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Calculate Cost Adjustment Factors by APR-DRG and CCS Using Selected States with Detailed Charges

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Executive Summary

Background

The Agency for Healthcare Research and Quality (AHRQ) creates hospital-wide cost-to-charge ratios (CCR) for each hospital in Healthcare Cost and Utilization Project (HCUP) using accounting data from the Centers for Medicare and Medicaid Services (CMS) and information from the American Hospital Association (AHA) each year. A known systematic bias of the hospital-wide CCR is that it does not account for the difference in markup between ancillary services and routine bed unit services. Past studies have used data from 2001, 2002, and 2003 to construct refined cost estimates using department-specific CCRs at each hospital with acceptable cost reports. This study of 2006 data extended previous methodologies to develop cost estimates and “adjustment factors” for each All Patient Refined Diagnosis Related Group (APR-DRG) and for each Clinical Classification Software (CCS) category.

Methods

The data sources for this study were the State Inpatient Databases (SID) 2006, CMS cost data 2006, and Crosswalk data for 2006. Ten states were included in the analysis. These states had detailed charges or revenue codes, their charges could be clustered into groups of CMS cost centers, and for the great majority of hospitals and cases, the sum of detailed charges was reasonably close to the reported total charges.

In each state, seven cost centers were created and CCRs were calculated for each cost center: routine bed units, specialty care units, nursery units, labor and delivery services, laboratory services, radiology services, and other ancillary services. For each APR-DRG and each CCS, we calculated costs using cost-center specific CCR and costs using a hospital-wide CCR. The relative cost of each APR-DRG (or CCS) was calculated as mean cost per case in that APR-DRG (or CCS) divided by mean cost across all APR-DRGs (or CCSs). The adjustment factor for calculating the final CCR was the ratio of relative cost based on cost-center specific CCR to the relative cost based on hospital-wide CCR.

Results

The adjustment factor by APR-DRG ranged between 0.80 (302: Knee joint replacement) and 1.41 (755: Adjustment disorder excluding depressive diagnosis), with a mean of 1.02 and a standard deviation of 0.11. Less than one-third of APR-DRGs had an adjustment factor less than 0.90 or greater than 1.10. Most categories needing an upward adjustment of CCR were in labor and delivery, newborns, nervous system, cardiovascular accident, depression/bipolar disorder, drug and alcohol abuse. Categories needing a downward adjustment included surgical services such as cardiovascular procedures and hip or knee replacement.

The adjustment factor by CCS ranged between 0.80 (203: Osteoarthritis) and 1.40 (71: Other psychoses), with a mean of 1.02 and a standard deviation of 0.10. About one-quarter of CCS categories had an adjustment factor below 0.90 or above 1.10. Most of the categories needing an upward adjustment involved mental conditions or behavioral

disorders, maternity, or newborns, while most of the downward adjustments were in CCS with a lot of ancillary and surgical services.

Conclusion

Cost estimates can be improved using adjustment factors derived from data on cost-center specific CCR and hospital-wide CCR from states and hospitals supplying detailed charges.

Background

Each year the Agency for Healthcare Research and Quality (AHRQ) creates hospital-wide cost-to-charge ratios (CCR) for each hospital in Healthcare Cost and Utilization Project (HCUP) using accounting data from the Centers for Medicare and Medicaid Services (CMS) and the American Hospital Association (AHA). However, charges are marked up from cost at different rates in different departments of a hospital. A known systematic bias of the hospital-wide CCR is that it does not account for the difference in markup between ancillary services and routine bed unit services. In general, services with a high labor component tend to get marked up less than services with a relatively low labor content. Hence, for example, patients using primarily routine bed unit services tend to have a low mark up from cost to charges, while surgical patients tend to have a higher markup.

This is the third in a series of projects to construct refined cost estimates using department-specific (i.e., cost-center specific) CCRs at each hospital with acceptable cost reports. Previous studies were for 2001, 2002 and 2003 data. In this study, Thomson Reuters extended previous methodologies to develop cost estimates and “adjustment factors” by the All Patient Refined Diagnosis Related Group (APR-DRG) and by the Clinical Classification Software (CCS) for ten states with detailed charges present in the 2006 State Inpatient Databases (SID). These adjustment factors allow an analyst to correct cost estimates based on hospital-wide CCRs. Such adjustments will increase the estimated costs for patients in some APR-DRGs and CCS and reduce the estimated costs for patients in other APR-DRGs and CCS categories.

Methods

Data Sources

The data sources for this study were the SID 2006, CMS cost data 2006, and Crosswalk data 2006. The SID was merged with Crosswalk by DSHOSPID to obtain IDNUMBER, which was then used to merge the SID with CMS cost data.

Selection of States with Detailed Charges

To develop adjustment factors, detailed charge and revenue data are needed. We first identified states that provided detailed charges or revenue codes in the SID, and then selected states in which we could confidently cluster charges into groups of CMS cost centers. The principle of the selection was to include as many states as possible that had detailed charge data. There were 19 states with detailed charge data in 2006: Arizona, Connecticut, Florida, Georgia, Iowa, Kentucky, Maine, Maryland, Massachusetts, Nebraska, Nevada, New Jersey, North Carolina, New York, South Carolina, South Dakota, Tennessee, West Virginia, and Virginia.

In each state, we calculated the difference between the sum of detailed charges and TOTCHG for every case and applied the following exclusion criteria:

- A case was considered "invalid" if the absolute value of (sum of detailed charges - TOTCHG) was greater than 200
- A hospital was considered "unreliable" if 5% or more of its cases were invalid
- A state was considered "unusable" if 10% or more of its hospitals were unreliable.

Nine states were considered "unusable" and thus were excluded from the study, leaving the following 10 states in our sample: Connecticut, Florida, Maryland, Massachusetts, Nebraska, New Jersey, North Carolina, Tennessee, West Virginia, and Virginia.

Detailed revenue codes were available in Maryland, Massachusetts, Nebraska, North Carolina, Tennessee, West Virginia, and Virginia using UB-92 definitions as defined by the National Uniform Billing Committee. Detailed charges data were available in Connecticut, Florida, and New Jersey using their own bucketing of charges.

Creation of Cost Centers

Through a previous study, AHRQ found that variations are most common between four types of frequently used cost centers: routine bed units, specialty care units (e.g. intensive care units), labor and delivery service, and other ancillary services. The same study further determined that variations are most dependent upon routine care. Specifically, the study revealed that DRGs with high proportions of routine bed unit charges are typically assigned CCRs that underestimate the true cost.

For all states we were able to cluster charges into seven cost centers: routine bed units, specialty care units, nursery units, labor and delivery services, laboratory services, radiology services, and other ancillary services. Table 1 lists the rules that we applied to create the clusters:

Table 1: Creation of clusters in selected states

MA, MD, NC, NE, TN, VA, WV (based on revenue codes)	
Room and board	110 <= revcd <= 219
Special	19x, 20x, 21x
Nursery	17x
Routine	room and board – specialty and nursery
Labor and delivery	72x
Laboratory	30x – 31x
Radiology	32x - 35x, 40x, 61x
Ancillary	totchg - room and board - labor and delivery – laboratory – radiology
CT (based on charges)	

Room and board	Chg1
Special	Chg3
Nursery	Chg2
Routine	Chg1 – chg2 – chg3
Labor and delivery	Chg15
Laboratory	Chg6
Radiology	Chg7 + chg8
Ancillary	totchg - room and board - labor and delivery – laboratory – radiology
FL (based on charges)	
Room and Board	Chg1 + chg2 + chg3 + chg4 + chg5
Special	Chg4 + chg5
Nursery	chg2 + chg3
Routine	chg1
Labor and delivery	chg19
Laboratory	chg9
Radiology	chg10
Ancillary	totchg – special – nursery - routine – labor and delivery – laboratory – radiology
NJ (based on charges)	
Room and board	chg1 + chg2 + chg3 + chg4 + chg5 + chg6 + chg7 + chg8 + chg9
Special	chg5 + chg6 + chg7
Nursery	chg8 + chg9
Routine	chg1 + chg2 + chg3 + chg4
Labor and delivery	chg15
Laboratory	Chg19
Radiology	Chg28
Ancillary	totchg – room and board – labor and delivery – laboratory - radiology

Using the clean CMS data, we constructed a CCR for each cluster of cost centers in addition to the hospital-wide CCR. Table 2 reports cost-center specific CCR:

	routine	Special	nursery	labor & delivery	Laboratory	radiology	ancillary
N	1883	1883	1883	1883	1883	1883	1883
Mean	0.780	0.702	0.710	0.643	0.463	0.712	0.284
Median	0.750	0.650	0.640	0.561	0.357	0.587	0.270
Mode	0.184	0.198	0.129	0.222	0.123	0.162	0.120
STD	0.347	0.334	0.393	0.363	0.341	0.432	0.116

Mean CCR was the highest for routine bed units (0.780), and the lowest in ancillary services (0.284). The next lowest CCR was in laboratory services (0.463). There could be some ancillary departments with extremely high or low CCRs, but we could not separate them out in all state reporting systems.

Development of relative cost and adjustment factor by APR-DRG

Some of the ten states that we selected were not large enough to contribute strongly to the estimates of relative cost of each APR-DRG. Not only did some smaller states not have many cases, but the less frequent APR-DRGs were spread around thinly so many hospital-APRDRG combinations could not be used in the estimate of relative cost by APR-DRG. Therefore, we enforced a minimum number of cases to protect against coding errors, biases, or unusual selection of patients in smaller hospitals.

Based on the distribution of hospital-APRDRG counts in each state, we decided to set the minimum threshold of hospital-APRDRG combination at five. Although the number five was arbitrary, we later estimated weighted averages combining all cases in ten states, thus sparsely populated or thinly distributed APR-DRGs did not matter much at all. There were 272 APR-DRGs that met the minimum threshold and were available in all ten states in 2006. Twenty-four APR-DRGs were dropped either because they had low counts or because they were not available in at least one state. We grouped the dropped APR-DRGs into one category, so an adjustment factor could also be produced for them.

In each state, we calculated two sets of cost for each APR-DRG: first using cost-center specific CCR and then using hospital-wide CCR. The relative cost of APR-DRG d was calculated as mean cost per case of APR-DRG d divided by mean cost across all APR-DRGs.

We examined the relative cost of each APR-DRG across ten states, and found them reasonably consistent. Thus we combined the ten states and created one set of relative costs. For APR-DRG d , the weighted mean cost per case was calculated as the mean cost per case in each state weighted by the number of cases in that state. This is equivalent to total costs divided by total number of cases across all ten states. Again, the relative cost for APR-DRG d in all ten states combined was the mean cost per case for DRG d divided by mean cost per case across all APR-DRGs. If we call relative costs based on cost-center specific CCR $RC-CC$, and relative costs based on hospital-wide CCR $RC-HW$, the adjustment factor is the ratio of $RC-CC$ to $RC-HW$.

Development of relative cost and adjustment factor by CCS

In addition to APR-DRG adjustment factors, we also developed CCS adjustment factors. There were 229 common CCS (DXCCS1) in the ten states and each of these CCS passed the minimum threshold of five per hospital-CCS combination. Eighty-seven CCSs were dropped either because they had low counts or because they were not available in at least one state. We grouped the dropped CCSs into one category, so an adjustment factor could also be produced for them.

The base of the CCS relative cost was the mean cost per case across all CCSs. Relative cost for CCS c was the mean cost per case for CCS c divided by the mean cost per case across all CCSs. Again, two sets of relative costs were calculated for each CCS: one based on cost-center specific CCR ($RC-CC$) and the other based on

hospital-wide CCR (*RC-HW*). We first calculated relative costs for each state separately. After a careful examination, we found them reasonably consistent. Thus we pooled ten states and computed relative cost using the combined data. The ratio of *RC-CC* to *RC-HW* is the CCS adjustment factor.

Findings

Relative costs and adjustment factors by APR-DRG

The range of relative costs at the state level is presented in Table 3.

Table 3: Relative costs based on cluster-specific CCR at APR-DRG level

	CT	FL	MA	MD	NC	NE	NJ	TN	VA	WV
min	0.16	0.11	0.13	0.14	0.11	0.10	0.19	0.14	0.12	0.12
max	18.76	14.59	13.47	16.97	11.80	11.03	13.09	12.47	14.18	12.64
mean	1.37	1.42	1.37	1.46	1.41	1.42	1.46	1.35	1.44	1.40
std dev	1.55	1.42	1.28	1.63	1.28	1.22	1.36	1.26	1.44	1.38

Of all ten states combined, the *RC-CC* was between 0.13 and 14.08 and the *RC-HW* was between 0.11 and 14.08. In both sets of relative costs, the minimum relative cost was in APR-DRG=640 (Neonate birth weight >2499g norm NB/oth prob), and the maximum relative cost was in APR-DRG=4 (ECMO or trach w MV w extn proc). The adjustment factor, *RC-CC/RC-HW*, ranged between 0.80 (302: Knee joint replacement) and 1.41 (755: Adjustment disorder excluding depressive diagnosis), with a mean of 1.02 and a standard deviation of 0.11.

Less than one-third of APR-DRGs had an adjustment factor less than 0.90 or greater than 1.10: 31 APR-DRGs had an adjustment factor below 0.90 and 52 (including one with the catch-all category) above 1.10. Most categories needing an upward adjustment of CCR were in labor and delivery, newborns, nervous system, cardiovascular accident, depression/bipolar disorder, drug and alcohol abuse. Categories needing a downward adjustment included surgical services such as cardiovascular procedures and hip or knee replacement.

Relative costs and adjustment factors by CCS

The range of relative costs at the state level is presented in Table 4.

Table 4: Relative costs based on cluster-specific CCR at CCS level

	CT	FL	MA	MD	NC	NE	NJ	TN	VA	WV
min	0.17	0.21	0.20	0.22	0.21	0.20	0.18	0.27	0.18	0.19
max	4.08	5.45	5.25	5.58	4.56	4.03	5.05	5.56	4.58	5.26
mean	1.07	1.17	1.16	1.24	1.17	1.20	1.18	1.15	1.17	1.13
Std dev	0.51	0.69	0.68	0.78	0.63	0.68	0.71	0.69	0.64	0.72

Of all ten states combined, the *RC-CC* was between 0.20 and 4.98 and the *RC-HW* was between 0.17 and 5.02. In both sets of relative costs, the minimum relative

cost was in DXCCS1=222 (Hemolytic jaundice and perinatal jaundice) and the maximum relative cost was in DXCCS1=227 (Spinal cord injury). The adjustment factor ranged between 0.80 (203: Osteoarthritis) and 1.40 (71: Other psychoses), with a mean of 1.02 and a standard deviation of 0.10.

About one-quarter of CCS categories had an adjustment factor below 0.90 or above 1.10: 21 categories below 0.90 and 34 above 1.10. Most of the categories needing an upward adjustment involved mental conditions or behavioral disorders, maternity, or newborns, while most of the downward adjustments were in CCS with a lot of ancillary and surgical services. The detailed statistics on adjustment factors are reported in Appendix B

Discussion

These adjustment factors can be used to calculate a refined cost estimate (RCE) for each patient J in hospital H . For each valid case type (APR-DRG or CCS), the adjustment factor (AF) can be multiplied by the hospital-wide CCR and total charges for each case. The formula is:

$$RCE (\text{case } J \text{ in hospital } H) = AF (\text{applicable to } J) * CCR (H) * Total \text{ Charges } (J),$$

where CCR is the cost-to-charge ratio that is computed for each hospital in HCUP as in the past.

There are two limitations in this study. First, we did not exclude professional fees from any of our analyses although states might be inconsistent of how professional fees might be billed. Secondly, only ten states were included in this study as we excluded nine states deemed to be unusable with at least 10% of hospitals unreliable. The far west and southwest were not represented in the final selected states. The generalizability of adjustment factors to all states will need to be examined when detailed charges are available in more states. Despite these limitations, this analysis provides an improvement in the existing CCR for estimating accurate costs, especially in the 10 states with acceptable cost report data.

Generalizability of the resulting adjustment factors to other states is of unknown quality, especially to the far west and southwest states. Past tests with adjustment factors for Diagnosis Related Groups (DRGs) in 2003 showed generalizability to be quite good from an original seven states to seven new states. The current methodology is strengthened in several respects – more weeding out of unreliable data and use of more clusters of departments with different CCRs.

Appendix A: Summary of adjustment factors in each state and all states combined, by APR-DRG

Appendix B: Summary of adjustment factors in each state and all states combined,
by CCS

APPENDIX A: Summary of adjustment factors in each state and all states combined

(State detail is reported here only for states that permit CCR release by hospital in statewide file)

Adjustment Factors to multiply by hospital-wide CCR

APR-DRG category	10 states	FL	MA	MD	NC	NJ	WV
	combined						
3: Bone marrow transplant	0.99	1.01	0.94	1.02	0.96	1.08	0.95
4: ECMO or trach w MV w extn proc	1.00	0.97	0.98	1.17	0.93	1.02	0.93
5: Trach w MV wo exten proc	0.99	0.99	1.03	0.97	0.95	1.02	0.94
20: Craniotomy for trauma	0.99	0.98	1.00	1.21	0.95	1.01	0.96
21: Craniotomy exc for trauma	0.96	0.95	0.94	1.04	0.97	1.03	0.93
22: Ventricular shunt proc	0.97	0.95	0.95	0.98	0.96	1.05	0.96
23: Spinal procedures	0.94	0.92	0.91	1.04	0.89	1.01	0.90
24: Extracranial vascular proc	0.91	0.89	0.89	1.02	0.88	1.05	0.90
26: Oth nervous syst & relat proc	0.92	0.91	0.88	0.99	0.91	0.99	0.92
40: Spinal disorders & injuries	1.14	1.10	1.13	1.30	1.17	1.10	1.21
41: Nervous system malignancy	1.15	1.13	1.16	1.11	1.21	1.04	1.17
42: Degeneratv nerv sys dis exc MS	1.23	1.23	1.30	0.99	1.29	0.92	1.26
43: Mult sclerosis/oth demyelin dx	1.08	1.05	1.09	1.05	1.14	1.03	1.15
44: Intracranial hemorrhage	1.09	1.10	1.11	1.05	1.10	1.07	1.09
45: CVA w infarct	1.11	1.11	1.13	1.06	1.14	1.06	1.13
46: Nonspec CVA & precereb occl	1.12	1.09	1.14	1.10	1.14	1.10	1.18
47: Transient ischemia	1.11	1.09	1.12	1.08	1.16	1.08	1.15
48: Periph, cranial, auton nerv dx	1.09	1.10	1.13	1.05	1.12	0.98	1.15
49: Bact & tuberculous nerv infect	1.02	1.03	1.03	1.02	0.99	1.01	1.03
50: Non-bact nerv infect exc VM	1.08	1.08	1.14	1.04	1.07	1.03	1.11
51: Viral meningitis	1.08	1.07	1.13	1.02	1.08	1.00	1.11
52: Nontrauma stupor & coma	1.09	1.10	1.13	1.02	1.12	1.00	1.10
53: Seizure	1.06	1.08	1.08	1.03	1.09	1.01	1.09
54: Migraine & other headache	1.14	1.09	1.12	1.14	1.21	1.09	1.18
55: Head trauma w coma >1 hr/hemor	1.10	1.09	1.12	1.21	1.10	1.08	1.12
56: Brain contusion/laceration	1.09	1.09	1.11	1.07	1.11	1.04	1.15
57: Concussion/closed skull fract	1.12	1.04	1.06	1.45	1.12	1.10	1.19
58: Oth disorders nervous sys	1.13	1.11	1.14	1.09	1.19	1.06	1.17
70: Orbital procedures	0.94	0.91	0.90	1.04	0.97	1.01	0.95
73: Eye procedures except orbit	0.94	0.96	0.87	0.89	0.96	1.00	0.97
80: Acute major eye infections	1.11	1.18	1.15	0.97	1.17	0.98	1.22
82: Eye disorders exc major infect	1.16	1.12	1.14	1.19	1.34	1.17	1.18
89: Maj cranial/facial bone proc	0.90	0.86	0.82	1.11	0.88	0.98	0.85
90: Maj larynx & trachea proc	0.95	0.95	0.93	1.02	0.95	0.95	0.92
91: Oth maj head & neck proc	0.91	0.86	0.84	1.13	0.86	1.00	0.89
92: Facial bone proc exc major	0.92	0.86	0.83	1.25	0.88	1.02	0.90
93: Sinus & mastoid proc	0.92	0.89	0.88	1.06	0.89	0.98	0.93
95: Cleft lip & palate repair	0.89	0.87	0.83	0.95	0.82	1.00	0.88
97: Tonsil & adenoid proc	0.97	0.96	1.01	1.04	0.95	0.97	1.01
98: Oth ear,nose,mouth,throat proc	0.94	0.92	0.86	1.03	0.95	0.99	0.94
110: Ear, nose, mouth, throat malig	1.05	1.04	1.08	1.05	1.10	0.98	1.08
111: Vertigo & other labyrinth dx	1.12	1.08	1.13	1.08	1.20	1.07	1.17
113: Infections of up resp tract	1.08	1.11	1.12	1.02	1.12	0.97	1.13
114: Dental & oral disease & injury	1.05	1.03	1.07	1.11	1.06	0.98	1.14
115: Oth ear,nose,mth,thrt,cran dx	1.06	1.07	1.08	1.08	1.08	0.98	1.11

APPENDIX A: Summary of adjustment factors in each state and all states combined

(State detail is reported here only for states that permit CCR release by hospital in statewide file)

Adjustment Factors to multiply by hospital-wide CCR

APR-DRG category	10 states combined	FL	MA	MD	NC	NJ	WV
120: Maj respiratory & chest proc	0.96	0.98	0.95	0.99	0.94	0.96	0.95
121: Oth respiratory & chest proc	0.98	0.99	0.97	1.00	0.96	1.00	0.96
130: Respiratory dx w MV 96+ hrs	0.99	1.01	1.06	0.97	0.96	0.99	0.95
131: Cystic fibrosis-pulm dx	0.98	0.97	1.06	0.91	0.97	1.05	0.98
132: BPD & oth chronic resp dis	1.03	1.10	0.84	0.96	1.00	1.03	1.08
133: Pulmonary edema & resp fail	1.01	1.05	1.06	0.95	0.99	0.97	1.03
134: Pulmonary embolism	1.08	1.11	1.10	1.02	1.08	0.99	1.08
135: Major chest & resp trauma	1.11	1.07	1.13	1.23	1.14	1.07	1.17
136: Respiratory malignancy	1.08	1.07	1.12	1.03	1.12	1.00	1.10
137: Major respiratory infections	1.05	1.09	1.11	0.99	1.05	0.94	1.07
138: Bronchiolitis & RSV pneum	1.10	1.17	1.13	0.95	1.17	0.92	1.13
139: Other pneumonia	1.05	1.07	1.09	0.99	1.06	0.95	1.10
140: Chronic obstructive pulm dis	1.03	1.08	1.07	0.97	1.04	0.94	1.07
141: Asthma	1.02	1.07	1.04	0.96	1.04	0.92	1.06
142: Interstitial lung disease	1.06	1.08	1.10	1.02	1.07	0.97	1.09
143: Oth resp dx exc sign/sym/minor	1.08	1.10	1.11	1.03	1.08	1.00	1.12
144: Resp signs/symptoms/minor dx	1.06	1.05	1.09	1.04	1.08	0.99	1.08
161: Card defib/heart asst implant	0.82	0.77	0.74	0.97	0.76	1.11	0.80
162: Cardiac valve proc w/cath	0.89	0.89	0.89	1.00	0.85	0.99	0.88
163: Cardiac valve proc wo cath	0.88	0.87	0.87	1.04	0.83	1.00	0.86
165: Coronary bypass w cath/percut	0.89	0.88	0.89	1.00	0.84	0.98	0.88
166: Coronary bypass wo cath/percut	0.89	0.89	0.89	1.09	0.85	0.97	0.87
167: Other cardiothoracic proc	0.91	0.88	0.90	1.12	0.87	1.00	0.90
169: Maj thorac&abdom vascular proc	0.92	0.92	0.92	1.05	0.89	0.99	0.88
170: Perm card pacemak w AMI/HF/Shk	0.89	0.88	0.86	0.91	0.83	1.03	0.89
171: Perm card pacemk wo AMI/HF/Shk	0.87	0.85	0.80	0.92	0.82	1.02	0.85
173: Other vascular procedures	0.92	0.90	0.89	1.02	0.88	1.05	0.89
174: Percut cardiovasc proc w/AMI	0.84	0.83	0.80	0.96	0.79	1.04	0.84
175: Percut cardiovasc wo AMI	0.82	0.78	0.74	0.95	0.78	1.08	0.81
176: Card pacemak & defib repl	0.81	0.78	0.74	0.90	0.79	1.03	0.83
177: Card pacemak & defib revis	0.91	0.92	0.85	0.99	0.87	0.95	0.90
180: Other circulatory system proc	0.98	1.00	1.00	1.01	0.97	0.94	0.97
190: Acute myocardial infarct	0.99	1.02	1.03	0.99	0.94	0.99	0.99
191: Card cathet exc ischemia	0.96	0.97	0.95	1.09	0.93	0.96	0.96
192: Card cathet w/ischemia	0.90	0.90	0.87	1.03	0.88	0.99	0.91
193: Acute & subacute endocarditis	1.04	1.06	1.11	1.02	1.04	0.96	1.06
194: Heart failure	1.05	1.10	1.10	0.99	1.04	0.95	1.09
196: Cardiac arrest	0.98	0.98	1.08	1.02	0.98	0.93	0.95
197: Peripheral & oth vasc dis	1.07	1.11	1.09	1.02	1.10	0.96	1.11
198: Angina pect & coronary ath	1.04	1.04	1.06	1.04	1.05	0.98	1.06
199: Hypertension	1.09	1.09	1.12	1.05	1.12	1.04	1.14
200: Card struct & valve dis	1.04	1.07	1.09	1.07	1.05	0.92	0.96
201: Card arrhythmia & conductn dis	1.04	1.09	1.08	1.00	1.03	0.97	1.06
203: Chest pain	1.04	1.00	1.05	1.09	1.06	1.01	1.07
204: Syncope & collapse	1.08	1.08	1.09	1.04	1.13	1.04	1.10

APPENDIX A: Summary of adjustment factors in each state and all states combined

(State detail is reported here only for states that permit CCR release by hospital in statewide file)

Adjustment Factors to multiply by hospital-wide CCR

APR-DRG category	10 states						
	combined	FL	MA	MD	NC	NJ	WV
205: Cardiomyopathy	1.08	1.11	1.12	1.13	1.06	0.99	1.06
206: Comp cardiac/vasc dev or proc	1.02	1.03	1.05	1.02	1.01	0.95	1.02
207: Oth circulatory system dx	1.06	1.07	1.09	1.04	1.07	0.97	1.07
220: Maj stom, esoph, duod proc	0.96	0.97	0.96	1.00	0.94	0.96	0.94
221: Maj small & large bowel proc	0.95	0.96	0.96	0.96	0.93	0.96	0.93
222: Oth stom, esoph, duod proc	0.91	0.94	0.85	0.99	0.87	0.98	0.91
223: Oth small & large bowel proc	0.96	0.96	0.95	1.00	0.95	0.96	0.95
224: Peritoneal adhesiolysis	0.99	1.00	1.02	0.96	1.00	0.99	1.02
225: Appendectomy	0.94	0.90	0.89	0.95	0.92	1.08	0.93
226: Anal procedures	0.95	0.95	0.98	0.97	0.94	0.98	0.98
227: Hernia proc exc inguin/fem/umb	0.91	0.91	0.87	0.99	0.88	0.99	0.87
228: Ing, fem & umbil hernia proc	0.93	0.91	0.90	0.96	0.92	0.99	0.92
229: Oth digest sys & abdom proc	0.98	0.97	0.98	1.03	0.98	1.00	0.97
240: Digestive malignancy	1.06	1.05	1.09	1.03	1.12	1.00	1.08
241: Peptic ulcer & gastritis	1.02	1.03	1.05	0.99	1.02	1.02	1.05
242: Major esophageal disorder	1.02	1.04	1.04	0.97	1.00	0.99	1.02
243: Other esophageal disorder	1.04	1.04	1.05	1.04	1.05	0.99	1.05
244: Diverticulitis&diverticulosis	1.09	1.09	1.14	1.00	1.12	1.03	1.15
245: Inflammatory bowel disease	1.07	1.06	1.14	1.01	1.10	1.01	1.12
246: GI vascular insufficiency	1.08	1.06	1.13	1.04	1.10	1.02	1.11
247: Intestinal obstruction	1.12	1.12	1.18	1.02	1.18	1.02	1.17
248: Major GI & peritoneal infectn	1.08	1.10	1.16	1.01	1.13	0.96	1.11
249: Non-bacterial gastroenteritis	1.09	1.09	1.13	1.01	1.15	0.99	1.14
251: Abdominal pain	1.12	1.08	1.15	1.07	1.18	1.09	1.17
252: Malfunc,react GI device/proc	1.07	1.07	1.12	1.01	1.09	0.98	1.09
253: Oth/unspec GI hemorrhage	1.02	1.04	1.05	0.98	1.03	0.99	1.04
254: Oth digestive system dx	1.06	1.06	1.09	1.02	1.09	1.01	1.09
260: Maj pancreas/liver/shunt proc	0.96	0.94	0.94	1.01	0.95	0.99	0.92
261: Major biliary tract proc	0.98	0.97	0.98	1.01	0.98	0.97	0.97
262: Cholecystectomy exc lap	0.95	0.96	0.95	0.97	0.94	1.00	0.94
263: Lap cholecystectomy	0.92	0.91	0.89	0.96	0.91	1.02	0.92
264: Oth hepatob/pancreas/abdm proc	0.99	0.97	0.98	1.11	1.00	1.02	0.98
279: Hepatic coma/oth maj liv dis	1.06	1.04	1.09	1.03	1.10	0.98	1.08
280: Alcoholic liver disease	1.05	1.04	1.08	1.02	1.06	1.01	1.06
281: Maligncy-hepatobil & pancreas	1.08	1.06	1.10	1.08	1.13	1.02	1.09
282: Pancreas disord exc malig	1.09	1.06	1.16	1.04	1.12	1.03	1.12
283: Other disorders of liver	1.06	1.05	1.09	1.05	1.10	0.98	1.10
284: Dis gallbladder & biliary tract	1.06	1.03	1.06	1.07	1.08	1.06	1.07
301: Hip joint replacement	0.84	0.83	0.80	0.92	0.81	0.99	0.83
302: Knee joint replacement	0.80	0.79	0.75	0.89	0.77	0.99	0.76
303: Dors/lumb fusion for curv back	0.82	0.77	0.79	0.89	0.80	1.09	0.78
304: Dors/lumb fusion exc curv back	0.80	0.78	0.78	0.91	0.77	1.01	0.78
305: Amputation lower limb exc toe	0.98	1.00	1.00	1.07	0.98	0.92	0.98
308: Hip/fem proc exc jt repl-traum	0.94	0.92	0.92	1.05	0.92	0.99	0.94
309: Hip/fem proc exc jt repl-nontr	0.92	0.90	0.91	0.97	0.90	0.99	0.93

APPENDIX A: Summary of adjustment factors in each state and all states combined

(State detail is reported here only for states that permit CCR release by hospital in statewide file)

Adjustment Factors to multiply by hospital-wide CCR

APR-DRG category	10 states combined	FL	MA	MD	NC	NJ	WV
310: Intervertebral disc excision	0.88	0.86	0.83	0.94	0.87	1.00	0.83
312: Skin grft exc hand-msckl/conn	1.00	0.97	0.96	1.36	0.96	0.94	0.95
313: Knee & lower leg proc exc foot	0.91	0.88	0.87	1.06	0.89	1.00	0.90
314: Foot & toe procedures	0.97	0.97	0.98	1.03	0.97	0.94	1.01
315: Shoulder, up arm, forearm proc	0.86	0.84	0.82	1.02	0.83	1.01	0.88
316: Hand & wrist procedures	0.91	0.90	0.85	1.09	0.90	0.97	0.98
317: Tendon/muscle/soft tiss proc	0.96	0.95	0.92	1.20	0.94	0.94	0.97
320: Oth musculoskeletal proc	0.93	0.91	0.91	1.02	0.92	0.95	0.94
321: Cerv spinal fus/oth back&nk pr	0.81	0.79	0.77	0.94	0.78	1.02	0.79
340: Fracture of femur	1.08	1.12	1.15	1.01	1.13	0.98	1.15
341: Fx pelvis/hip dislocation	1.15	1.16	1.16	1.12	1.25	1.00	1.21
342: Fx&dislocat exc fem/pelv/back	1.10	1.07	1.12	1.14	1.16	1.01	1.17
343: Musculoskel malign & pathol fx	1.13	1.12	1.19	1.09	1.22	1.02	1.21
344: Bone/joint/oth muscskel infect	1.07	1.11	1.12	1.04	1.08	0.96	1.10
346: Connective tissue disorder	1.05	1.05	1.08	1.02	1.07	0.98	1.11
347: Back & neck dis, fract & inj	1.14	1.14	1.16	1.12	1.21	1.02	1.21
349: Malf/react/comp orth dev/proc	1.03	1.06	1.07	1.00	1.05	0.94	1.11
351: Oth musculoskl & conn tiss dx	1.08	1.08	1.15	1.04	1.16	0.98	1.15
361: Skin graft-skin & subcu dx	0.95	0.96	0.93	0.97	0.97	0.92	0.99
362: Mastectomy procedures	0.84	0.81	0.77	0.93	0.82	0.99	0.83
363: Breast proc exc mastectomy	0.88	0.83	0.78	0.95	0.89	1.01	0.88
364: Other skin & subcut proc	0.96	0.97	0.90	1.04	0.97	0.95	0.97
380: Skin ulcers	1.05	1.11	1.12	0.97	1.07	0.90	1.07
381: Major skin disorders	1.05	1.08	1.09	0.99	1.08	0.95	1.03
382: Malignant breast disorders	1.09	1.08	1.16	1.05	1.16	0.97	1.09
383: Cellulitis & oth bact skin inf	1.05	1.10	1.13	0.98	1.08	0.91	1.12
384: Contusion/open wnd skin/oth tr	1.10	1.04	1.11	1.37	1.10	1.03	1.15
385: Oth skin/subcut/breast dis	1.06	1.09	1.11	1.00	1.09	0.94	1.08
401: Pituitary & adrenal proc	0.93	0.92	0.85	1.05	0.93	1.04	0.90
403: Procedures for obesity	0.83	0.81	0.74	0.94	0.77	1.03	0.81
404: Thyroid/parathyrd/thyrogl proc	0.86	0.84	0.78	0.92	0.85	0.99	0.85
405: Oth proc-endocr/nutrit/met dx	0.98	1.00	1.01	0.96	0.96	1.04	0.94
420: Diabetes	1.06	1.08	1.13	0.97	1.08	0.97	1.06
421: Malnut,fail thrive,oth nutr dx	1.12	1.20	1.17	0.99	1.18	0.94	1.19
422: Hypovolem/relat electrolyte dx	1.08	1.11	1.14	1.01	1.15	0.96	1.14
424: Oth endocrine disorders	1.10	1.14	1.17	1.02	1.13	0.98	1.11
425: Electrolyte dis exc hypovol	1.07	1.10	1.13	0.99	1.10	0.95	1.10
440: Kidney transplant	0.90	0.82	0.78	1.06	0.83	1.16	0.82
441: Major bladder proc	0.93	0.93	0.90	0.94	0.92	0.95	0.90
442: Kidney/urinary trct proc-malig	0.91	0.91	0.89	0.96	0.90	1.00	0.94
443: Kidney/urin trct proc-nonmalig	0.94	0.92	0.92	1.06	0.91	1.03	0.93
444: Renal dialy acc dev proc only	0.94	0.95	0.90	0.95	0.93	0.95	0.91
445: Other bladder proc	0.89	0.89	0.84	0.90	0.88	0.97	0.93
446: Urethral & transureth proc	0.95	0.93	0.94	0.97	0.92	1.04	0.94
447: Oth kid/urin tract & rel proc	0.95	0.93	0.95	1.05	0.92	1.03	0.92

APPENDIX A: Summary of adjustment factors in each state and all states combined

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Adjustment Factors to multiply by hospital-wide CCR

APR-DRG category	10 states	FL	MA	MD	NC	NJ	WV
	combined						
460: Renal failure	1.05	1.08	1.12	1.00	1.07	0.96	1.08
461: Kidney/urinary tract malig	1.08	1.07	1.15	1.03	1.14	0.98	1.09
462: Nephritis & nephrosis	1.08	1.10	1.10	1.04	1.11	0.98	1.14
463: Kidney/urin tract infect	1.09	1.12	1.15	1.00	1.14	0.95	1.14
465: Urin stones&acq up urin obstr	1.03	0.99	1.02	1.01	1.02	1.13	1.06
466: Malf/reac/comp GU device/proc	1.01	1.02	1.03	1.03	1.01	0.95	1.05
468: Oth kidney/urinary tract dx	1.06	1.07	1.09	1.02	1.08	1.00	1.10
480: Major male pelvic proc	0.83	0.81	0.77	0.90	0.81	1.05	0.86
481: Penis procedures	0.88	0.84	0.81	0.97	0.84	0.97	0.87
482: Transurethral prostatectomy	0.89	0.89	0.85	0.93	0.86	0.94	0.94
500: Malignancy, male reprod sys	1.07	1.05	1.14	1.02	1.14	0.95	1.02
501: Male reprod sys dx exc malig	1.06	1.07	1.10	1.04	1.08	0.96	1.11
510: Pelvic evisc/rad hysterectomy	0.91	0.88	0.90	0.93	0.93	0.99	0.92
511: Uter/adnex proc-ovar/ad mal	0.94	0.92	0.94	0.95	0.96	0.98	0.93
512: Uter/adnex proc-non-ov/ad mal	0.91	0.88	0.88	0.94	0.91	0.98	0.92
513: Uter/adnx proc-nonmal exc leio	0.85	0.85	0.80	0.92	0.83	0.98	0.84
514: Female reprod reconstruct proc	0.81	0.80	0.72	0.93	0.77	1.01	0.82
517: Dilation & curet for non-OB dx	0.96	0.93	0.95	0.99	0.95	1.00	0.90
518: Oth female repro sys&rel proc	0.96	0.91	0.94	0.99	0.96	0.99	0.98
519: Uterine/adnex proc-leiomyoma	0.86	0.85	0.79	0.91	0.83	0.97	0.85
530: Female repro syst malig	1.06	1.06	1.13	1.02	1.15	0.97	1.08
531: Female repro syst infection	1.08	1.07	1.15	1.05	1.13	0.98	1.15
532: Menstrual/oth female reprod dx	1.08	1.03	1.10	1.10	1.11	1.15	0.94
540: Cesarean delivery	1.08	1.13	1.13	0.94	1.03	1.03	1.21
541: Vaginal delivery w steril/D&C	1.04	1.09	1.02	0.94	1.01	1.18	1.13
542: Vag del w cmp proc ex ster/D&C	1.15	1.25	1.09	0.97	1.22	1.10	1.28
544: D&C, asp curet, hysterot-OB	0.95	0.90	0.96	1.01	0.93	1.04	0.98
545: Ectopic pregnancy proc	0.87	0.84	0.84	0.97	0.83	1.00	0.84
546: Oth O.R. proc-OB dx exc deliv	1.01	1.00	1.01	1.04	0.98	1.05	0.98
560: Vaginal delivery	1.20	1.36	1.13	0.93	1.25	1.11	1.40
561: Postpartum & post abortion dx	1.10	1.10	1.15	1.01	1.15	1.01	1.15
563: Threatened abortion	1.24	1.36	1.29	0.98	1.29	1.01	1.34
564: Abort wo D&C,asp curet,hystrot	1.12	1.15	1.10	0.97	1.13	1.18	1.61
565: False labor	1.16	1.40	1.18	0.97	1.20	1.02	1.30
566: Other antepartum diagnoses	1.17	1.24	1.25	1.03	1.24	0.97	1.26
581: Neo, trans <5d born here	1.05	1.00	0.90	1.01	1.18	1.15	1.05
626: Neo bw 2000-2499g NNB/oth prob	1.18	1.42	0.92	0.92	1.23	1.10	1.28
633: Neo bw >2499g w/maj anom	1.19	1.21	0.84	1.08	1.28	1.10	1.22
639: Neo bw >2499g oth sig cond	1.19	1.29	0.98	0.93	1.23	1.10	1.27
640: Neo bw >2499g norm NB/oth prob	1.17	1.36	0.95	0.90	1.28	1.09	1.25
650: Splenectomy	0.94	0.93	0.93	1.09	0.91	1.01	0.92
651: Other procedures of blood	0.97	0.96	0.94	1.00	1.01	1.01	0.94
660: Maj hematologic/immunol dx	0.99	0.99	1.00	0.98	0.99	1.00	1.00
661: Coagulation/platelet disorder	0.92	0.92	0.92	0.93	0.90	0.99	0.84
662: Sickle cell anemia crisis	1.05	1.11	1.11	0.96	1.09	0.89	1.12

APPENDIX A: Summary of adjustment factors in each state and all states combined

(State detail is reported here only for states that permit CCR release by hospital in statewide file)

Adjustment Factors to multiply by hospital-wide CCR

APR-DRG category	10 states combined	FL	MA	MD	NC	NJ	WV
663: Other anemia/blood disord	1.04	1.05	1.07	0.99	1.06	0.99	1.07
680: Maj proc lymph/hemat/oth neopl	0.96	0.95	0.94	0.99	0.97	1.00	0.92
681: Oth proc lymph/hemat/oth neopl	0.98	0.94	0.95	1.07	0.98	1.02	0.97
690: Acute leukemia	0.97	0.94	0.95	1.03	0.98	0.98	0.95
691: Lymph/myelo/non-ac leuk	1.03	1.00	1.06	1.05	1.06	1.00	1.05
692: Radiotherapy	1.11	1.05	1.21	1.40	1.19	0.99	1.05
693: Chemotherapy	0.97	0.91	0.94	0.99	0.91	1.02	0.97
694: Lymph & oth malig & neopl	1.05	1.04	1.08	1.02	1.09	0.98	1.05
710: Infect & parasitic dis w proc	0.98	0.99	1.02	0.99	0.95	0.97	0.95
711: Postop/traum/dev infect w proc	0.98	0.98	1.01	1.06	0.96	0.95	0.97
720: Septicemia & dissem infect	1.02	1.05	1.08	0.96	1.02	0.97	1.04
721: Post-op/post-traum/dev infect	1.06	1.08	1.13	1.00	1.07	0.95	1.10
722: Fever	1.10	1.11	1.13	1.04	1.13	1.02	1.12
723: Viral illness	1.08	1.08	1.12	1.04	1.14	0.99	1.12
724: Oth infect & parasitic dis	1.06	1.07	1.11	1.01	1.07	0.99	1.08
750: Schizophrenia	1.39	1.67	1.44	0.91	1.76	0.82	1.48
751: Major depressive disorder	1.40	1.61	1.41	0.91	1.77	0.83	1.44
753: Bipolar disorders	1.38	1.61	1.41	0.91	1.71	0.80	1.45
754: Depression exc maj depressv dx	1.32	1.56	1.39	0.88	1.68	0.84	1.39
755: Adjust dis exc depressive dx	1.41	1.56	1.41	0.89	1.67	0.76	1.43
756: Acute anxiety & delirium	1.21	1.17	1.43	1.00	1.26	0.98	1.18
757: Organic mental health dis	1.38	1.40	1.54	0.98	1.41	0.87	1.31
758: Childhood behavioral dis	1.30	1.62	1.39	0.85	1.51	0.71	1.57
760: Oth mental health disorder	1.36	1.61	1.37	0.93	1.54	0.97	1.40
770: Drug & alcohol abuse - LAMA	1.11	1.11	1.17	0.96	1.18	0.95	1.25
773: Opioid abuse & dependence	1.18	1.25	1.25	0.90	1.57	0.80	1.28
774: Cocaine abuse & dependence	1.34	1.46	1.27	0.95	1.52	0.85	1.31
775: Alcohol abuse & dependence	1.18	1.21	1.23	0.96	1.33	0.95	1.21
776: Other drug abuse & depend	1.23	1.32	1.27	0.99	1.35	0.95	1.21
791: O.R. proc oth comp treat	0.96	0.95	0.95	1.04	0.94	0.97	0.94
811: Allergic reactions	1.03	1.08	1.05	0.98	1.02	0.95	1.02
812: Poisoning medicinal agent	1.05	1.07	1.08	0.98	1.05	0.96	1.03
813: Oth comp of treatment	1.04	1.05	1.06	1.02	1.04	0.98	1.09
815: Oth inj/ poison/toxic dx	1.08	1.06	1.11	1.09	1.07	1.00	1.09
816: Toxic effects non-medc subst	1.00	0.98	1.06	1.05	0.99	0.99	0.95
842: Full thick burns w graft	0.97	1.00	1.00	0.98	0.89	1.05	0.89
843: Ext 3rd/full thck burn wo grft	0.97	0.94	1.01	0.98	1.01	1.03	0.94
844: Part thick burns w/wo graft	1.02	1.07	1.07	0.94	0.96	1.01	0.91
850: Proc w dx rehab,aftercare,oth	0.99	0.90	0.95	1.11	0.97	1.02	1.02
860: Rehabilitation	1.24	1.27	1.18	0.99	1.39	0.86	1.43
861: Signs/symptoms/oth factors	1.11	1.13	1.13	1.02	1.16	0.96	1.14
911: Ext abd/thorac proc for MST	0.98	0.91	0.95	1.60	0.91	1.01	0.93
912: Musckl/oth proc mult sig traum	0.98	0.92	0.95	1.71	0.94	1.04	0.95
930: Multiple sig trauma wo proc	1.06	1.02	1.10	1.38	1.06	1.05	1.10
950: Extensive proc unrel pdx	0.97	0.97	0.98	1.05	0.95	0.98	0.96

APPENDIX A: Summary of adjustment factors in each state and all states combined

(State detail is reported here only for states that permit CCR release by hospital in statewide file)

Adjustment Factors to multiply by hospital-wide CCR

APR-DRG category	10 states combined	FL	MA	MD	NC	NJ	WV
951: Mod extensive proc-unrel pdx	0.97	0.98	0.98	1.03	0.95	0.99	0.97
952: Nonextensive proc-unrel pdx	0.99	1.01	0.98	1.03	0.97	0.99	1.01
All other APRDRG	1.11	1.13	0.92	1.03	1.12	1.08	1.13
min	0.80	0.77	0.72	0.85	0.76	0.71	0.76
max	1.41	1.67	1.54	1.71	1.77	1.18	1.61
mean	1.02	1.03	1.03	1.02	1.04	1.00	1.04
standard deviation	0.11	0.15	0.14	0.10	0.17	0.06	0.15

APPENDIX B: Summary of adjustment factors in each state and all states combined
(State detail is reported here only for states that permit CCR release by hospital in statewide file)

Adjustment Factors to multiply by hospital-wide CCR

CCS diagnosis category	10 states combined	FL	MA	MD	NC	NJ	WV
2: Septicemia (except in labor)	1.01	1.03	1.06	0.97	1.00	0.97	1.02
3: Bacterial infection; unspecified site	1.01	1.03	1.06	0.99	0.99	0.96	1.04
4: Mycoses	1.00	0.99	1.02	0.99	1.02	0.95	1.03
6: Hepatitis	1.02	1.01	1.02	1.03	1.09	0.98	1.15
7: Viral infection	1.07	1.07	1.12	1.02	1.12	0.98	1.11
8: Other infections; including parasitic	1.05	1.01	1.09	1.06	1.04	1.00	1.09
11: Cancer of head and neck	0.98	0.95	0.93	1.13	0.98	0.97	0.93
12: Cancer of esophagus	1.01	0.99	0.99	1.19	1.01	0.95	0.96
13: Cancer of stomach	0.98	0.99	1.00	0.99	0.99	0.95	0.99
14: Cancer of colon	0.95	0.97	0.97	0.95	0.94	0.97	0.94
15: Cancer of rectum and anus	0.95	0.96	0.95	0.95	0.95	0.96	0.93
16: Cancer of liver and intrahepatic bile duct	1.00	0.98	1.00	1.06	1.02	1.01	1.02
17: Cancer of pancreas	1.01	0.99	1.00	1.00	1.04	1.00	0.99
18: Cancer of other GI organs; peritoneum	0.98	0.97	0.99	0.98	1.00	0.98	0.97
19: Cancer of bronchus; lung	1.02	1.02	1.00	1.00	1.03	1.00	1.02
21: Cancer of bone and connective tissue	0.95	0.94	0.90	0.96	0.97	1.01	0.91
22: Melanomas of skin	0.94	0.89	0.88	0.99	1.01	1.01	1.12
23: Other non-epithelial cancer of skin	0.93	0.90	0.91	0.97	0.93	1.00	0.97
24: Cancer of breast	0.87	0.84	0.80	0.94	0.88	1.00	0.86
25: Cancer of uterus	0.92	0.90	0.90	0.94	0.94	0.98	0.92
26: Cancer of cervix	0.95	0.90	0.93	0.99	0.98	0.99	0.92
27: Cancer of ovary	0.96	0.94	0.96	0.95	1.00	0.98	0.98
28: Cancer of other female genital organs	0.96	0.93	0.95	0.94	0.99	0.98	0.99
29: Cancer of prostate	0.86	0.83	0.80	0.91	0.83	1.04	0.89
32: Cancer of bladder	0.95	0.94	0.95	0.99	0.94	0.97	0.95
33: Cancer of kidney and renal pelvis	0.92	0.92	0.89	0.97	0.91	1.00	0.94
35: Cancer of brain and nervous system	0.99	0.98	0.98	1.01	1.00	1.04	0.95
36: Cancer of thyroid	0.91	0.95	0.82	0.93	0.93	0.99	0.89
37: Hodgkin`s disease	1.00	0.97	0.96	1.02	1.00	1.03	0.97
38: Non-Hodgkin`s lymphoma	1.00	0.98	0.99	1.05	1.02	1.01	0.98
39: Leukemias	0.98	0.95	0.96	1.03	0.97	1.00	0.96
40: Multiple myeloma	1.03	1.02	0.97	1.10	1.07	0.98	1.04
41: Cancer; other and unspecified primary	1.00	1.00	0.97	1.04	1.02	0.99	0.95
42: Secondary malignancies	1.04	1.02	1.02	1.02	1.08	1.01	1.04
43. Malignant neoplasm without specification of site	1.05	1.03	1.08	1.06	1.08	0.96	1.04
44. Neoplasms of unspecified nature or uncertain behavior	0.98	0.97	0.96	1.00	0.96	1.03	0.96
45: Maintenance chemotherapy; radiotherapy	0.95	0.92	0.94	0.99	0.92	1.01	0.97
46: Benign neoplasm of uterus	0.87	0.86	0.80	0.95	0.84	1.00	0.85
47: Other and unspecified benign neoplasm	0.93	0.92	0.88	0.98	0.92	1.00	0.91
48: Thyroid disorders	0.93	0.93	0.89	0.95	0.95	0.97	0.91
49: Diabetes mellitus without complication	1.07	1.12	1.10	0.99	1.15	0.89	1.11
50: Diabetes mellitus with complications	1.01	1.03	1.04	0.98	1.03	0.96	1.03
51: Other endocrine disorders	1.06	1.08	1.07	1.00	1.08	0.99	1.06
52: Nutritional deficiencies	1.06	1.08	1.15	0.98	1.09	0.94	1.09

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Adjustment Factors to multiply by hospital-wide CCR

CCS diagnosis category	10 states combined	FL	MA	MD	NC	NJ	WV
54: Gout and other crystal arthropathies	1.06	1.09	1.11	1.02	1.13	0.91	1.08
55: Fluid and electrolyte disorders	1.07	1.10	1.13	1.00	1.12	0.96	1.11
56: Cystic fibrosis	0.97	0.95	0.99	0.90	0.96	1.07	0.96
58: Other nutritional; endocrine; and metabolic disorders	0.89	0.91	0.82	0.96	0.87	1.01	0.86
59: Deficiency and other anemia	1.00	1.01	1.02	0.99	1.01	0.97	1.02
60: Acute posthemorrhagic anemia	1.02	1.05	1.05	0.98	1.01	1.00	1.01
61: Sickle cell anemia	1.05	1.11	1.10	0.96	1.09	0.89	1.12
62: Coagulation and hemorrhagic disorders	0.92	0.92	0.92	0.92	0.89	0.99	0.85
63: Diseases of white blood cells	1.01	1.01	1.03	0.95	1.02	1.02	1.00
64: Other hematologic conditions	0.99	0.99	1.04	1.02	0.96	0.96	1.00
66: Alcohol-related mental disorders	1.19	1.19	1.25	0.96	1.39	0.95	1.27
67: Substance-related mental disorders	1.25	1.34	1.28	0.92	1.57	0.87	1.30
68: Senility and organic mental disorders	1.34	1.37	1.45	0.97	1.40	0.90	1.34
69: Affective disorders	1.39	1.61	1.42	0.91	1.74	0.81	1.44
70: Schizophrenia and related disorders	1.39	1.67	1.44	0.91	1.76	0.83	1.48
71: Other psychoses	1.40	1.59	1.39	0.90	1.75	0.89	1.41
72: Anxiety; somatoform; dissociative; and personality disorders	1.30	1.32	1.41	0.96	1.39	0.84	1.24
73: Preadult disorders	1.29	1.63	1.38	0.83	1.44	0.69	1.53
74: Other mental conditions	1.28	1.54	1.40	0.88	1.57	0.97	1.35
76: Meningitis (except that caused by tuberculosis or sexually transmitted disease)	1.07	1.07	1.10	1.03	1.09	1.01	1.06
77: Encephalitis (except that caused by tuberculosis or sexually transmitted disease)	1.06	1.04	1.10	1.08	1.03	1.03	1.08
78: Other CNS infection and poliomyelitis	1.02	1.00	1.04	1.07	1.00	1.01	1.00
79: Parkinson`s disease	0.99	0.98	1.09	0.95	1.00	0.98	1.00
80: Multiple sclerosis	1.12	1.12	1.09	1.03	1.22	1.03	1.26
81: Other hereditary and degenerative nervous system conditions	1.02	1.00	1.03	0.98	1.07	1.02	0.98
82: Paralysis	1.03	1.02	0.99	1.09	1.03	1.02	0.94
83: Epilepsy; convulsions	1.05	1.06	1.05	1.03	1.08	1.01	1.05
84: Headache; including migraine	1.13	1.08	1.12	1.14	1.21	1.09	1.17
85: Coma; stupor; and brain damage	1.09	1.06	1.12	1.01	1.10	1.09	1.09
87: Retinal detachments; defects; vascular occlusion; and retinopathy	1.17	1.09	1.02	0.92	1.52	1.32	1.10
89: Blindness and vision defects	1.13	1.06	1.13	1.11	1.23	1.07	1.18
90: Inflammation; infection of eye (except that caused by tuberculosis or sexually transmitted disease)	1.09	1.12	1.15	0.99	1.13	0.98	1.17
91: Other eye disorders	1.06	1.11	1.04	0.97	1.11	1.05	1.04
92: Otitis media and related conditions	1.04	1.08	1.10	1.04	1.05	0.96	1.14
93: Conditions associated with dizziness or vertigo	1.12	1.08	1.12	1.07	1.20	1.07	1.17
95: Other nervous system disorders	1.03	1.03	1.04	1.02	1.04	1.01	1.03

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96: Heart valve disorders	0.89	0.88	0.89	1.02	0.84	0.99	0.88
97: Peri-; endo-; and myocarditis; cardiomyopathy (except that caused by tuberculosis or sexually transmitted disease)	0.95	0.92	0.95	1.08	0.91	1.01	0.93
98: Essential hypertension	1.06	1.05	1.09	1.05	1.08	1.03	1.08
99: Hypertension with complications and secondary hypertension	0.99	1.00	0.97	1.06	0.97	1.00	1.00
100: Acute myocardial infarction	0.89	0.89	0.88	0.99	0.84	1.01	0.89
101: Coronary atherosclerosis and other heart disease	0.86	0.84	0.81	0.97	0.82	1.04	0.86
102: Nonspecific chest pain	1.00	0.97	1.02	1.07	0.99	1.00	1.01
103: Pulmonary heart disease	1.06	1.09	1.08	1.03	1.06	0.99	1.06
105: Conduction disorders	0.85	0.82	0.78	0.92	0.81	1.04	0.86
106: Cardiac dysrhythmias	0.93	0.92	0.89	0.98	0.91	1.00	0.95
107: Cardiac arrest and ventricular fibrillation	0.92	0.90	0.96	1.01	0.88	1.01	0.93
108: Congestive heart failure; nonhypertensive	0.98	0.98	1.01	1.00	0.95	0.98	1.02
109: Acute cerebrovascular disease	1.07	1.06	1.08	1.08	1.09	1.05	1.08
110: Occlusion or stenosis of precerebral arteries	0.90	0.89	0.86	0.98	0.87	1.03	0.90
111: Other and ill-defined cerebrovascular disease	0.98	0.92	0.95	1.12	0.98	1.10	0.94
112: Transient cerebral ischemia	1.10	1.08	1.11	1.07	1.15	1.08	1.13
113: Late effects of cerebrovascular disease	1.09	1.13	1.10	0.99	1.17	0.98	1.17
114: Peripheral and visceral atherosclerosis	0.96	0.93	0.93	1.01	0.93	1.04	0.92
115: Aortic; peripheral; and visceral artery aneurysms	0.90	0.88	0.89	1.01	0.86	1.03	0.90
116: Aortic and peripheral arterial embolism or thrombosis	0.96	0.96	0.95	0.99	0.92	1.06	0.92
117: Other circulatory disease	1.02	1.03	1.02	1.03	1.03	1.01	1.01
118: Phlebitis; thrombophlebitis and thromboembolism	1.06	1.09	1.07	1.02	1.10	0.97	1.10
120: Hemorrhoids	1.00	1.01	1.03	0.96	0.99	0.99	1.04
121: ther diseases of veins and lymphatics	1.02	1.04	1.04	1.02	1.04	0.92	1.00
122: Pneumonia (except that caused by tuberculosis or sexually transmitted disease)	1.03	1.06	1.08	0.98	1.04	0.96	1.08
123: Influenza	1.07	1.09	1.10	1.02	1.09	0.96	1.06
124: Acute and chronic tonsillitis	0.99	1.00	1.04	0.94	0.99	0.97	1.09
125: Acute bronchitis	1.07	1.12	1.11	0.97	1.12	0.94	1.05
126: Other upper respiratory infections	1.06	1.07	1.08	1.04	1.09	0.97	1.09
127: Chronic obstructive pulmonary disease and bronchiectasis	1.03	1.07	1.06	0.97	1.03	0.94	1.05
128: Asthma	1.02	1.07	1.05	0.97	1.04	0.93	1.07
129: Aspiration pneumonitis; food/vomitus	1.04	1.07	1.10	0.98	1.05	0.95	1.06
130: Pleurisy; pneumothorax; pulmonary collapse	1.04	1.07	1.07	1.00	1.04	0.98	1.06

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131: Respiratory failure; insufficiency; arrest (adult)	1.00	1.02	1.05	0.96	0.98	0.98	0.99
132: Lung disease due to external agents	1.03	1.04	1.10	0.99	0.97	1.08	1.05
133: Other lower respiratory disease	1.01	1.02	1.03	1.04	1.01	0.98	1.01
134: Other upper respiratory disease	1.00	1.02	0.98	1.02	0.99	0.97	1.02
135: Intestinal infection	1.08	1.09	1.14	1.00	1.13	0.97	1.12
136: Disorders of teeth and jaw	0.90	0.87	0.83	1.12	0.91	0.98	0.94
137: Diseases of mouth; excluding dental	1.03	1.03	1.07	1.02	1.04	0.98	1.08
138: Esophageal disorders	1.01	1.02	0.98	1.05	1.00	0.99	1.00
139: Gastroduodenal ulcer (except hemorrhage)	1.00	0.99	1.05	0.96	0.99	1.01	0.98
140: Gastritis and duodenitis	1.03	1.02	1.06	1.00	1.05	1.02	1.07
141: Other disorders of stomach and duodenum	1.02	1.04	1.04	0.99	1.03	0.99	1.03
142: Appendicitis and other appendiceal conditions	0.94	0.91	0.90	0.95	0.92	1.08	0.93
143: Abdominal hernia	0.93	0.93	0.90	1.02	0.90	1.00	0.91
144: Regional enteritis and ulcerative colitis	1.03	1.02	1.07	0.99	1.04	1.00	1.04
145: Intestinal obstruction without hernia	1.05	1.05	1.09	0.98	1.07	1.00	1.07
146: Diverticulosis and diverticulitis	1.02	1.02	1.04	0.97	1.02	1.00	1.04
147: Anal and rectal conditions	0.98	0.99	1.01	1.00	0.97	0.97	0.99
148: Peritonitis and intestinal abscess	1.04	1.02	1.08	1.06	1.05	0.99	1.02
149: Biliary tract disease	0.95	0.93	0.95	0.99	0.93	1.03	0.96
150: Liver disease; alcohol-related	1.01	1.00	1.03	1.00	1.04	1.01	1.04
151: Other liver diseases	1.01	0.98	1.01	1.06	1.05	0.99	1.06
152: Pancreatic disorders (not diabetes)	1.06	1.03	1.10	1.05	1.08	1.02	1.05
153: Gastrointestinal hemorrhage	1.01	1.02	1.03	0.98	0.99	1.00	1.02
154: Noninfectious gastroenteritis	1.08	1.06	1.12	1.01	1.13	1.02	1.14
155: Other gastrointestinal disorders	1.00	1.00	1.02	1.01	1.01	0.98	1.00
156: Nephritis; nephrosis; renal sclerosis	1.02	1.05	1.00	1.00	1.01	0.99	1.10
157: Acute and unspecified renal failure	1.05	1.07	1.11	1.00	1.07	0.96	1.06
158: Chronic renal failure	0.95	0.91	0.89	0.99	0.96	1.08	0.92
159: Urinary tract infections	1.08	1.11	1.14	1.00	1.13	0.95	1.13
160: Calculus of urinary tract	0.98	0.93	0.95	1.01	0.94	1.12	0.99
161: Other diseases of kidney and ureters	0.98	0.97	0.99	1.00	0.98	1.05	1.00
162: Other diseases of bladder and urethra	0.95	0.94	0.90	0.99	0.96	0.98	0.97
163: Genitourinary symptoms and ill-defined conditions	1.00	1.01	0.97	0.98	1.01	0.99	1.04
164: Hyperplasia of prostate	0.90	0.91	0.86	0.93	0.89	0.94	0.94
165: Inflammatory conditions of male genital organs	1.04	1.05	1.09	1.02	1.06	0.95	1.08
166: Other male genital disorders	0.94	0.91	0.90	1.11	0.90	0.97	0.91
167: Nonmalignant breast conditions	0.92	0.92	0.86	0.94	0.96	0.96	0.95
168: Inflammatory diseases of female pelvic organs	0.98	0.97	1.00	1.02	1.00	1.00	0.99
169: Endometriosis	0.85	0.86	0.81	0.91	0.82	0.99	0.85

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170: Prolapse of female genital organs	0.81	0.81	0.73	0.94	0.78	1.00	0.81
171: Menstrual disorders	0.83	0.84	0.78	0.92	0.82	0.97	0.83
172: Ovarian cyst	0.92	0.89	0.88	0.95	0.90	1.03	0.94
173: Menopausal disorders	0.87	0.88	0.86	0.92	0.85	0.96	0.88
175: Other female genital disorders	0.88	0.88	0.83	0.93	0.86	0.99	0.85
177: Spontaneous abortion	0.98	0.95	0.94	0.99	0.97	1.07	0.99
180: Ectopic pregnancy	0.88	0.85	0.86	0.98	0.84	1.00	0.86
181: Other complications of pregnancy	1.13	1.21	1.10	0.96	1.17	1.04	1.25
182: Hemorrhage during pregnancy; abruptio placenta; placenta previa	1.15	1.22	1.23	0.99	1.18	1.02	1.28
183: Hypertension complicating pregnancy; childbirth and the puerperium	1.14	1.19	1.16	0.94	1.14	1.07	1.27
184: Early or threatened labor	1.18	1.29	1.23	0.95	1.21	1.04	1.26
185: Prolonged pregnancy	1.14	1.28	1.10	0.92	1.19	1.08	1.43
186: Diabetes or abnormal glucose tolerance complicating pregnancy; childbirth; or the puerperium	1.16	1.28	1.15	0.93	1.18	1.05	1.35
187: Malposition; malpresentation	1.09	1.16	1.14	0.94	1.05	1.03	1.24
188: Fetopelvic disproportion; obstruction	1.08	1.18	1.15	0.93	1.04	1.05	1.35
189: Previous C-section	1.06	1.11	1.11	0.93	1.00	1.04	1.22
190: Fetal distress and abnormal forces of labor	1.09	1.17	1.10	0.93	1.07	1.05	1.18
191: Polyhydramnios and other problems of amniotic cavity	1.17	1.26	1.13	0.96	1.21	1.09	1.33
192: Umbilical cord complication	1.21	1.35	1.16	0.93	1.22	1.11	1.41
193: OB-related trauma to perineum and vulva	1.19	1.34	1.11	0.94	1.23	1.12	1.47
194: Forceps delivery	1.21	1.41	1.20	0.89	1.27	1.04	1.22
195: Other complications of birth; puerperium affecting management of mother	1.13	1.21	1.15	0.95	1.13	1.05	1.22
196: Normal pregnancy and/or delivery	1.21	1.36	1.12	0.93	1.25	1.12	1.31
197: Skin and subcutaneous tissue infections	1.04	1.09	1.11	0.98	1.07	0.91	1.10
198: Other inflammatory condition of skin	1.01	1.06	1.05	0.99	0.97	0.97	0.97
199: Chronic ulcer of skin	1.03	1.09	1.08	1.00	1.05	0.90	1.03
200: Other skin disorders	0.94	0.94	0.85	0.98	0.97	0.95	0.99
201: Infective arthritis and osteomyelitis (except that caused by tuberculosis or sexually transmitted disease)	1.02	1.03	1.05	1.03	1.02	0.96	1.05
202: Rheumatoid arthritis and related disease	0.91	0.92	0.84	0.96	0.89	1.00	0.83
203: Osteoarthritis	0.80	0.80	0.75	0.90	0.77	0.99	0.77
204: Other non-traumatic joint disorders	0.93	0.89	0.95	0.99	0.90	0.99	0.89
205: Spondylosis; intervertebral disc disorders; other back problems	0.83	0.82	0.82	0.92	0.81	1.01	0.81
207: Pathological fracture	0.97	0.95	1.01	0.98	0.98	1.00	0.95
208: Acquired foot deformities	0.85	0.84	0.82	0.92	0.84	1.01	0.88

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209: Other acquired deformities	0.81	0.78	0.79	0.93	0.79	1.00	0.79
210: Systemic lupus erythematosus and connective tissue disorders	1.02	1.03	1.05	1.04	1.03	0.99	0.99
211: Other connective tissue disease	1.03	1.00	1.01	1.27	1.01	0.96	1.06
212: Other bone disease and musculoskeletal deformities	0.85	0.82	0.82	0.96	0.82	1.02	0.82
213: Cardiac and circulatory congenital anomalies	0.94	0.88	0.89	1.10	0.95	1.07	0.93
214: Digestive congenital anomalies	1.06	1.04	0.93	1.06	1.06	1.05	1.05
215: Genitourinary congenital anomalies	0.94	0.89	0.88	0.98	0.92	1.04	0.92
216: Nervous system congenital anomalies	1.00	0.98	0.89	0.93	1.06	1.13	0.91
217: Other congenital anomalies	0.90	0.87	0.84	0.93	0.88	1.03	0.91
218: Liveborn	1.17	1.30	0.88	0.96	1.20	1.10	1.17
222: Hemolytic jaundice and perinatal jaundice	1.22	1.45	1.13	0.96	1.38	0.93	1.25
224: Other perinatal conditions	1.21	1.20	0.99	1.18	1.23	1.09	1.20
225: Joint disorders and dislocations; trauma-related	0.91	0.88	0.85	1.15	0.88	1.02	0.91
226: Fracture of neck of femur (hip)	0.93	0.93	0.92	0.97	0.91	0.98	0.93
227: Spinal cord injury	0.99	0.96	0.95	1.49	0.92	1.03	0.94
228: Skull and face fractures	1.00	0.94	0.99	1.37	0.96	1.05	1.00
229: Fracture of upper limb	0.94	0.90	0.93	1.18	0.93	1.03	0.95
230: Fracture of lower limb	0.94	0.91	0.91	1.22	0.91	1.01	0.94
231: Other fractures	1.03	0.99	1.05	1.35	1.02	1.03	1.01
232: Sprains and strains	0.98	0.94	0.94	1.07	0.96	1.02	1.02
233: Intracranial injury	1.04	1.01	1.05	1.41	1.01	1.04	1.04
234: Crushing injury or internal injury	1.02	0.96	1.01	1.45	0.98	1.02	1.01
235: Open wounds of head; neck; and trunk	1.01	0.95	1.01	1.33	0.99	1.03	1.03
236: Open wounds of extremities	0.96	0.93	0.90	1.30	0.93	0.97	1.00
237: Complication of device; implant or graft	0.93	0.91	0.91	1.01	0.90	0.98	0.92
238: Complications of surgical procedures or medical care	1.01	1.02	1.04	1.01	1.00	0.96	1.01
239: Superficial injury; contusion	1.11	1.09	1.12	1.27	1.14	1.02	1.16
240: Burns	0.96	0.98	1.01	0.99	0.91	1.05	0.89
241: Poisoning by psychotropic agents	1.05	1.07	1.09	0.96	1.06	0.95	1.04
242: Poisoning by other medications and drugs	1.03	1.05	1.07	1.01	1.03	0.98	1.01
243: Poisoning by nonmedicinal substances	0.96	0.93	1.02	1.11	0.94	0.95	0.93
244: Other injuries and conditions due to external causes	1.03	1.03	1.03	1.10	1.02	1.00	1.04
245: Syncope	1.05	1.03	1.04	1.04	1.07	1.04	1.07
246: Fever of unknown origin	1.09	1.10	1.13	1.04	1.12	1.02	1.12
247: Lymphadenitis	1.06	1.06	1.07	1.04	1.08	1.07	1.10
248: Gangrene	0.98	1.00	0.97	0.97	0.96	0.96	0.95
250: Nausea and vomiting	1.08	1.08	1.12	1.02	1.11	0.99	1.11
251: Abdominal pain	1.11	1.07	1.13	1.06	1.16	1.09	1.14

APPENDIX B: Summary of adjustment factors in each state and all states combined
(State detail is reported here only for states that permit CCR release by hospital in statewide file)

Adjustment Factors to multiply by hospital-wide CCR

CCS diagnosis category	10 states combined	FL	MA	MD	NC	NJ	WV
252: Malaise and fatigue	1.12	1.12	1.13	1.06	1.18	0.99	1.15
253: Allergic reactions	1.04	1.09	1.07	0.99	1.07	0.93	1.06
254: Rehabilitation care; fitting of prostheses; and adjustment of devices	1.24	1.26	1.18	0.99	1.39	0.91	1.43
257: Other aftercare	1.04	0.97	1.11	1.09	0.98	0.96	0.99
259: Residual codes; unclassified	0.99	0.99	0.90	1.03	1.03	0.98	1.02
Other DXCCS1	1.07	1.06	1.04	1.01	1.06	1.02	1.10
min	0.80	0.78	0.73	0.83	0.77	0.69	0.77
max	1.40	1.67	1.45	1.49	1.76	1.32	1.53
mean	1.02	1.03	1.02	1.01	1.04	1.00	1.04
std dev	0.10	0.15	0.13	0.09	0.15	0.06	0.14