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Reductions in Hospital Days, Re-Admissions, and Potentially Avoidable Admissions Among Medicare Advantage Enrollees in California and Nevada, 2006

September 2009

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Reductions in Hospital Days, Re-Admissions, and Potentially Avoidable Admissions Among Medicare Advantage Enrollees in California and Nevada, 2006

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SUMMARY

The Agency for Healthcare Research and Quality (AHRQ) has compiled statewide datasets on hospital admissions in California and Nevada that allow direct, risk-adjusted comparisons of utilization rates among enrollees in Medicare Advantage (MA) plans and in Medicare's traditional fee-for-service (FFS) program.

Based on the AHRQ data for these states in 2006, risk-adjusted rates of inpatient days per patient were 30 percent lower for MA enrollees than for FFS enrollees in California, and 23 percent lower in Nevada. Same-quarter re-admission rates for the same DRG (Medicare's "diagnosis-related group" codes for each type of hospitalization) were 15 percent lower among MA patients in California and 33 percent lower among MA patients in Nevada. Based on classifications for 13 potentially avoidable admissions defined by AHRQ – ranging from dehydration to urinary tract infection to uncontrolled diabetes – risk-adjusted MA patients had a 6 percent lower rate of avoidable admissions than FFS enrollees in both California and Nevada.

These comparisons were adjusted for health status using the Medicare risk score process for age, sex, and 70 Hierarchical Condition Categories (HCCs) for serious diagnoses that are used as a basis for Medicare risk adjustment.

The AHRQ data also allow comparisons of MA vs. FFS results across regions within California and Nevada. For example, reductions in risk-adjusted re-admission rates among MA enrollees were highest in the Central region (-34 percent) and North San Joaquin region (-27 percent) compared with FFS enrollees, but were much smaller or near-zero in other regions, such as the West Bay (-6 percent) and Orange County (+1 percent). Re-admission rates were reduced among MA enrollees by about the same amounts compared with FFS in Nevada's Las Vegas referral area (-32 percent) and Reno referral area (-34 percent).

By linking the AHRQ data with data from all California hospitals, we were also able to compare MA vs. FFS re-admission rates among hospital groups and individual hospitals in California. Some of the hospitals with the lowest re-admission rates were Kaiser Foundation hospitals.

The AHRQ data for these two states show similar patterns of admission, re-admission and potentially avoidable admission rates to those of a prior AHIP study of eight MA plans in various locations throughout the country.[1] The earlier study used data from 2005 and 2006 gathered directly from the eight MA plans and comparison data from the Medicare FFS 5 percent sample claims files for FFS enrollees in each plan's corresponding local service area, with the same method for risk adjustment used for the AHRQ data.

These new comparisons of FFS and MA utilization rates illustrate how MA plans can make substantial progress in reducing inpatient days and re-admissions relative to FFS, and may also be able to reduce potentially avoidable admissions. A recent comprehensive study on FFS re-admissions noted that in half of the re-admissions studied among FFS patients, there was no physician contact billed to Medicare prior to the re-admission.[2] We assume that the MA plans are able to lower re-admission rates precisely because of their emphasis on discharge planning and coordinated follow-up care.

Summary Table. Percentage Difference in Risk-Adjusted Utilization Rates in California and Nevada, MA versus FFS, 2006

	Inpatient Days	Same Quarter Re-Admissions (Same DRG, Any Hospital)	13 Potentially Avoidable Admissions
	MA Rate versus FFS Rate (Per Risk Score* Value)		
California – All Hospitals (Acute Care Admissions)			
All Patients	-30%	-15%	-6%
Diabetes Patients	-35%	-21%	-10%
Heart Disease Patients	-30%	-14%	-5%
Nevada – All Hospitals (Acute Care Admissions)			
All Patients	-23%	-33%	-6%
Diabetes Patients	-25%	-32%	-3%
Heart Disease Patients	-21%	-36%	-7%

Source: California and Nevada data from the Health Cost and Utilization Project (HCUP) compiled by the Agency for Healthcare Research and Quality (AHRQ) for 2006.
*Risk scores for FFS and MA enrollees based on age/sex and HCC relative cost values used in Medicare risk adjustment for beneficiaries living in the community, but do not include disease interactive factors, or factors related to disability or institutional status.

[1] AHIP Working Paper: *A Preliminary Comparison of Utilization Measures Among Diabetes and Heart Disease Patients in Eight Regional Medicare Advantage Plans and Medicare Fee-for-Service in the Same Service Areas* (revised September 2009), available at www.ahipresearch.org/PDFs/MAvsFFS.pdf. Thanks to Dr. Julie Lee for methodological assistance during the first year of this project.
[2] For a perspective on FFS re-admissions, see Jencks, S., Williams, M., and Coleman, E., "Rehospitalizations in the Medicare Fee-for-Service Program," New England Journal of Medicine (April 2, 2009), available at http://content.nejm.org/chi/content/full/360/14/1418.

INTRODUCTION

In early 2008, AHIP launched a project to compare utilization rates – including hospital days and admissions, re-admissions, potentially avoidable admissions, and various outpatient services – in Medicare Advantage (MA) plans and Medicare's traditional fee-for-service (FFS) coverage.

A working paper describing the first phase of the project – a comparison of risk-adjusted utilization rates among patients in eight small or medium-sized HMOs versus FFS results in the corresponding local service areas in 2005 and 2006 – was published in early June 2009.[3] Analysts at the Brookings Institution's Engelberg Center for Health Care Reform helped with the design of the data specification for MA plans and the methods for comparing data gathered from MA plans with FFS data from Medicare's 5 percent sample claims files.

This report represents a second phase of the MA versus FFS analysis, using data from all hospital admissions in California and Nevada in 2006 compiled by the Agency for Healthcare Research and Quality (AHRQ). The AHRQ data for these particular states have unique (de-identified) person designations, so that patients with multiple admissions and re-admissions can be studied for both Medicare FFS and MA enrollees.

DATA AND METHOD BASICS

In total, there were nearly four million acute care admissions in AHRQ's Healthcare Cost and Utilization Project (HCUP) dataset for 2006 in California and more than a quarter million in Nevada. For California, we identified 176,794 records for (de-identified) patients in Medicare HMO or other Medicare managed care plans and 376,721 for FFS (see Table 1). For Nevada, there were 14,396 MA records and 33,862 FFS records. Nevada did not have a precisely defined data field for MA. We assumed that all enrollees over age 65 whose primary source of payment to the hospital was categorized as a "private insurance" plan (usually coded as PPO, HMO, or Blue Cross/Blue Shield) were MA, and those coded with primary source of payment as "Medicare" were FFS (see Appendix A).[4]

Data Records, Diagnosis Codes, and Risk Scores. The main unit of analysis in both this study and the eight-company study is a data "record" for a (de-identified) person in a year. Person records were created in the California and Nevada datasets from the unique patient designations attached to each admission, and risk scores were computed from the primary and secondary diagnosis codes associated with their admissions (see Appendix B). Risk scores were slightly higher for FFS enrollees in both the eight-company study and the California/Nevada comparisons. Risk scores were higher overall for the California/Nevada data than in the eight-company study because the universe of California/Nevada data was limited to patients with at least one hospital

[3] AHIP Working Paper: *A Preliminary Comparison of Utilization Measures Among Diabetes and Heart Disease Patients in Eight Regional Medicare Advantage Plans and Medicare Fee-for-Service in the Same Service Areas* (revised September 2009), available at www.ahipresearch.org/PDFs/MAvsFFS.pdf.
Thanks to Dr. Julie Lee for methodological assistance during the first year of this project.

[4] Some of these records with primary source of payment identified as private insurance may be from patients over age 65 who are still working or otherwise not Medicare-eligible. These patients likely have private coverage that is similar to MA coverage – HMO or PPO – and we believe this does not affect the nature of the MA versus FFS comparisons for Nevada.

admission.[5] In both studies, we compared subsets of patients with diabetes (HCCs 15-19) and heart disease (HCCs 79-83, 92, and 104-105).[6]

As with the eight-company study, utilization rates for the California and Nevada hospital patients were calculated on a per risk score basis. Risk scores for MA and FFS enrollees in both studies were based on age, sex, and HCC relative cost values used in Medicare risk adjustment for beneficiaries living in the community, but do not include disease interactive factors or factors related to disability or institutional status.

In the prior eight-company study, the HCCs used to compute risk scores were generated from inpatient, outpatient, and office visits, using primary and secondary diagnosis codes (up to 12 diagnoses per claim). Because the AHRQ data are limited to patients with at least one admission in the year, the HCCs used for computing risk scores in this California/Nevada analysis are generated only from diagnoses associated with hospital admissions (not outpatient or office visits). There were up to 24 secondary diagnoses available per admission from the California data, and up to 14 secondary diagnosis codes in the data from Nevada.

Re-Admissions and "Potentially Avoidable" Admissions. Neither the HCUP nor the FFS 5 percent sample claims data report specific dates of service, only the calendar quarter in which the service occurred. Therefore our method counted a re-admission for each subsequent admission within the same quarter. Our primary definition of a re-admission was for multiple admissions with the same DRG, but at any hospital. This is the same definition used in the eight-company report. However, this is not the only possible definition. Table 2 shows the basic numbers of re-admissions by this measure, as well as for "any DRG" and "same hospital."[7]

Importantly, these definitions of re-admissions do not necessarily imply fault or failure on the hospitals associated with re-admissions. Our main definition – same-quarter, same DRG, any hospital re-admissions – includes referring and referral hospitals. For example, a patient who is stabilized at a rural or local hospital and subsequently transferred to a regional or specialty facility would count as a re-admission by this measure (for both hospitals). Likewise, some re-admissions may not be preventable even with the best care, and some re-admissions may be planned or even clinically desirable. However, it seems likely that hospitals associated with higher rates of re-admissions are also associated with higher rates of avoidable or preventable re-admissions.

In addition to the re-admission information, AHRQ has defined 13 types of specific "potentially avoidable" admissions in particular disease categories: dehydration, bacterial pneumonia, urinary tract infection, hypertension, angina, perforated appendix, asthma, uncontrolled diabetes, diabetes with short-term complications, diabetes with long-term complications, congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD), and

[5] In the eight-company study, risk scores varied much more from place to place than between MA and FFS comparison groups in the same location.

[6] The five HCCs for diabetes HCCs 15-19 are: Diabetes with Renal or Peripheral Circulatory Manifestation, Diabetes with Neurologic or Other Specified Manifestation, Diabetes with Acute Complications, Diabetes with Ophthalmologic or Unspecified Manifestation, and Diabetes without Complication. The HCCs for heart disease HCCs 79-83, 92, and 104-105 are: Cardio-Respiratory Failure and Shock, Congestive Heart Failure, Acute Myocardial Infarction, Unstable Angina and Other Acute Ischemic Heart Disease, Angina Pectoris/Old Myocardial Infarction, Specified Heart Arrhythmias, Vascular Disease with Complications, and Vascular Disease.

[7] Alternative definitions of re-admissions may be the subject of future study, and tabulations based on these other measures are available from the authors.

Table 1. Basic Data Characteristics: Records with At Least One Hospital Admission in a Year, Acute Care Admissions

	Medicare Advantage			Fee-for-Service		
	Average Number of Records	Average Age	Average Risk Score*	Average Number of Records	Average Age	Average Risk Score*
	Data for 2006					
California – Acute Care Hospitals						
All Enrollees	176,794	77.4	1.83	376,721	77.3	1.87
Diabetes Patients	51,749	76.4	2.53	112,739	76.4	2.54
Heart Disease Patients	94,920	78.1	2.40	199,528	78.2	2.49
Nevada – Acute Care Hospitals						
All Enrollees	14,396	74.5	1.60	33,862	75.6	1.73
Diabetes Patients	3,894	74.0	2.01	9,161	75.0	2.19
Heart Disease Patients	7,423	75.2	2.17	17,863	76.4	2.31

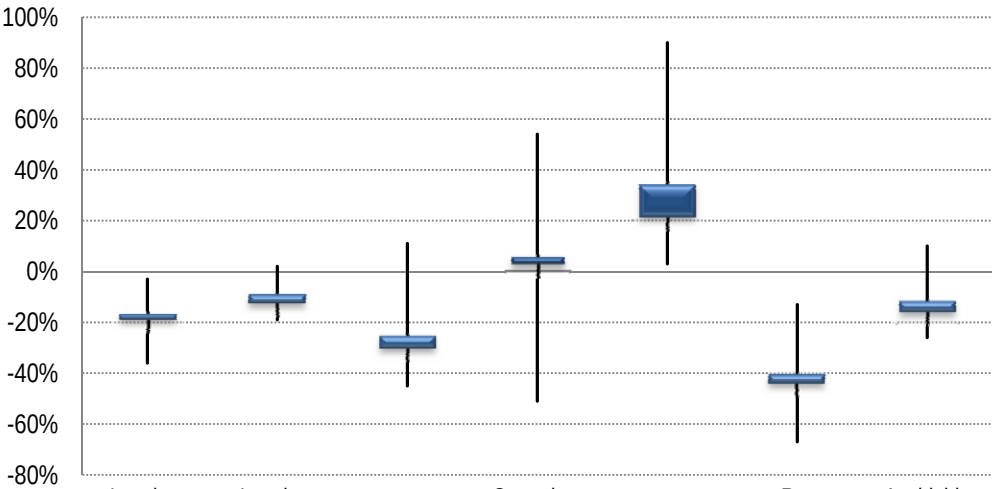
Sources: California and Nevada from the Health Cost and Utilization Project (HCUP) compiled by the Agency for Healthcare Research and Quality (AHRQ).
*Risk scores for FFS and MA enrollees based on age/sex and HCC relative cost values used in Medicare risk adjustment for beneficiaries living in the community, but do not include disease interactive factors, or factors related to disability or institutional status. Therefore, these computed risk scores may not be exactly the same as those used for risk adjustment purposes. Based on http://www.cms.hhs.gov/MedicareAdvtgSpecRateStats/. Accessed March 19, 2009.

Table 2. California Re-Admissions by Type of Re-Admission, 2006

	People with a Re-Admission		Re-Admissions		Re-Admissions Per Person with a Re-Admission	
Same Quarter Re-Admissions	MA	FFS	MA	FFS	MA	FFS
Any DRG, Any Hospital	35,243	90,211	49,875	136,401	1.42	1.51
Any DRG, Same Hospital	28,386	73,755	38,697	105,798	1.36	1.43
Same DRG, Any Hospital*	7,580	18,770	8,908	22,878	1.18	1.22
Same DRG, Same Hospital	5,987	15,590	6,969	18,717	1.16	1.20

Source: California data from the Health Cost and Utilization Project (HCUP) compiled by the Agency for Healthcare Research and Quality (AHRQ).
*This "same DRG, any hospital" definition was used for the comparisons throughout this report.

Figure 1. Eight-Company Results: Percentage Difference in Utilization Rates, MA Rate versus FFS Rate (Per Risk Score Value)



	Inpatient Days	Inpatient Admissions	E.R. Visits	Outpatient Visits	Office Visits	Re-Admissions	Avoidable Admissions
Mean	-18%	-10%	-27%	3%	33%	-42%	-13%
High	-3%	2%	11%	54%	90%	-13%	10%
Low	-36%	-19%	-45%	-51%	3%	-67%	-26%
Median	-18%	-12%	-30%	6%	22%	-44%	-16%

Source: Authors' calculations, based on the Medicare 5 percent sample files for hospital and physician claims and data from eight regional Medicare Advantage HMO plans in 2005-2006.

lower extremity amputation for patients with diabetes (see Appendix C).[8]

Advantages and Disadvantages of the California and Nevada Data Sources. A key advantage of the California and Nevada data is that the coding used to calculate the compared measures was precisely the same for MA and FFS enrollees. A disadvantage is that the California and Nevada data do not include outpatient, office, or ER visits, or information for patients who were not hospitalized in the year.

In the eight-company study, the responding MA plans represented different regions of the U.S, including the Northeast, Middle Atlantic states, upper Midwest, South Central states, and West. All of the eight MA plans studied were HMOs (none had significant non-HMO coverage in the years studied), which ranged from group model HMOs to broader Blue-Cross style networks, and seven of the eight companies were non-profits. Thus, the eight-company results are not necessarily representative of all types of MA plans in all places. By contrast, the California and Nevada data include all types of MA plans, but only in those two states. Although California is the most populous state and represents a large share of the overall Medicare population, its health sector includes several large and well-established HMOs and multi-

[8] Details and specifications are from AHRQ Prevention Quality Indicators, Technical Specifications, October 2001 (Version 3.1, March 12, 2007), technical details accessed at http://qualityindicators.ahrq.gov/pqi_download.htm. For more information, please see AHRQ's Guide to the Prevention Quality Indicators, accessible at http://www.qualityindicators.ahrq.gov.

Table 3. Percentage Difference in Risk-Adjusted Utilization Rates, MA versus FFS

Data for 2006	Inpatient Days	Same Quarter Re-Admissions (Same DRG, Any Hospital)	13 Potentially Avoidable Admissions
	MA Rate versus FFS Rate (Per Risk Score* Value)		
California – All Hospitals (Acute Care Admissions)			
All Patients	-30%	-15%	-6%
Diabetes Patients	-35%	-21%	-10%
Heart Disease Patients	-30%	-14%	-5%
Nevada – All Hospitals (Acute Care Admissions)			
All Patients	-23%	-33%	-6%
Diabetes Patients	-25%	-32%	-3%
Heart Disease Patients	-21%	-36%	-7%

Source: California and Nevada data from the Health Cost and Utilization Project (HCUP) compiled by the Agency for Healthcare Research and Quality (AHRQ) for 2006. *Risk scores for FFS and MA enrollees based on age/sex and HCC relative cost values used in Medicare risk adjustment for beneficiaries living in the community, but do not include disease interactive factors, or factors related to disability or institutional status.

specialty medical groups, which are less common in some other parts of the country.

The eight-company results reflect very tightly prescribed service areas, usually a handful of counties surrounding a city. Thus, the potential impact of broader regional variations in practice patterns is reduced. In some ways, the eight-company results may have been affected by the impact of local HMOs on FFS itself. There is evidence that higher MA enrollment in local areas is correlated with lower FFS costs, presumably because the practice patterns encouraged by high-performing HMOs are also used when hospitals and doctors treat FFS patients.[9] Because the California and Nevada data are shown by the states as a whole, or large sub-regions, some differences in local practice patterns could affect the comparisons.

The California and Nevada comparisons reflect identical data definitions and coding. In the eight-company study, the definitions of the hospital inpatient variables were set very precisely, and the resulting ranges between the highest and lowest observed differences between the risk-adjusted MA and FFS results were relatively consistent across the eight comparison groups for inpatient days, admissions, emergency room visits, re-admissions, and potentially avoidable admissions. However, the definitions of outpatient and office visits were necessarily less precise, and the results relied more on interpretations and judgments made by the programmers at each MA plan on how to extract that information from their claims data systems. The ranges for the outpatient hospital visits and physician office visits were wider, possibly resulting from dramatically different practice patterns across the HMOs studied, and possibly because of definitional or coding differences across responding plans (see Figure 1).

[9] See Michael Chernew et al. (2008). Managed Care and Medical Expenditures of Medicare Beneficiaries. Working Paper 13747. Cambridge, MA: National Bureau of Economic Research.

COMPARISONS OF UTILIZATION RATES AMONG MA AND FFS PATIENTS IN CALIFORNIA AND NEVADA

Table 3 shows the percentage differences in risk-adjusted utilization rates between MA and FFS for inpatient days, same quarter re-admissions, and potentially avoidable admissions from the California and Nevada data.

Comparisons for Diabetes and Heart Disease Patients. The California data showed lower risk-adjusted rates of inpatient days (-30 percent) for all patients in MA plans than those in FFS, as well as lower rates for same quarter re-admissions (-15 percent) and potentially avoidable admissions (-6 percent). In Nevada, the MA patients had similarly lower rates of inpatient days (-23 percent), re-admissions (-33 percent), and potentially avoidable admissions (-6 percent), compared with FFS. In the California data, MA patients with diabetes had lower

Table 4. Selected Regions: California and Nevada Comparisons of Risk-Adjusted Utilization Rates, 2006

	Number of Records (Patients with at Least One Admission)		Percentage Difference in Utilization Rates Per Risk Score Value* (MA versus FFS)		
Data for 2006	MA	FFS	Inpatient Days	Same Quarter Re-Admissions (Same DRG, Any Hospital)	Potentially Avoidable Admissions
California Regions					
Golden Empire	10,994	23,531	-13%	-17%	-13%
West Bay	6,052	12,280	-31%	-6%	-10%
North Bay	12,967	22,646	-27%	-21%	3%
East Bay	14,020	23,486	-20%	-14%	-14%
North San Joaquin	5,904	20,386	-17%	-27%	3%
Santa Clara	10,075	17,823	-25%	-14%	1%
Central	6,183	26,079	-32%	-34%	-33%
Santa Barbara Ventura	3,358	12,957	-21%	-26%	-10%
Los Angeles County	51,085	98,874	-39%	-14%	0%
Inland Counties	23,490	33,390	-29%	-6%	-8%
Orange County	15,107	31,148	-33%	1%	8%
San Diego/Imperial	20,357	28,121	-27%	-22%	1%
Nevada Regions					
Las Vegas Referral Area	11,615	22,479	-28%	-32%	-5%
Reno Referral Area	2,688	10,302	-7%	-34%	-9%

Source: California and Nevada data from the Health Cost and Utilization Project (HCUP) compiled by the Agency for Healthcare Research and Quality (AHRQ). For this table, re-admissions were counted in each region where multiple admissions occurred in different regions in the same quarter.
*Risk scores for FFS and MA enrollees based on age/sex and HCC relative cost values used in Medicare risk adjustment for beneficiaries living in the community, but do not include disease interactive factors, or factors related to disability or institutional status.

Table 5. Risk-Adjusted Re-Admission Rates Associated with Various California Hospital Systems, 2006

	Number of People with Admissions		Risk-Adjusted Re-admission Rates (Same Quarter, Same DRG, Any Hospital)*		Percent Difference
	MA	FFS	MA	FFS	MA versus FFS
Adventist Health Systems	978	13,377	6.6%	5.1%	29%
Catholic Healthcare West	13,387	50,585	3.5%	3.9%	-10%
County of Los Angeles	373	2,446	5.8%	5.9%	-3%
Daughters of Charity Health	1,514	9,254	3.7%	5.1%	-26%
HCA Healthcare Corporation	2,617	9,516	3.0%	2.9%	4%
Kaiser Foundation	79,797	4,658	2.5%	2.6%	-2%
Memorial Health Services	7,038	9,667	3.2%	3.6%	-11%
Prime Healthcare Services, Inc.	893	4,402	5.7%	4.1%	38%
Scripps Health	2,759	6,607	2.2%	4.0%	-45%
Sharp Healthcare	5,618	8,786	3.0%	3.4%	-13%
St. Joseph Health System	2,548	18,204	4.8%	3.1%	55%
Sutter Health	7,396	32,706	3.0%	3.7%	-19%
Tenet Healthcare Corporation	8,988	24,294	3.9%	3.4%	15%
University of California	3,017	14,673	3.9%	4.1%	-6%
Other or No Hospital System Identified**	47,537	197,572	4.0%	3.7%	10%
All California Hospitals	176,794	376,721	2.8%	3.3%	-15%

Source: California data from the Health Cost and Utilization Project (HCUP) compiled by the Agency for Healthcare Research and Quality (AHRQ). For this table, admissions, risk scores, and re-admissions were counted in each hospital group where multiple admissions occurred in different hospital groups in the same quarter. Thus, the sums for the California hospital systems will not equal the values for "All California Hospitals."
*Risk scores for FFS and MA enrollees based on age/sex and HCC relative cost values used in Medicare risk adjustment for beneficiaries living in the community, but do not include disease interactive factors, or factors related to disability or institutional status.
**Includes Pacific Health Corporation and Universal Health Services, Inc., hospital groups with too few admissions to show separately.

rates of risk-adjusted re-admissions compared with FFS than did heart disease patients (-21 percent for diabetes versus -14 percent for heart disease), which was the pattern also shown in the eight-company results. However, the reductions in re-admissions shown by MA patients relative to FFS patient in Nevada were larger for the heart disease patients (-32 percent for diabetes versus -36 percent for heart disease).

The percentage difference in rates of AHRQ-defined potentially avoidable admissions between risk-adjusted MA patients and FFS patients was about the same in the eight-company study (-4 percent) as in the California data (-6 percent) and Nevada results (-6 percent).

Comparisons by Hospital Regions. Table 4 shows comparisons of MA and FFS patients for major regions of California and Nevada that have large numbers of MA patients. In California, the largest

differences in inpatient days among MA patients relative to FFS were in Los Angeles County (-39 percent), and the largest differences in re-admissions (-34 percent) and potentially avoidable admissions (-33 percent) were in the Central region. In Nevada, the MA patients in both the Las Vegas and Reno referral areas had lower re-admission rates than FFS patients by a similarly large margin (-32 percent in Las Vegas and -34 percent in Reno). However, the difference in risk-adjusted rates of inpatient days was smaller in Reno (-7 percent) than in Las Vegas (-28 percent), and the difference in potentially avoidable admissions was greater in the Reno referral area (-9 percent) than in Las Vegas (-5 percent).

Some patients may have had a re-admission in another region. For this reason, Table 4 is based on counts of all patients with at least one admission in the region. Likewise, a person with a re-admission in a different region will "count" as having had a re-admission in both regions in this table.

Comparisons by Hospital System. The California hospital data allowed comparisons by hospital groups (see Table 5). Among the large groups, the Kaiser hospitals generally had low risk-adjusted same-DRG re-admission rates, which were nearly identical for their MA (2.5 percent) and FFS patients (2.6 percent), and below the state-wide average for MA patients (2.8 percent) and FFS patients (3.3 percent). (FFS patients may be admitted to Kaiser hospitals in emergencies or for other reasons.) Only one other hospital system in California – Scripps Health at 2.2 percent – had a below-average re-admission rate among their MA patients. As with the region-by-region analysis in Table 4, the breakdown by hospital systems in Table 5 includes patients who may have had admissions in different hospital systems, or re-admissions at a different hospital system. In these cases, the numbers of patients are reflected in both regions where they had admissions, and the re-admission rates are reflected in the all hospital groups associated with the patient with a re-admission (see Appendix A, Methodological Notes, for more technical details).

Comparisons by Income Quartile. The California data allow comparisons by the Census income quartile associated with the zip codes where patients live. Table 6 shows the rates of risk-adjusted inpatient days, re-admissions, and potentially avoidable admissions for each quartile of neighborhood median incomes. Although the differences between MA and FFS enrollees were relatively small across income groups, MA patients living in the highest income areas had smaller-than-average differences in inpatient days relative to FFS (-28 percent), but higher-than-average differences in re-admissions (-18 percent). MA patients in the lowest-income neighborhoods showed larger-than-average differences in potentially avoidable admissions relative to FFS (-9 percent).

Medicaid Enrollees. In the eight-company study, certain Medicaid-Medicare "dual" eligible enrollees, who tended to have higher-than-average risk scores and rates of utilization, were excluded from the FFS comparison groups. (Including these records in the eight-company study seemed to exaggerate the differences in utilization between MA and FFS enrollees.[10])

The Nevada data allow us to exclude patients listed with Medicaid as their secondary payer (see Table 7). The California data do not include information on Medicaid as a secondary payer. However, we can show the MA versus FFS comparisons for

[10] The eight-company working paper includes an appendix with the Medicaid records included in the FFS comparison groups.

Table 6. California Risk-Adjusted Utilization Rates by Income Quartile, 2006

	Number of Records (Patients with at Least One Admission)		Average Risk Score*		Percentage Difference in Risk-Adjusted Utilization Rates (MA versus FFS)*		
Income Quartiles	MA	FFS	MA	FFS	Inpatient Days	Same Quarter Re-Admissions (Same DRG, Any Hospital)	Potentially Avoidable Admissions
Lowest	32,914	95,804	1.88	1.99	-31%	-14%	-9%
Low-Middle	42,429	91,398	1.83	1.95	-31%	-16%	-5%
High-Middle	53,604	99,876	1.85	1.90	-32%	-16%	-4%
Highest	48,253	90,607	1.83	1.79	-28%	-18%	-5%

Source: California data from the Health Cost and Utilization Project (HCUP) compiled by the Agency for Healthcare Research and Quality (AHRQ). Income quartiles are based on the median income of the patient's ZIP code. For this table, the numbers of patients, risk scores, re-admissions, and potentially avoidable admissions were counted separately in each income quartile if the patient had different places of residence (in different income quartiles) associated with different admissions during the year.
*Risk scores for FFS and MA enrollees based on age/sex and HCC relative cost values used in Medicare risk adjustment for beneficiaries living in the community, but do not include disease interactive factors, or factors related to disability or institutional status.

Table 7. Utilization Rates For Hospitals Disproportionately Serving the Poor (DSH) in California and Enrollees with Medicaid Coverage in Nevada

	Number of Records (Patients with at Least One Admission)		Percentage Difference in Risk-Adjusted Utilization Rates (MA versus FFS)*		
Data for 2006	MA	FFS	Inpatient Days	Same Quarter Re-Admissions	Potentially Avoidable Admissions
California Hospitals					
DSH	16,088	81,407	-27%	6%	-9%
Non-DSH	163,403	311,404	-31%	-18%	-4%
Nevada Secondary Coverage					
Medicaid	458	2,539	-34%	-45%	-22%
Non-Medicaid	14,001	31,781	-23%	-32%	-5%

Source: California and Nevada data from the Health Cost and Utilization Project (HCUP) compiled by the Agency for Healthcare Research and Quality (AHRQ). For this table, patients, risk scores, and utilization rates may be counted in both DSH and Non-DSH or Medicaid and Non-Medicaid categories if patients had admissions in both categories during the year.
*Risk scores for FFS and MA enrollees based on age/sex and HCC relative cost values used in Medicare risk adjustment for beneficiaries living in the community, but do not include disease interactive factors, or factors related to disability or institutional status.

disproportionate share hospitals (DSH) -- which serve a high number of low-income or uninsured patients -- and for non-DSH hospitals. Both the non-Medicaid patients in Nevada and the non-DSH patients in California had patterns of utilization between MA and FFS that were similar to the results for the states as a whole.

Individual Hospital Re-Admission Rates. Tables 8-A and 8-B show the 20 California hospitals with at least 1,000 combined MA and FFS patient admissions in 2006 that had the highest and lowest re-admission rates, respectively. Many of the hospitals associated with low re-admission rates were Kaiser Foundation facilities, and some of the hospitals with high rates were not affiliated with larger hospital systems.

As with the analysis of re-admissions by hospital group above, the re-admission rates in Tables 8-A and 8-B reflect a hospital's association with a re-admission. That is, if a patient has multiple admissions for the same DRG in the same quarter in different hospitals, both hospitals will have the re-admission reflected in their results.

ISSUES AND DISCUSSION

The comparisons of risk-adjusted FFS and MA utilization rates, in both the California/Nevada data and the prior eight-company study, support the proposition that MA plans can make substantial progress in reducing the need for inpatient days and re-admissions relative to FFS, and possibly for potentially avoidable admissions as well.

To be sure, the comparisons do not necessarily imply that MA plans have lower costs than FFS. The costs of care that can reduce re-admissions or potentially avoidable admissions, for example, could be substantial. Likewise, Medicare's FFS reimbursement rates are below hospitals' costs in California, and some of those shortfalls are likely shifted to private payers.[11]

However, if we start with the premise that longer hospitalizations, re-admissions, and potentially avoidable admissions can be inherently inefficient, at least statistically (if not in every individual case), these data suggest that MA plans are making substantial improvements relative to FFS.
Of course, with data only for hospital admissions, the California and Nevada comparisons leave out very important health care services, such as outpatient visits and office visits. In the prior eight-company study, outpatient visits were roughly the same among MA and FFS patients (although the variation was very large from plan to plan), and office visits were generally higher among MA plans. Although the research is very preliminary, we believe that additional primary care visits likely were a key factor in the MA plans' ability to reduce ER visits, re-admissions, and potentially avoidable admissions.[12]

By contrast, a recent study on FFS re-admissions noted that in half of the re-admissions studied among FFS patients, there was no physician contact billed to Medicare prior to the re-admission.[13] We assume that the MA plans are able to lower re-admission rates precisely because of their emphasis on discharge planning and coordinated follow-up care.

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[11] See, for example, AHIP Working Paper: *An Illustration of the Impact on Hospitals in California of a Government-Run Health Plan that Pays Medicare Fee-for-Service Rates* (July 2009), available at http://www.ahipresearch.org/OSHPDanalysisWP.html.

[12] The data specification in the eight-company study did not include patient contacts by telephone or remote monitoring systems, secure electronic visits or communications with providers, or other methods of primary or chronic care that also likely contributed to lower ER, re-admission, or potentially avoidable admission rates among MA patients.

[13] For a perspective on FFS readmissions, see Jencks, S., Williams, M., and Coleman, E., "Rehospitalizations in the Medicare Fee-for-Service Program," *New England Journal of Medicine* (April 2, 2009), available at http://content.nejm.org/cgi/content/full/360/14/1418.

We believe policymakers should continue to focus on hospital utilization, especially on re-admissions, as a means of improving the quality of care and reducing unnecessary costs, and we hope these data from California and Nevada provide new ideas or ways of studying the issue.

Table 8-A. Re-Admissions Associated with California Hospitals with Over 1,000 Patients Admitted, Ranked by Re-Admission Rate from Highest, 2006

	Number of Patients with an Admission	Average Risk Score*	Same Quarter Re-Admissions (Same DRG, Any Hospital)	Risk-Adjusted Re-Admission Rate*
Verdugo Hills Hospital	1,531	2.0	251	8.1%
Citrus Valley Medical Center - Queen of the Valley Campus	2,210	2.2	391	8.1%
Little Company of Mary - San Pedro Hospital	1,696	1.9	262	8.0%
Providence Saint Joseph Medical Center	4,084	2.0	605	7.4%
White Memorial Medical Center	2,023	2.6	387	7.4%
Little Company of Mary Hospital	4,677	1.8	572	6.9%
Sutter Solano Medical Center	1,060	2.0	147	6.9%
Hemet Valley Medical Center	4,446	1.6	495	6.9%
Glendale Memorial Hospital & Health Center	3,154	2.0	434	6.7%
St. Francis Medical Center	1,806	2.5	303	6.6%
Oroville Hospital	1,813	1.9	222	6.5%
Glendale Adventist Medical Center	2,798	2.1	375	6.5%
Chino Valley Medical Center	1,397	2.2	199	6.4%
San Francisco General Hospital Medical Center	1,112	2.0	136	6.1%
California Hospital Medical Center	1,321	2.2	178	6.1%
Peninsula Medical Center	3,461	1.9	391	5.9%
St. Luke's Hospital	1,182	2.0	141	5.9%
San Gabriel Valley Medical Center	2,133	2.7	338	5.8%
San Gorgonio Memorial Hospital	1,371	1.9	151	5.8%
Huntington Beach Hospital	1,039	2.2	132	5.7%

Source: California data from the Health Cost and Utilization Project (HCUP) compiled by the Agency for Healthcare Research and Quality (AHRQ). For this table, re-admissions were counted in each hospital where multiple admissions occurred in different hospitals in the same quarter.
*Risk scores for FFS and MA enrollees based on age/sex and HCC relative cost values used in Medicare risk adjustment for beneficiaries living in the community, but do not include disease interactive factors, or factors related to disability or institutional status.

Table 8-B. Re-Admissions Associated with California Hospitals with Over 1,000 Patients Admitted, Ranked by Re-Admission Rate from Lowest, 2006

	Number of Patients with an Admission	Average Risk Score*	Same Quarter Re-Admissions (Same DRG, Any Hospital)	Risk-Adjusted Re-Admission Rate*
Kaiser Foundation Hospital - Fresno	2,792	2.2	109	1.8%
Rideout Memorial Hospital	1,969	2.2	84	2.0%
John Muir Medical Center - Walnut Creek	4,446	2.1	182	2.0%
Kaiser Foundation Hospital - San Diego	6,695	2.0	271	2.0%
Kaiser Foundation Hospital - Anaheim	2,579	2.3	129	2.2%
Eisenhower Medical Center	8,035	1.6	287	2.3%
Sierra Vista Regional Medical Center	1,212	1.6	44	2.3%
Kaiser Foundation Hospital - Sacramento/Roseville	3,944	2.0	181	2.3%
Sharp Memorial Hospital	4,652	1.9	206	2.3%
St. John's Regional Medical Center	2,907	2.1	147	2.4%
Kaiser Foundation Hospital - Oakland Campus	3,933	2.1	193	2.4%
Community Memorial Hospital - San Buenaventura	3,411	1.8	150	2.4%
St. Joseph Hospital - Eureka	1,547	1.9	69	2.4%
El Camino Hospital	3,733	1.8	167	2.4%
Tri-City Medical Center	4,783	1.7	193	2.4%
Community Hospital of Monterey Peninsula	3,242	1.7	136	2.5%
Sutter Roseville Medical Center	3,311	2.1	168	2.5%
Kaiser Foundation Hospital - Hayward	2,514	2.3	145	2.5%
Kaiser Foundation Hospital - Woodland Hills	4,021	2.4	244	2.5%
Feather River Hospital	1,496	1.9	74	2.6%

Source: California data from the Health Cost and Utilization Project (HCUP) compiled by the Agency for Healthcare Research and Quality (AHRQ). For this table, re-admissions were counted in each hospital where multiple admissions occurred in different hospitals in the same quarter.
*Risk scores for FFS and MA enrollees based on age/sex and HCC relative cost values used in Medicare risk adjustment for beneficiaries living in the community, but do not include disease interactive factors, or factors related to disability or institutional status.

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APPENDIX A: METHODOLOGICAL NOTES FOR THE CALIFORNIA AND NEVADA ADMISSIONS ANALYSIS

The Agency for Healthcare Research and Quality's (AHRQ's) Healthcare Cost and Utilization Project (HCUP) data for California and Nevada were the main source of information for this report. The HCUP data used contain information on all inpatient admissions (which can alternatively be called "discharges"). The data provide information on patient demographics, utilization, coverage type, diagnosis codes, and procedure codes.[1] The California HCUP data were linked with information on the state's hospitals' financial characteristics from the state's Office of Statewide Planning and Development (OSHPD) using a unique ID for each hospital found in each dataset.[2]

In general, the HCUP data were filtered to include only discharge records with the following characteristics:

1. Individuals age 65 to 89
2. Discharges for persons who received general acute care

In the California data, we assumed that the primary coverage type listed as "Medicare" and "Medicare fee-for-service" was Medicare FFS, and the coverage types "Medicare HMO" and "Medicare Managed Care-Other" were for a Medicare Advantage plan. (The California data did not include information on secondary coverage.)

The Nevada data did not have as direct a categorization of primary coverage type as California, but it did include information on secondary coverage. In Nevada, we assumed that the primary payer type listed by the hospital as "Medicare" was Medicare FFS, and we assumed that persons over age 65 with primary coverage described as commercial insurance, HMO, PPO, or Blue Cross/Blue Shield were Medicare Advantage.[3]

In some cases, an individual had more than one coverage type (both MA and FFS during the year), or no coverage type; these individuals and all of their discharge records were removed from the dataset. Likewise, discharge records indicating that the annual number of inpatient days was more than 365 were discarded. If a discharge record did not have a coverage type, only the record was removed provided the individual had other admissions with a defined type of coverage for the full year.

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[1] See AHRQ's Overview of the State Inpatient Databases at http://www.hcup-us.ahrq.gov/sidoverview.jsp.
[2] See California Office of Statewide Planning and Development, Healthcare Information Division – Data Products at http://www.oshpd.state.ca.us/HID/DataFlow/HospData.html.
[3] A small number of these Nevada admissions thus categorized as MA may be for people age 65 or older who are still working and have employer-based primary coverage instead of Medicare Advantage. However, we believe that because the number of these working seniors with employer primary coverage is probably small, and because their employer coverage is probably very similar to MA coverage, the basic comparison of private coverage with Medicare FFS remains valid.

Individuals who did not have a patient identifier number, sex designation, or age designation (or who had more than one sex designation), were removed from the dataset. In some cases an individual with several admissions had several age designations – normally two consecutive years due to birthdays occurring during the year – and the average age of the two years was calculated for these individuals and used in the analyses.

The HCUP inpatient discharge data for California contained information on 3,997,182 discharges for 2006. After removing discharge records which did not meet the study criteria, there were 876,694 discharge records in the final dataset, representing 553,515 individuals. The inpatient discharge data for Nevada contained information on 285,162 discharges for 2006. After removing discharge records which did not meet the study criteria, there were 71,874 discharge records in the final dataset, representing 48,258 individuals.

Neither state's HCUP dataset included dates of service. Therefore, re-admissions were based on multiple admissions within the same calendar quarter. Re-admissions were calculated in four categories:

1. Any DRG, Any Hospital
2. Any DRG, Same Hospital
3. Same DRG, Any Hospital
4. Same DRG, Same Hospital

In the report, we mostly used the third category of re-admission – same DRG, any hospital – for analysis. This was because that was the definition used in a prior AHIP report comparing the re-admission rates of eight MA plans versus FFS in their corresponding local service areas. Using the same definition of re-admission was intended to help facilitate comparisons between the two studies, but it was not intended to imply that this was necessarily the most appropriate or "best" definition.

For the statewide totals, a re-admission was simply counted for each additional admission in the same quarter for the given definition. For example, under the third category of re-admission, a person with two admissions in a calendar quarter with the same DRG would be counted as having one re-admission. Three admissions in the same quarter with the same DRG would be counted as two re-admissions.

Re-admissions were counted differently for the regional, hospital system, and hospital-by-hospital tables. Some patients' re-admissions in the same quarter may not be at the same hospital. They may be re-admitted to different hospitals, which can be in different regions or belong to different hospital groups. Moreover, we cannot be sure of the chronology of the admissions within the quarter, and there is no way to know which admissions were primary admissions versus re-admissions. Therefore, we chose to display the numbers of patients and admissions that were associated with a re-admission in each region, hospital system, or individual hospital. Thus, the sum of the re-admissions or

admissions shown on the regional, hospital system, and hospital-by-hospital tables are higher than the state totals.

For example, consider a person admitted to one hospital in one region of the state (Los Angeles County), and re-admitted in another hospital in a different region of the state (Orange County) in the same quarter. This patient is flagged as having a re-admission, and in the statewide totals, one re-admission would be counted. However, in the region-by-region table, both Los Angeles County and Orange County would be counted as having been associated with a re-admission. Similarly, both individual hospitals would be shown as associated with a re-admission for the purposes of the calculations behind Tables 8-A and 8-B of the main report, which illustrate hospital-by-hospital re-admission rates.

The HCUP data provides primary and secondary diagnosis information for each admission (up to 24 secondary diagnoses in the California data and up to 14 in the Nevada data). This diagnosis information was used to create risk scores for each patient, based on their admissions during the year. We used Medicare's 70 Hierarchical Condition Categories (HCCs), which are used by CMS in risk adjustment for Medicare Advantage plans, as well as age and sex to compute the risk scores. Essentially the HCCs are groups of conditions, based on ICD-9 diagnosis codes. In the dataset, there are 70 distinct HCC variables; if a beneficiary had a diagnosis within the HCC, the beneficiary was assigned the value of "1" in the dataset for the HCC. The variables were created by using a crosswalk of HCC codes and ICD-9 diagnosis codes. These variables were used to create markers for people who had diabetes or heart disease; these subgroups were analyzed separately in the report. Risk scores were calculated for each individual, using the predicted age, sex, and HCC relative cost factors used by CMS for MA risk-adjustment (but not including factors related to program or institutional status, or disease interaction factors.)

The variables for potentially avoidable admissions were developed based on technical specifications from the AHRQ report, "Prevention Quality Indicators."[4] The report provides parameters for identifying "...potentially avoidable hospitalizations for ambulatory care sensitive condition (ACSC) indicators, which involve admissions that evidence suggest could have been avoided, at least in part, through better access to high-quality outpatient care." For this study, we chose 13 of the conditions described by AHRQ because of their relevance to the Medicare population.

[4] October 2001, Version 3.1 (March 12, 2007), downloaded on February 26, 2008. See http://www.qualityindicators.ahrq.gov/pqi_download.htm.

Table A-1. Details of Record Selection Based on Study Criteria

	Nevada	California
Beginning Number of Discharges	285,162	3,997,182
Beginning Number of People	186,658	2,095,319
Discharge Records Removed:		
No Age; Age Under 65 years, Over 89 Years	206,520	2,876,023
No Person Identifier	1,207	24,178
No or Conflicting Sex	0	5,773
No or Conflicting Coverage Type; Not MA or FFS	5,561	143,285
Not General Acute Care (Type of Care)	0	70,953
Length of Stay Greater than 365 Days	0	276
Ending Number of Discharges	71,874	876,694
Ending Number of People	48,258	553,515

APPENDIX B: RISK SCORE DESCRIPTION AND METHODOLOGY

For this study, we used the main elements of the risk scores developed for payment purposes by CMS. The CMS risk scores are based on the beneficiaries' demographic status and relative cost values of their Hierarchical Condition Categories[1] (HCCs), which are major diagnosis groups.

HCC codes were derived from the ICD-9 diagnosis codes assigned to each Medicare discharge for beneficiaries in the California and Nevada datasets. Table C-1 is an example of the ICD-9 to HCC crosswalk for HCC 79 (Cardio-Respiratory Failure and Shock). In addition to the primary diagnosis code, there were up to 24 secondary diagnoses in the California data and up to 14 secondary diagnoses in the Nevada data. Risk scores for each patient were based on diagnoses from all discharges in the year. If a beneficiary had an ICD-9 diagnosis within the HCC category, the beneficiary was assigned the value of "1" for the HCC. The patient's risk score is then calculated as the sum of each value that the CMS risk-adjustment system provides each of the 70 HCCs, as well as the elements for the age and sex of the beneficiary (see tables B-1, B-2, and B-3).

The risk scores used for comparison in this study are not identical to the CMS risk scores used for payment purposes. First, we did not use the CMS risk score elements for disease interaction, disability, or institutional status elements. Second, because the data are based only on inpatient discharges, the risk scores computed for this study do not use diagnosis information from outpatient or office visits. Third, the average level of the risk scores computed for this study are higher than those computed for payment purposes, since this data is based only on patients with a hospital discharge. Since many Medicare beneficiaries do not have a hospitalization during a year, this universe is smaller and certainly less healthy than Medicare beneficiaries as a whole.

[1] The definitions of HCCs are based on the concept of disease hierarchies. Condition Categories (CC's) and RxGroups (RxG's) are grouped into hierarchies within clinically related medical conditions (CC's) or pharmaceutical groups (RxG's). The hierarchies are used in the risk calculation process to diminish the risk inflation caused when a single individual has two or more closely related conditions. The imposition of the hierarchies causes the lesser conditions within each hierarchy to be ignored for the purpose of calculating risk. http://www.dxcg.com/docs/news-events/Glossary.pdf.

Table B-1. Example of ICD-9-CM Code Crosswalk with Hierarchical Condition Category 79

ICD-9-CM Code	ICD9_Description	CMS-HCC Model Category	Category Name
4274	Ventricular Fibrillation /Flutter	79	Cardio Respiratory Failure And Shock
42741	Ventricular Fibrillation	79	Cardio Respiratory Failure And Shock
42742	Ventricular Flutter	79	Cardio Respiratory Failure And Shock
4275	Cardiac Arrest	79	Cardio Respiratory Failure And Shock
5184	Acute Lung Edema Nos	79	Cardio Respiratory Failure And Shock
5185	Post Traumatic Pulmonary Insufficiency	79	Cardio Respiratory Failure And Shock
51881	Acute Respiratory Failure	79	Cardio Respiratory Failure And Shock
51882	Other Pulmonary Insufficiency	79	Cardio Respiratory Failure And Shock
51883	Chronic Respiratory Failure	79	Cardio Respiratory Failure And Shock
51884	Acute & Chronic Respiratory Fail	79	Cardio Respiratory Failure And Shock
7855	Shock Without Trauma	79	Cardio Respiratory Failure And Shock
78550	Shock Nos	79	Cardio Respiratory Failure And Shock
78551	Cardiogenic Shock	79	Cardio Respiratory Failure And Shock
798	Sudden Death Cause Unknown	79	Cardio Respiratory Failure And Shock
7980	Sudden Infant Death Syndrome	79	Cardio Respiratory Failure And Shock
7981	Instantaneous Death	79	Cardio Respiratory Failure And Shock
7982	Death Within 24 Hr Symptom	79	Cardio Respiratory Failure And Shock
7989	Unattended Death	79	Cardio Respiratory Failure And Shock
7990	Asphyxia	79	Cardio Respiratory Failure And Shock
79901	Asphyxia	79	Cardio Respiratory Failure And Shock
79902	Hypoxemia	79	Cardio Respiratory Failure And Shock

Source: The ICD-9-CM to HCC crosswalk are from Humana, Inc., "CMS-HCC Medicare Risk Adjustment Model" and can be found at http://www.humana.com/providers/MedPlans/MRA_PFFS.asp?plan=H3.

Table B-2. Age/Sex Risk Factor Values

Sex, Age	Risk Factor Value
Female, Age 65-69	0.307
Female, Age 70-74	0.384
Female, Age 75-79	0.483
Female, Age 80-84	0.572
Female, Age 85-89	0.665
Male, Age 65-69	0.346
Male, Age 70-74	0.453
Male, Age 75-79	0.577
Male, Age 80-84	0.657
Male, Age 85-89	0.79

Source: Age/Sex risk factor values are from the 2005 MA Ratebook compiled by the Centers for Medicare and Medicaid Services (CMS).

Table B-3. Disease Group Factors

HCC	Description	Risk Factor Value
HCC1	HIV/AIDS	0.685
HCC2	Septicemia/Shock	0.89
HCC5	Opportunistic Infections	0.652
HCC7	Metastatic Cancer and Acute Leukemia	1.464
HCC8	Lung, Upper Digestive Tract, and Other Severe Cancers	1.464
HCC9	Lymphatic, Head and Neck, Brain, and Other Major Cancers	0.69
HCC10	Breast, Prostate, Colorectal and Other Cancers and Tumors	0.233
HCC15	Diabetes with Renal or Peripheral Circulatory Manifestation	0.764
HCC16	Diabetes with Neurologic or Other Specified Manifestation	0.552
HCC17	Diabetes with Acute Complications	0.391
HCC18	Diabetes with Ophthalmologic or Unspecified Manifestation	0.343
HCC19	Diabetes without Complication	0.2
HCC21	Protein-Calorie Malnutrition	0.922
HCC25	End-Stage Liver Disease	0.9
HCC26	Cirrhosis of Liver	0.516
HCC27	Chronic Hepatitis	0.359
HCC31	Intestinal Obstruction/Perforation	0.408
HCC32	Pancreatic Disease	0.445
HCC33	Inflammatory Bowel Disease	0.307
HCC37	Bone/Joint/Muscle Infections/Necrosis	0.496
HCC38	Rheumatoid Arthritis and Inflammatory Connective Disease Tissue	0.322
HCC44	Severe Hematological Disorders	1.011
HCC45	Disorders of Immunity	0.83
HCC51	Drug/Alcohol Psychosis	0.353
HCC52	Drug/Alcohol Dependence	0.265
HCC54	Schizophrenia	0.543
HCC55	Major Depressive, Bipolar, and Paranoid Disorders	0.431
HCC67	Quadriplegia/Other Extensive Paralysis	1.181
HCC68	Paraplegia	1.181
HCC69	Spinal Cord Disorders/Injuries	0.492
HCC70	Muscular Dystrophy	0.386
HCC71	Polyneuropathy	0.268
HCC72	Multiple Sclerosis	0.517
HCC73	Parkinson's and Huntington's Diseases	0.475
HCC74	Seizure Disorders and Convulsions	0.269
HCC75	Coma, Brain Compression/Anoxic Damage	0.568
HCC77	Respirator Dependence/Tracheostomy Status	2.102
HCC78	Respiratory Arrest	1.429
HCC79	Cardio-Respiratory Failure and Shock	0.692

HCC80	Congestive Heart Failure	0.417
HCC81	Acute Myocardial Infarction	0.348
HCC82	Unstable Angina and Other Acute Ischemic Heart Disease	0.348
HCC83	Angina Pectoris/Old Myocardial Infarction	0.235
HCC92	Specified Heart Arrhythmias	0.266
HCC95	Cerebral Hemorrhage	0.392
HCC96	Ischemic or Unspecified Stroke	0.306
HCC100	Hemiplegia/Hemiparesis	0.437
HCC101	Cerebral Palsy and Other Paralytic Syndromes	0.164
HCC104	Vascular Disease with Complications	0.677
HCC105	Vascular Disease	0.357
HCC107	Cystic Fibrosis	0.376
HCC 108	Chronic Obstructive Pulmonary Disease	0.376
HCC111	Aspiration and Specified Bacterial Pneumonias	0.693
HCC112	Pneumococcal Pneumonia, Emphysema, Lung Abscess	0.202
HCC119	Proliferative Diabetic Retinopathy and Vitreous Hemorrhage	0.349
HCC130	Dialysis Status	3.076
HCC131	Renal Failure	0.576
HCC132	Nephritis	0.273
HCC148	Decubitus Ulcer of Skin	1.03
HCC149	Chronic Ulcer of Skin, Except Decubitus	0.484
HCC150	Extensive Third-Degree Burns	0.962
HCC154	Severe Head Injury	0.568
HCC155	Major Head Injury	0.242
HCC157	Vertebral Fractures without Spinal Cord Injury	0.49
HCC158	Hip Fracture/Dislocation	0.392
HCC161	Traumatic Amputation	0.843
HCC164	Major Complications of Medical Care and Trauma	0.262
HCC174	Major Organ Transplant Status	0.722
HCC176	Artificial Openings for Feeding or Elimination	0.79
HCC177	Amputation Status, Lower Limb/Amputation Complications	0.843

Source: Age/Sex risk factor values are from the 2005 MA Ratebook compiled by the Centers for Medicare and Medicaid Services (CMS).

APPENDIX C: POTENTIALLY AVOIDABLE ADMISSIONS DESCRIPTION AND METHODOLOGY

The potentially avoidable admissions definitions in this report were based on criteria developed by the AHRQ (Prevention Quality Indicators) to measure inpatient admissions for ambulatory care sensitive conditions. AHRQ believes these conditions would benefit from early intervention and outpatient care to potentially avoid hospitalization and worsening of the conditions.

For this study we used 13 of the 14 potentially avoidable admissions targeted by AHRQ. (One of the conditions, low birth weight, was not applicable to the population we studied.) The 13 AHRQ classifications we studied were:

- Diabetes, short-term complications
- Perforated appendicitis
- Diabetes, long-term complications
- Chronic obstructive pulmonary disease
- Hypertension
- Congestive heart failure
- Dehydration
- Bacterial pneumonia
- Urinary infections
- Angina without procedure
- Uncontrolled diabetes
- Adult asthma
- Lower extremity amputations among patients with diabetes

Each condition has a proscribed set of diagnoses codes and procedures to include or exclude in order to identify an individual with the potentially avoidable hospitalization. As an illustration, Table C-1 below describes the criteria used to identify individuals with a potentially avoidable inpatient admission for bacterial pneumonia.

Table C-1. Criteria for Identifying Preventable Admissions For Bacterial Pneumonia

INCLUSIONS	EXCLUSIONS
ICD-9-CM Principal Diagnosis Codes for Bacterial Pneumonia	Exclude These Cases
481 (Pneumococcal Pneumonia)	Transferring From Another Institution (SID ASOURCE=2)
4822 (H.Influenzae Pneumonia)	MDC 14 (Pregnancy, Childbirth, And Puerperium)
48230 (Strep Pneumonia Unspecified)	MDC 15 (Newborn And Other Neonates)
48231 (Grp A Strep Pneumonia)	With Diagnosis Code For Sickle Cell Anemia Or HB-S Disease (see below)
48232 (Grp B Strep Pneumonia)	
48239 (Oth Strep Pneumonia)	Exclude These ICD-9-CM Diagnosis Codes
4829 (Bacterial Pneumonia Nos)	28241 (Thalassemia HB-S W/O Crisis)
4830 (Mycoplasma Pneumonia)	28242 (Thalassemia HB-S W Crisis)
4831 (Chlamydia Pneumonia Oct96-)	28260 (Sickle Cell Disease Nos)
4838 (Oth Spec Org Pneumonia)	28261 (HB-S Disease W/O Crisis)
485 (Bronchopneumonia Org Nos)	28262 (HB-S Disease W Crisis)
486 (Pneumonia, Organism Nos)	28263 (HB-S /HB-C Disease W/O Crisis)
	28264(HB-S /HB-C Disease W Crisis)
	28268 (HB-S Disease W/O Crisis Nec)
	28269 (HB-Ss Disease Nec W Crisis)

Source: AHRQ Quality Indicators, Prevention Quality Indicators: Technical Specifications; Department of Health and Human Services, Agency for Healthcare Research and Quality, http://www.qualityindicators.ahrq.gov. October 2001. Version 3.1 (March 12, 2007).

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