

Understanding Rural Hospital Bypass Among Medicare Fee-for-Service (FFS) Beneficiaries in 2018

Background

Rural hospitals serve approximately 4 million rural Medicare beneficiaries and act as a central access point for healthcare services in the community.¹ However, rural hospitals inherently experience lower patient volumes than urban hospitals due to population density and geography. Low patient volumes contribute to the financial vulnerability of rural hospitals.² While rural residents may receive inpatient care in their local community, some rural residents receive inpatient services at hospitals that are not their nearest rural hospital (*rural hospital bypass*). When patients bypass their local rural hospital for services that are available locally, it can further threaten the sustainability of their local rural hospital.³

Rural hospital bypass may occur for a number of reasons, including patient choice and the complexity of care a patient needs.⁴ Bypass for complex procedures that are not offered at local rural hospitals, such as coronary artery bypass graft surgery (CABG), can be expected. Rural patients often mention limited services and lack of specialty care as reasons for bypassing their local rural hospital.⁵ Across inpatient and outpatient admissions, patients are more likely to access care nearby for emergency and urgent care than for elective or scheduled care.^{4,6} While patients may not use a local rural hospital due to limited services or lack of specialty care, increasing the number of services and technologies offered by rural hospitals has only a small effect on patient decision-making.⁷

Purpose

Previous studies of rural hospital bypass behavior have included data for a limited number of states.

This data highlight focuses on a national perspective of rural hospital bypass with a refined definition of

Key Findings

- In 2018, while almost 60 percent of rural Medicare fee-for-service (FFS) inpatient stays were at the Medicare beneficiary's nearest rural hospital, over 33 percent were at another hospital for services that could have been provided by the nearest rural hospital.
- Beneficiaries bypassed Tribal hospitals and critical access hospitals (CAHs), particularly CAHs with 15 beds or fewer, at the highest overall rate.
- Beneficiaries living in rural areas bypassed rural Prospective Payment System (PPS) hospitals with 26 to 100 beds at the highest rate for treatment in urban hospitals.
- Over half of all inpatient stays for intracranial hemorrhage or cerebral infarction (e.g. stroke) among rural Medicare beneficiaries were not at their nearest rural hospital.
- Rural hospital bypass rates are significantly higher for rural Medicare beneficiaries less than age 75 years, males, Hispanic beneficiaries, and non-dual eligible beneficiaries.

Data Source: Estimates were produced using Medicare Provider Analysis and Review files (MedPAR) inpatient claims.

rural hospital bypass using Medicare fee-for-service inpatient stays applied to rural Hospital Service Areas (HSAs) constructed from these stays. The purpose of this data highlight is to: 1) understand the extent to which rural Medicare beneficiaries bypass their nearest rural hospital; and 2) learn what hospital services rural Medicare beneficiaries most often seek locally and at distant hospitals.

Data Sources and Methods

The data used for this analysis were from Medicare claims and enrollment files obtained for calendar year (CY) 2018. Only rural fee-for-service (FFS) Medicare beneficiaries who had coverage for all 12 months during CY 2018 are included in the analysis. Medicare Advantage beneficiaries were excluded from the analyses.

The Medicare Provider Analysis and Review files (MedPAR) inpatient claims were merged with other datasets, including Rural-Urban Commuting Area (RUCA) codes from the United States Department of Agriculture's Economic Research Service, the Rural Hospital List from the University of North Carolina at Chapel Hill Cecil G. Sheps Center for Health Services Research (Sheps Center), a list of Tribal hospitals generated by the Indian Health Service (2019), the CMS Provider of Services file, the Medicare Master Beneficiary Summary File, and the CMS geographic variation public use file. SAS Enterprise Guide (7.1; SAS, Cary, NC) was used to produce the utilization and beneficiary statistics.

Defining Rural Hospitals

All acute care hospitals, including critical access hospitals (CAHs), located in rural ZIP codes were included in the analysis. RUCA codes, which are based off of the Office of Management and Budget metropolitan statistical area and micropolitan statistical area definitions, were used to define rural and urban. The hospitals were categorized as rural or urban facilities based on the RUCA code for the hospital ZIP code (rural includes RUCA codes ≥ 4 and urban includes RUCA codes < 4). Hospitals that do not provide general medical services (i.e., psychiatric hospitals, long-term care hospitals, and specialty hospitals) were not included in the analysis.

Defining Rural Hospital Markets (Hospital Service Areas)

For this analysis, hospital service areas (HSAs) are defined by the ZIP codes that a rural hospital serves. The goals of this analysis required construction of an HSA for every hospital located in a rural ZIP code using Medicare FFS inpatient claims and assignment of beneficiaries to one or more HSAs.ⁱ Each HSA was defined by ranking the ZIP codes for Medicare beneficiaries by Medicare inpatient volume and identifying those ZIP codes that accounted for 80 percent of Medicare inpatient volume at a particular hospital.^{8,9} Patients who received services at the rural hospital and reside in one of the ZIP codes that did not comprise the top 80 percent of inpatient

ⁱ We determined that the HSAs developed by the [Dartmouth Atlas](#) were not appropriate for this analysis, because they are focused mainly on urban cities. The Dartmouth Atlas creates HSAs by assigning ZIP codes to the hospital area where the greatest proportion of their Medicare residents were hospitalized, allowing for only one hospital service area per ZIP code and for more than one hospital to comprise a single HSA.

stays were not considered to be part of that HSA. If the 80 percent threshold only captures one beneficiary ZIP code, the HSA for the hospital contains only one residential ZIP code.

This approach to constructing HSAs allowed for some overlap in ZIP codes. There were instances in which ZIP codes, and the rural Medicare beneficiaries who live in those ZIP codes, were assigned to multiple HSAs. For beneficiaries residing in ZIP codes with multiple HSA assignments, we identified the type of markets in which they reside by calculating the distance between the beneficiary ZIP code centroid, which is a point marking the center of the ZIP code, and the hospital ZIP code centroid.ⁱⁱ We then used this calculation to estimate whether the hospital and beneficiary were greater than or less than 30 miles apart.^{10,11} This distinction between markets was used (as described below) to avoid assigning a hospital stay as bypass, if the hospital stay was actually at a reasonably close hospital other than at the nearest hospital.

Defining Rural Hospital Bypass

We identified the inpatient stays for Medicare FFS beneficiaries residing in a rural HSA and determined the facilities where the beneficiaries received inpatient hospital services. Each inpatient stay was assigned to one of four markets:

- Market 1: Closest rural hospital to the beneficiary residential ZIP code
- Market 2: Rural hospitals that are not the closest rural hospital, but are ≤ 30 miles away
- Market 3: Rural hospitals that are not the closest rural hospital, but are >30 miles away
- Market 4: Urban hospitals that are not the closest rural hospital

Inpatient stays in Markets 1 and 2 were not considered to be rural hospital bypasses. Inpatient stays in Market 3 were considered to be a “rural to other rural” hospital bypass. Inpatient stays in Market 4 were considered to be a “rural to urban” hospital bypass.

Recognizing that some rural hospital bypass was due to the availability of services, we characterized bypasses as “unavoidable” or “avoidable.”

- **Unavoidable rural hospital bypass:** Inpatient stays in Markets 3 or 4 for services that were *not available* at the assigned HSA for the rural Medicare beneficiary.
- **Avoidable rural hospital bypass:** Inpatient stays in Markets 3 or 4 for services that were *available* at the assigned HSA for the rural Medicare beneficiary, as determined by the services provided by that hospital in CY 2018.

To avoid the possible misclassification of bypass based on less frequently provided services, we limited the inpatient stays to the most common 50 diagnostic related groups (DRGs), out of the 765 DRGs provided by rural hospitals in CY 2018. To determine the availability of services at each HSA, we compiled a list of DRGs provided in CY 2018 from the top 50 DRGs for each hospital. If the beneficiary’s DRG code on the claim appeared in the list of DRGs for that beneficiary’s assigned hospital, we classified this particular discharge as an “avoidable” bypass,

ⁱⁱ A centroid is a point (usually on a map) that defines the center (in this case, of the zip code). The centroid (point) is represented by longitude and latitude coordinates. In this study, the ZIP code centroid is used to approximate the Euclidean (or straight line) distance between two ZIP codes.

as the DRG could be provided at the beneficiary’s assigned hospital. If the beneficiary’s DRG code on the claim did not appear in the list of DRGs for that beneficiary’s assigned hospital, we classified this particular discharge as an “unavoidable” bypass, as the DRG could not be provided at the beneficiary’s assigned hospital. The 50 DRGs included in the analysis are listed in the Appendix, Table A.1.

We also examined the proportion of inpatient stay bypasses for several subgroups, including: beneficiary sex; beneficiary age group; beneficiary race/ethnicity; and status of dual eligibility for Medicare and Medicaid; hospital type (i.e., CAH, rural Prospective Payment System [PPS] hospital,ⁱⁱⁱ Tribal hospital); and state.

Results

As shown in Table 1, the study sample included a total of 2,051 rural HSAs, with 2,066,659 inpatient stays for 1,333,443 Medicare beneficiaries. Of those stays, 58 percent (1,199,752 inpatient stays) were provided to 65 percent of Medicare beneficiaries (867,228 beneficiaries) for the 50 most frequently provided (top) DRGs.

Table 1. Medicare FFS Beneficiaries, Inpatient Hospital Stays, and HSAs for All Diagnostic Related Groups (DRGs) and Top 50 (Most Frequent) DRGs, 2018

Sample Size	All DRGs	Top 50 DRGs
Number of Medicare FFS Beneficiaries	1,333,443	867,228
Number of Inpatient Stays	2,066,659	1,199,752
Number of HSAs	2,051	2,051

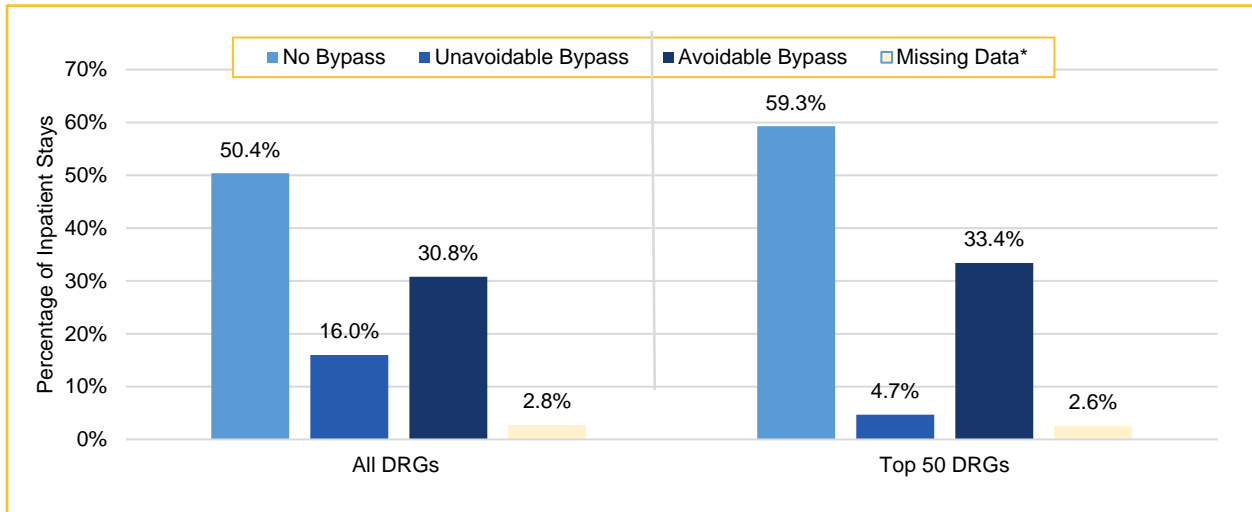
Notes: DRG is the Diagnostic Related Group that is used to classify the type of hospitalization.

Source: Estimates were produced using Medicare Provider Analysis and Review files (MedPAR) inpatient claims.

ⁱⁱⁱ Rural Prospective Payment System (PPS) hospitals include all general, acute care hospitals located in rural ZIP codes (RUCA ≥ 4) that receive reimbursement for inpatient services under the inpatient prospective payment system (IPPS). Rural PPS hospitals do not include critical access hospitals (CAHs) or Tribal hospitals.

The overall pattern of rural hospital bypass for the 50 most common DRGs was similar to rural hospital bypass for all DRGs, as shown in Figure 1. However, when examining the bypass rate for the top 50 DRGs, the unavoidable bypass percentage was lower, indicating that restricting the analysis to these top 50 DRGs may reduce misclassification of a stay as a bypass, if the procedure performed elsewhere was one that the nearest hospital did not frequently provide.

Figure 1. Rural Hospital Bypass for All Diagnostic Related Groups (DRGs) and Top 50 (Most Frequent) DRGs, 2018



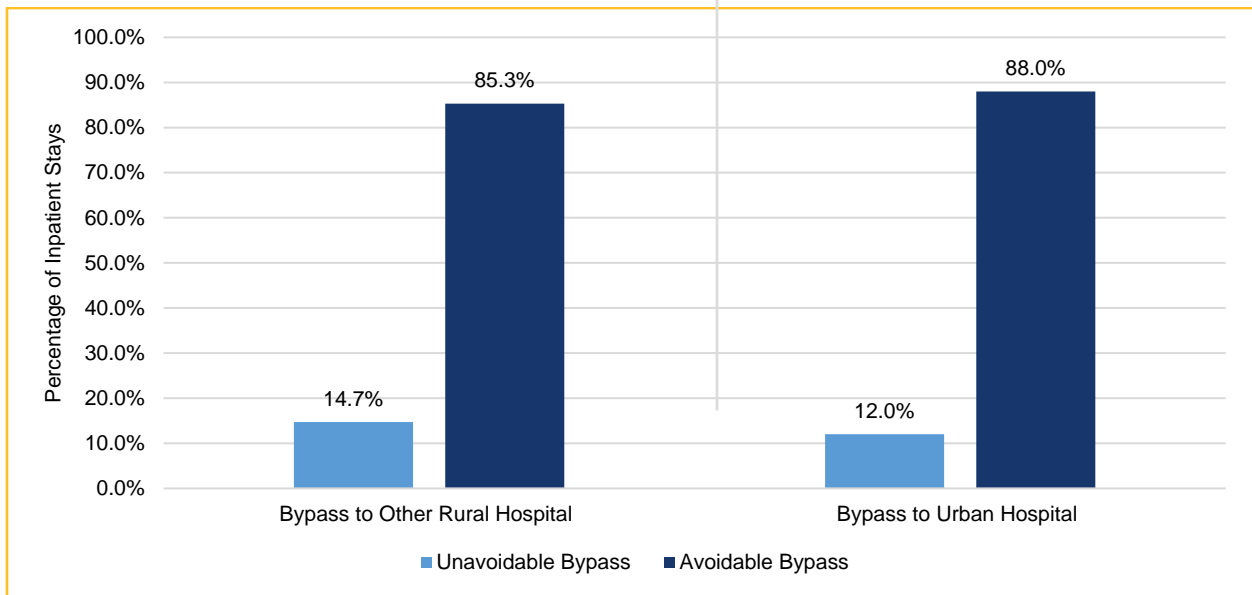
Notes: DRG is the Diagnostic Related Group that is used to classify the type of hospitalization. No bypass is the percentage of inpatient stays for which rural Medicare beneficiaries received care in Market 1 or Market 2 (their local hospital). Unavoidable bypass is the percentage of inpatient stays for which rural Medicare beneficiaries received care in Market 3 or Market 4 because services were not available in Market 1 or Market 2. Avoidable bypass is the percentage of inpatient stays for which rural Medicare beneficiaries received care in Market 3 or Market 4 even though those services were available in Market 1 or Market 2. Total rural Medicare inpatient stays in 2018 for all DRGs was 2,066,659. The total rural Medicare inpatient stays for the 50 most common DRGs is 1,199,752.

*Claims had missing or incorrect ZIP codes.

Source: Estimates were produced using Medicare Provider Analysis and Review files (MedPAR) inpatient claims.

Thus, limiting the findings to the top 50 DRGs focuses the results on avoidable bypass, or those stays for which a rural Medicare beneficiary could have reasonably received care at a local rural hospital, but instead chose to receive inpatient services elsewhere—either at another rural hospital or an urban hospital. In Figure 2, the majority of bypass to either a rural hospital or an urban hospital was avoidable—the service was available at the Medicare beneficiary’s closest rural hospital. Note that the majority of rural hospital bypasses were to an urban hospital (400,563 inpatient stays at urban hospitals versus 56,614 inpatient stays at another rural hospital).

Figure 2. Rural Hospital Bypass for Top 50 DRGs by Inpatient Stay Hospital Location, 2018



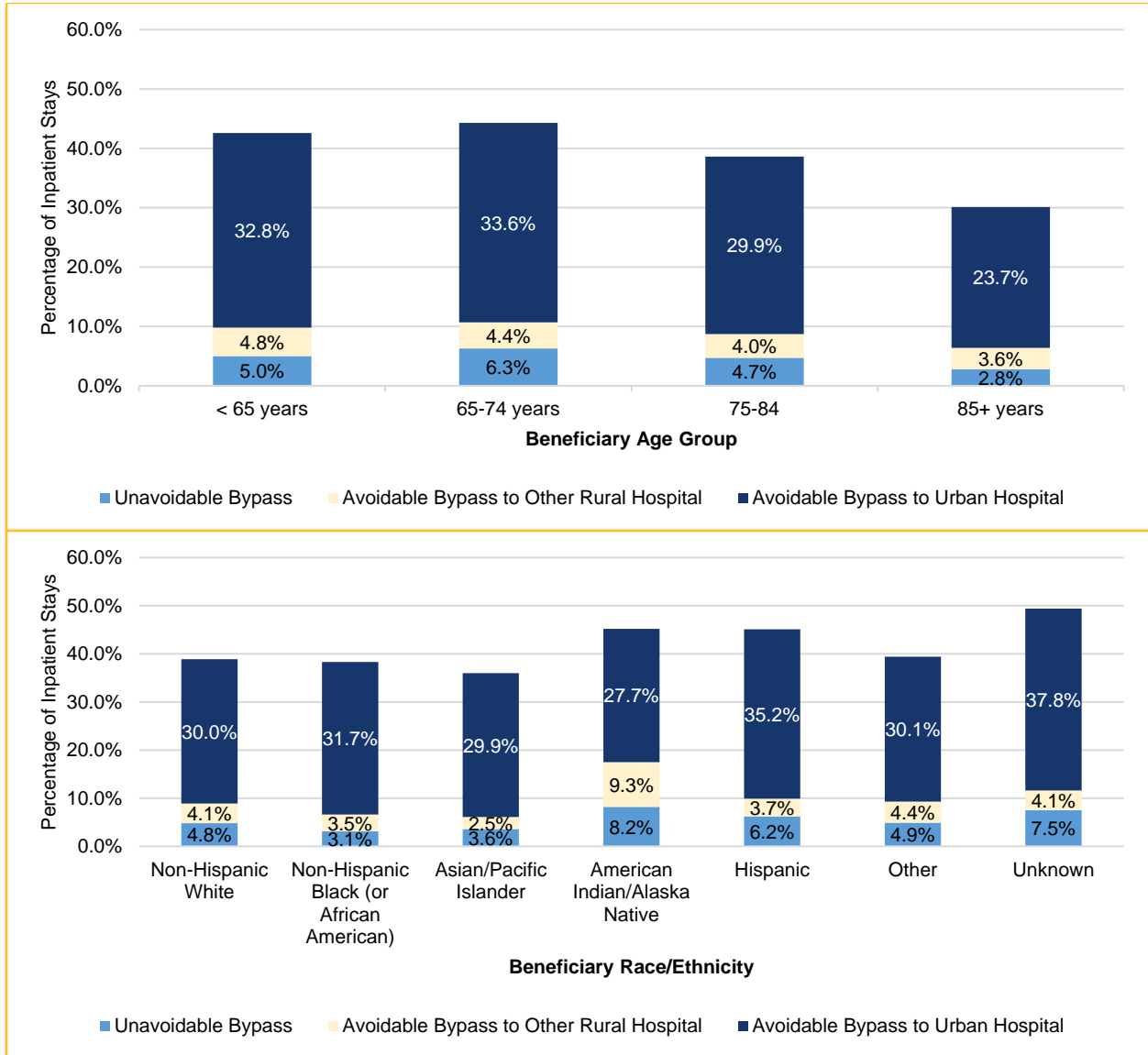
Notes: DRG is the Diagnostic Related Group that is used to classify the type of hospitalization. Unavoidable bypass is the percentage of inpatient stays for which rural Medicare beneficiaries received care in Market 3 or Market 4 because services were not available in Market 1 or Market 2 (their local rural hospital). Avoidable bypass is the percentage of inpatient stays for which rural Medicare beneficiaries received care in Market 3 or Market 4 even though those services were available in Market 1 or Market 2. The number of inpatient stays that were a bypass to another rural hospital were 56,614 and the number of inpatient stays that were a bypass to an urban hospital were 400,563.

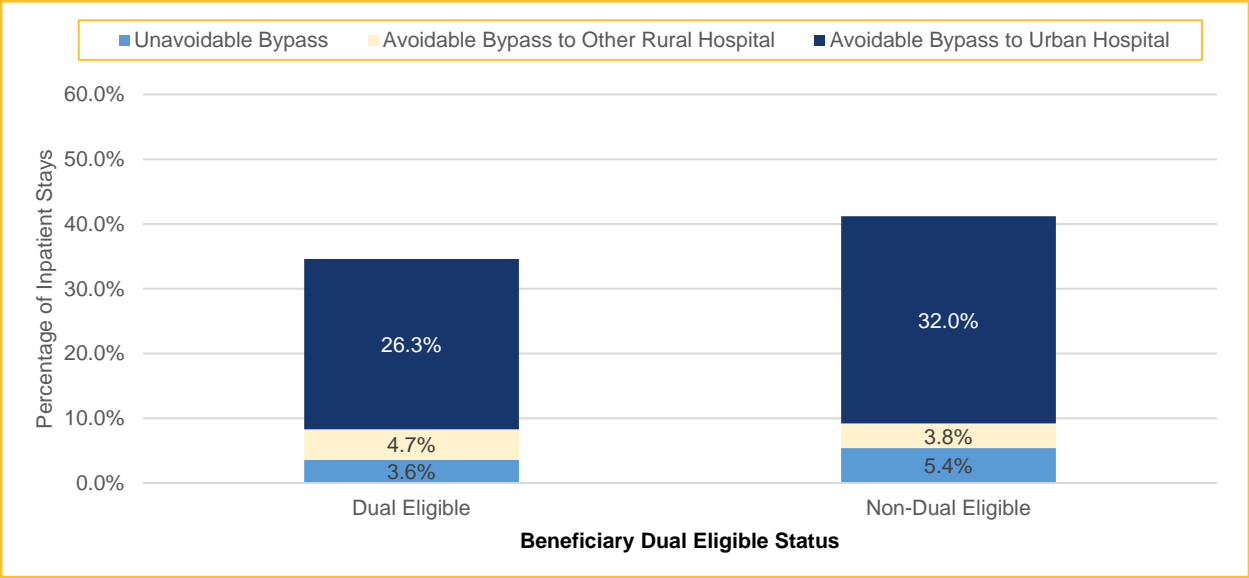
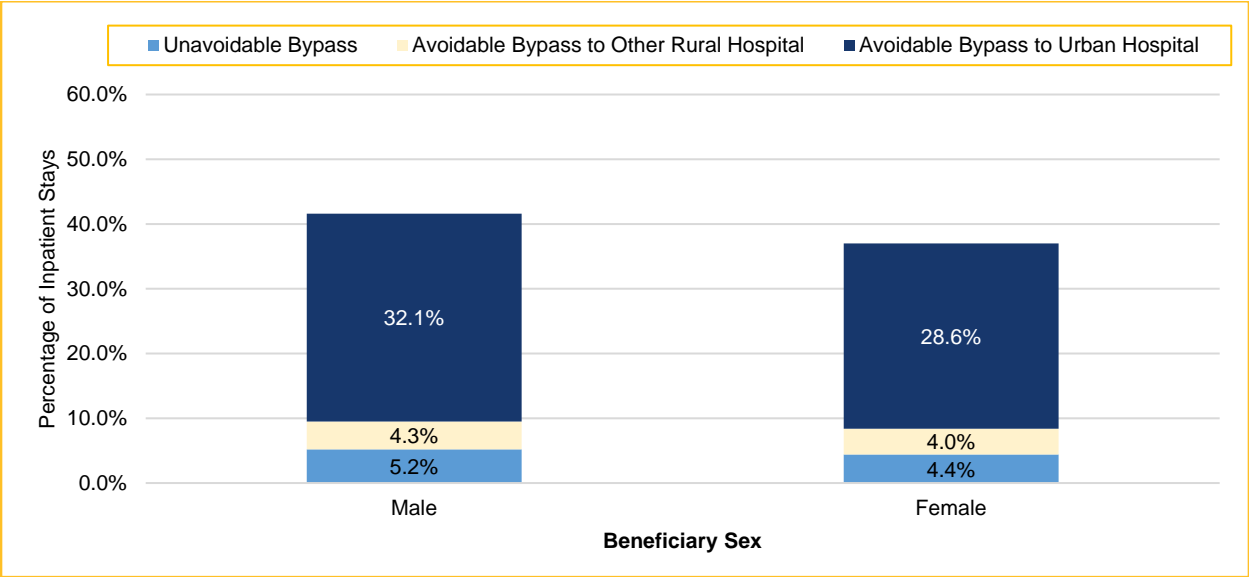
Source: Estimates were produced using Medicare Provider Analysis and Review files (MedPAR) inpatient claims.

Rural Hospital Bypass for Top 50 DRGs

Figure 3 provides avoidable rural hospital bypass by rural Medicare beneficiary characteristics, as a percentage of inpatient stays. Avoidable bypass rates (represented by orange and gray bars) are significantly higher among rural Medicare beneficiaries that are less than 75 years of age, males, Hispanic beneficiaries, and non-dual eligible beneficiaries.

Figure 3. Rural Hospital Bypass by Medicare Beneficiary Characteristics, 2018



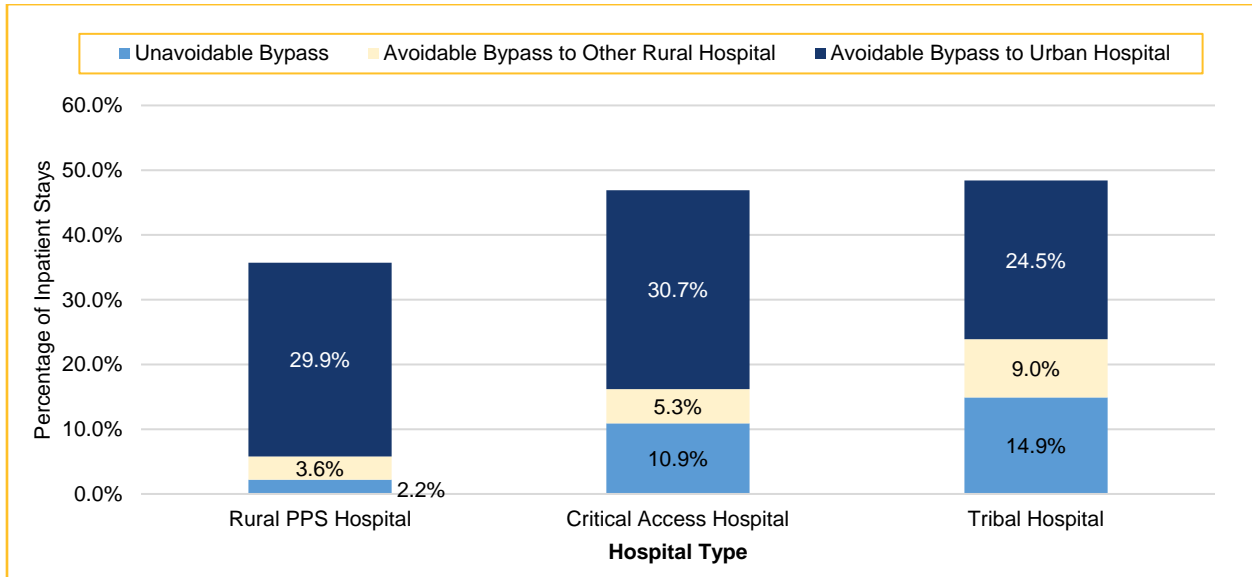


Notes: Unavoidable bypass is the percentage of inpatient stays for which rural Medicare beneficiaries received care in Market 3 or Market 4 because services were not available in Market 1 or Market 2 (their local hospital). Avoidable bypass is the percentage of inpatient stays for which rural Medicare beneficiaries received care in Market 3 or Market 4 even though those services were available in Market 1 or Market 2. The total rural Medicare inpatient stays with non-missing data for the 50 most common DRGs is 1,168,099. This analysis is based on the number of inpatient stays; Medicare beneficiary demographic information may be double-counted for those beneficiaries with multiple hospital stays in 2018 that occurred in different categories (e.g., one stay that was an avoidable bypass and one stay that was an unavoidable bypass.)

Source: Estimates were produced using Medicare Provider Analysis and Review files (MedPAR) inpatient claims.

Rural residents may choose to seek inpatient care at tertiary care hospitals located in urban areas, even though the service is available at nearby rural hospitals. Figure 4 shows the unavoidable and avoidable bypass rates by hospital type. The overall bypass rate was highest for Tribal hospitals and CAHs, particularly those with 15 beds or fewer.

Figure 4. Unavoidable and Avoidable Bypass Rates by Hospital Type, 2018

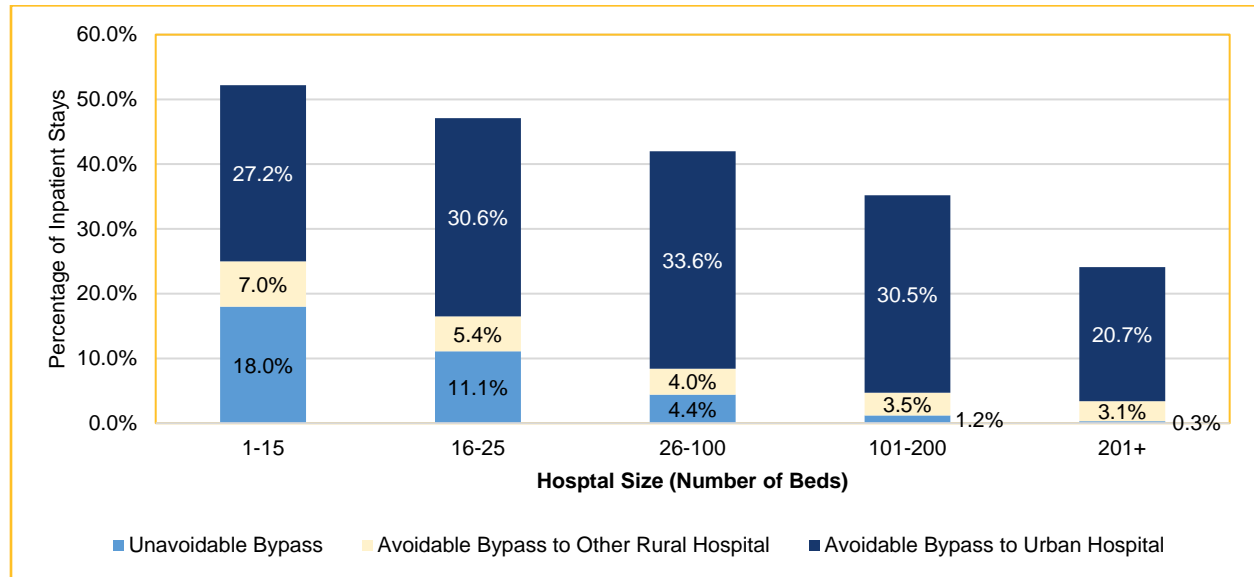


Notes: Table shows the unavoidable and avoidable bypass rates by hospital type. Unavoidable bypass is the percentage of inpatient stays for which rural Medicare beneficiaries received care in Market 3 or Market 4 because services were not available in Market 1 or Market 2 (their local hospital). Avoidable bypass is the percentage of inpatient stays for which rural Medicare beneficiaries received care in Market 3 (other rural hospital) or Market 4 (urban hospital) even though those services were available in Market 1 or Market 2. The total rural Medicare inpatient stays with non-missing data for the 50 most common DRGs is 1,168,099.

Source: Estimates were produced using Medicare Provider Analysis and Review files (MedPAR) inpatient claims.

Figure 5 shows the unavoidable and avoidable bypass rates by hospital size, as measured by hospital bed count. The rural to urban avoidable bypass rate was highest for rural PPS hospitals with 26 to 100 beds.

Figure 5. Unavoidable and Avoidable Bypass Rates by Hospital Size, 2018

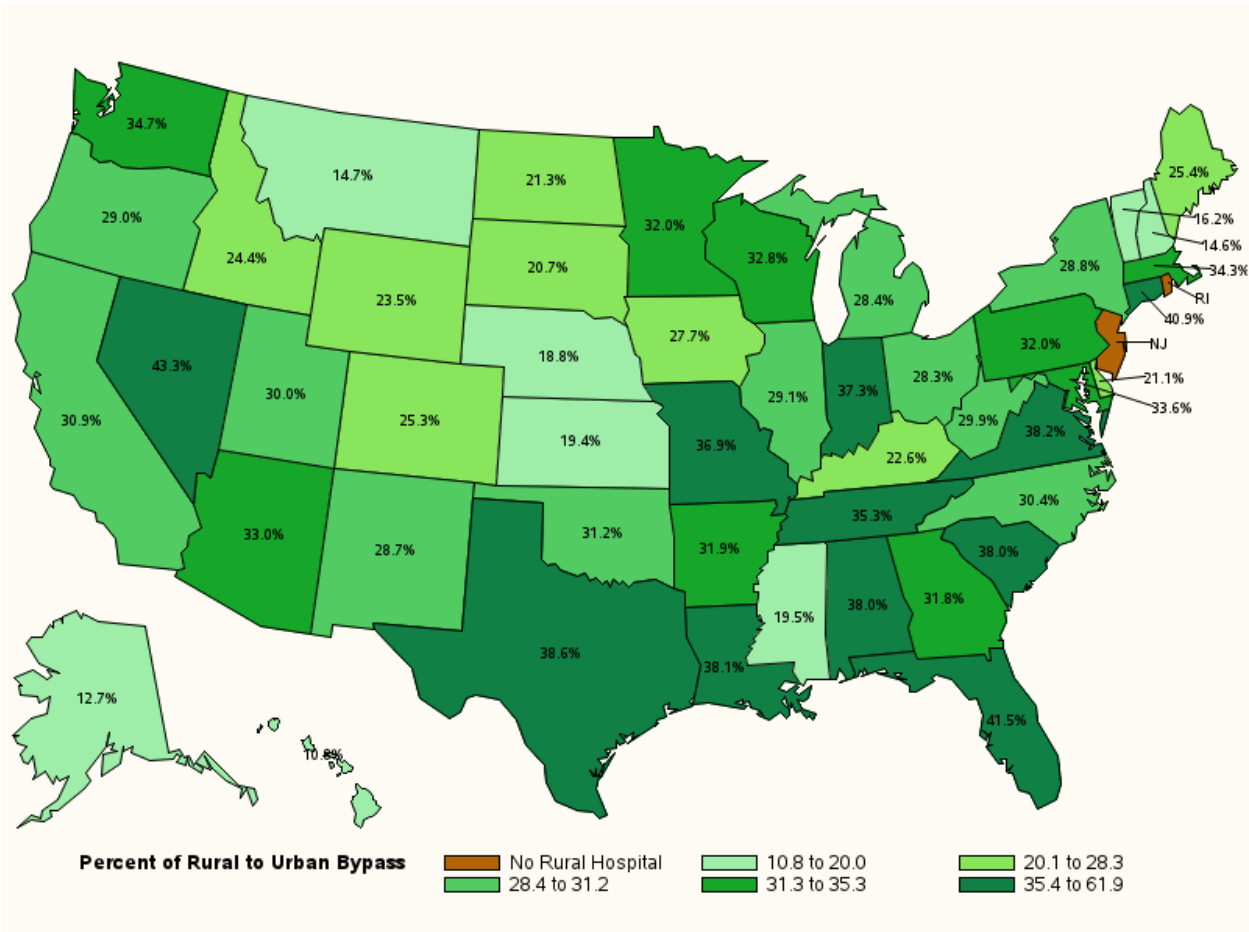


Notes: Table shows the unavoidable and avoidable bypass rates by hospital type. Unavoidable bypass is the percentage of inpatient stays for which rural Medicare beneficiaries received care in Market 3 or Market 4 because services were not available in Market 1 or Market 2 (their local hospital). Avoidable bypass is the percentage of inpatient stays for which rural Medicare beneficiaries received care in Market 3 (other rural hospital) or Market 4 (urban hospital) even though those services were available in Market 1 or Market 2. The total rural Medicare inpatient stays with non-missing data for the 50 most common DRGs is 1,168,099.

Source: Estimates were produced using Medicare Provider Analysis and Review files (MedPAR) inpatient claims.

Figure 6 shows the percentage of rural to urban avoidable bypass by state. This figure illustrates the percentage of inpatient stays for rural Medicare beneficiaries who sought inpatient care at an urban hospital for services that were available at their local rural hospital in quintiles. The lowest rate was in Hawaii (10.8 percent), while the highest rate was in Nevada (43.3 percent).

Figure 6. Avoidable Rural Hospital Bypass to an Urban Hospital by State, 2018

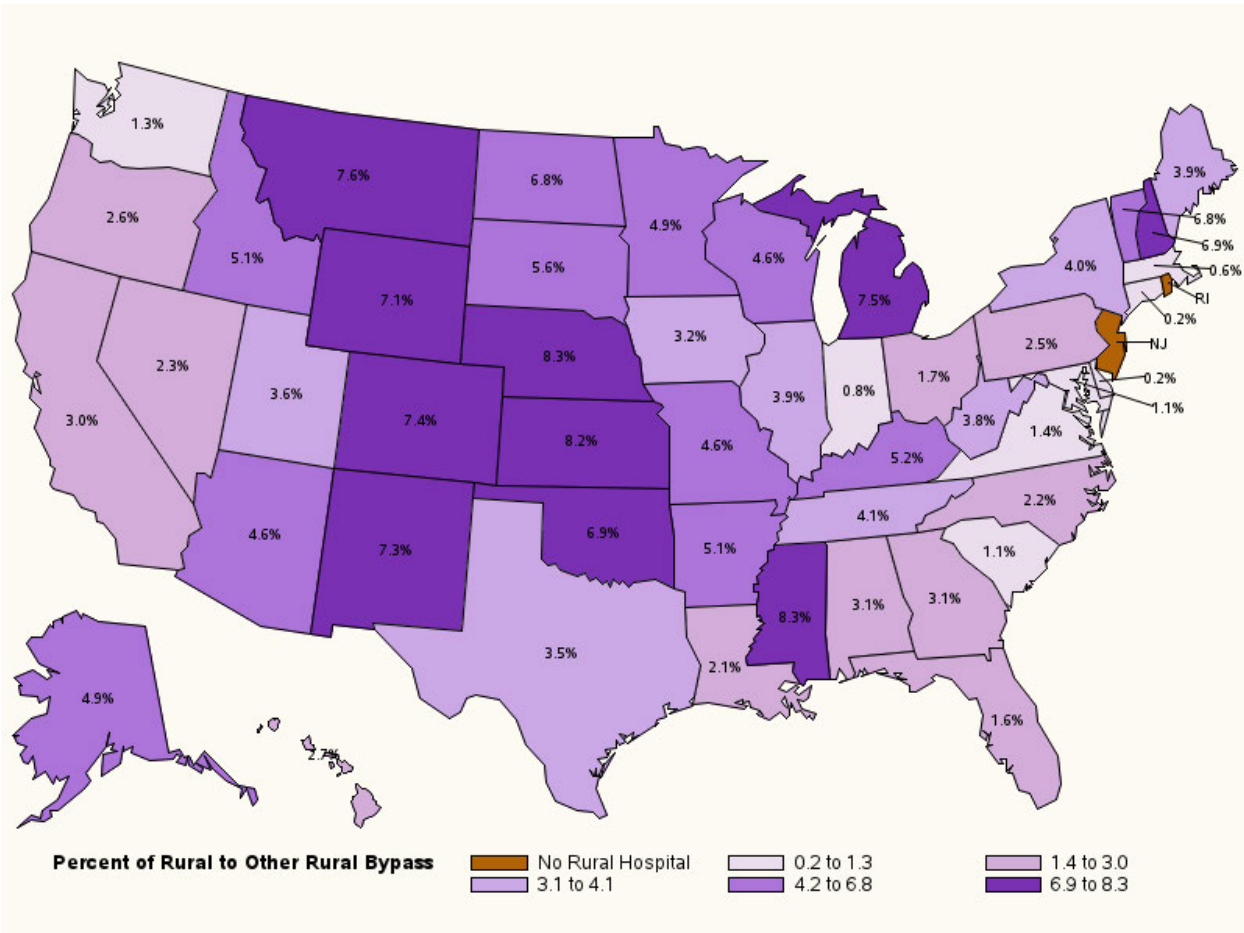


Notes: Avoidable bypass to an urban hospital is the percentage of inpatient stays for which rural Medicare beneficiaries received care in Market 4 (urban hospital) even though those services were available in Market 1 or Market 2 (their local rural hospital).

Source: Estimates were produced using Medicare Provider Analysis and Review files (MedPAR) inpatient claims.

Figure 7 shows the rural to rural avoidable bypass rate by state. This rate describes the percentage of rural Medicare beneficiaries who sought inpatient care at a rural hospital that is not their closest rural hospital for services that were available at their local rural hospital. The lowest rate was in Connecticut (0.2 percent), while the highest rate was in Mississippi (8.3 percent).

Figure 7. Avoidable Rural Hospital Bypass to a Rural Hospital Located More than 30 Miles Away (Not the Nearest Rural Hospital) by State, 2018



Notes: Avoidable bypass to a rural hospital is the percentage of inpatient stays for which rural Medicare beneficiaries received care in Market 3 (rural hospitals that are not the closest rural hospital and >30 miles away) even though those services were available in Market 1 or Market 2 (their local hospital).
 Source: Estimates were produced using Medicare Provider Analysis and Review files (MedPAR) inpatient claims.

Table 2 includes the 20 DRGs with the highest avoidable bypass rates. Over half of all inpatient stays for intracranial hemorrhage or cerebral infarction (e.g., stroke) among rural Medicare beneficiaries were not at their local rural hospital.

Table 2. Avoidable Bypass Rates for the 20 Most Frequently Bypassed DRGs, 2018

DRG Code	DRG Description	Avoidable Bypass to Other Rural Hospital (%)	Avoidable Bypass to Urban Hospital (%)
064	Intracranial Hemorrhage or Cerebral Infarction with MCC	2.8	58.0
065	Intracranial Hemorrhage or Cerebral Infarction with CC or Tissue Plasminogen Activator (TPA) in 24 Hours	3.5	48.8
281	Acute Myocardial Infarction Discharged Alive with CC	4.8	45.0
280	Acute Myocardial Infarction Discharged Alive with MCC	4.7	43.7
377	Gastrointestinal (GI) Hemorrhage with MCC	3.7	42.4
853	Infectious and Parasitic Diseases with Operating Room (OR) Procedure with MCC	2.9	43.0
552	Medical Back Problems without MCC	3.2	42.4
330	Major Small and Large Bowel Procedures with CC	3.3	41.8
378	Gastrointestinal (GI) Hemorrhage with CC	4.4	40.2
208	Respiratory System Diagnosis with Ventilator Support ≤ 96 Hours	3.8	40.3
066	Intracranial Hemorrhage or Cerebral Infarction without CC/MCC	3.4	39.7
470	Major Hip and Knee Joint Replacement or Reattachment of Lower Extremity without MCC	5.7	36.8
682	Renal Failure with MCC	4.4	37.4
885	Psychoses	7.8	32.9
309	Cardiac Arrhythmia and Conduction Disorders with CC	4.2	36.2
069	Transient Ischemia without Thrombolytic	3.2	36.6
483	Major Joint/Limb Reattachment Procedure of Upper Extremities	4.1	35.5
310	Cardiac Arrhythmia and Conduction Disorders without CC/MCC	3.8	35.8
313	Chest Pain	4.0	35.1
308	Cardiac Arrhythmia and Conduction Disorders with MCC	4.2	34.7

Notes: DRG is the Diagnostic Related Group that is used to classify the type of hospitalization. Avoidable bypass is the percentage of inpatient stays for which rural Medicare beneficiaries received care in Market 3 (other rural hospital) or Market 4 (urban hospital) even though those services were available in Market 1 or Market 2 (their local hospital). CC is complication or comorbidity. MCC is major complication or comorbidity. The complete list of the top 50 DRGs is provided in Appendix, Table A.1.

Source: Estimates were produced using Medicare Provider Analysis and Review files (MedPAR) inpatient claims.

Limitations

There are limitations that need to be considered when reviewing the study findings. First, the analysis is limited to inpatient acute hospital care for rural FFS Medicare beneficiaries. This care represents only a portion of the patients served and services provided by rural hospitals in their communities. Additionally, although the DRG intends to encompass patients who have a similar diagnosis and seek similar care and services, clinical severity and patient conditions cannot be completely observed in claims. While patients with higher degrees of clinical complexity or severity may be appropriately referred to a higher-level facility outside of their nearest rural HSA, these referrals are classified as a bypass in this analysis, potentially overestimating the avoidable rural hospital bypass rate.

Conclusion

Examining rural hospital bypass rates provides insight into how rural Medicare beneficiaries access inpatient acute hospital care. In 2018, almost 60 percent of Medicare fee-for-service (FFS) inpatient stays were at the Medicare beneficiary's nearest rural hospital; however, over 33 percent were at another hospital for services that could have been provided by the nearest rural hospital. Overall, the highest bypass rate was for critical access hospitals (CAHs) and Tribal hospitals with 15 or fewer beds, while the rural to urban bypass rate was highest for rural PPS hospitals with 26 to 100 beds.

Rural hospital bypass rates were also significantly higher for rural Medicare beneficiaries less than age 75 years, males, Hispanic beneficiaries, and non-dual eligible beneficiaries. Determining what types of inpatient hospital services rural Medicare beneficiaries seek within and outside of their assigned hospital market area helps providers, policy makers, and community stakeholders understand local health care needs. For example, over half of all inpatient stays for intracranial hemorrhage or cerebral infarction (e.g. stroke) among rural Medicare beneficiaries were not at their nearest rural hospital.

Avoidable bypass may result in reduced revenue for rural hospitals and providers. It also may contribute to a loss of revenue for other rural health care services, such as ancillary and primary care services, which are foundational to supporting the health needs of rural communities. Likewise, for rural hospitals providing specialty services, avoidable bypass moderates the ability to provide these services locally.

Additional quantitative analyses that include risk adjustment are needed to further explain the services sought by these rural Medicare beneficiaries to better understand their utilization patterns; however, qualitative analyses are key to understanding why these Medicare beneficiaries sought care outside of their community, such as the role of patients' perceptions and providers' decision making. Understanding the underlying issues driving rural Medicare beneficiaries' bypass behavior is foundational to identifying policy solutions to help mitigate avoidable bypasses.

As health care systems continue to evolve, information on access to health care services, especially inpatient hospital care, for rural Medicare beneficiaries is essential. Medicare plays a vital role in sustaining access to essential health care services in many rural communities. Rural hospitals play a pivotal role in supporting the health and economic stability of the rural communities they serve.

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About the Authors

CMS Alliance to Modernize Healthcare (Health FFRDC), Alana Knudson, Shena Popat, Wen Hu and Curt Mueller are with the Walsh Center for Rural Health Analysis at NORC at the University of Chicago. Cristina Miller is with Centers for Medicare & Medicaid Services Office of Minority Health.

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CMS Office of Minority Health

7500 Security Blvd.

MS S2-12-17

Baltimore, MD 21244

HealthEquityTA@cms.hhs.gov

<http://go.cms.gov/cms-omh>

Appendix. Supporting Tables

Table A.1. Top 50 DRGs Included in the Analysis

DRG Number	DRG Description	Number of HSAs	Total Number of Inpatient Claims	Avoidable Bypass to Urban Hospital (%)	Avoidable Bypass to Rural Hospital (%)	Unavoidable Bypass (%)	Total Bypass (%)
064	Intracranial Hemorrhage or Cerebral Infarction with MCC	1,872	16,656	58.0	2.8	6.2	67.0
065	Intracranial Hemorrhage or Cerebral Infarction with CC or Tissue Plasminogen Activator (TPA) in 24 Hours	1,945	24,601	48.8	3.5	1.5	53.8
281	Acute Myocardial Infarction Discharged Alive with CC	1,796	12,791	45.0	4.8	3.6	53.4
280	Acute Myocardial Infarction Discharged Alive with MCC	1,827	19,178	43.7	4.7	3.5	51.9
377	Gastrointestinal (GI) Hemorrhage with MCC	1,768	10,611	42.4	3.7	7.2	53.3
853	Infectious and Parasitic Diseases with Operating Room (OR) Procedure with MCC	1,892	16,055	43.0	2.9	18.5	64.4
552	Back Problems without MCC	1,852	10,455	42.4	3.2	1.1	46.7
330	Major Small and Large Bowel Procedures with CC	1,847	12,750	41.8	3.3	13.6	58.7
378	Gastrointestinal (GI) Hemorrhage with CC	1,951	28,647	40.2	4.4	1.8	46.4
208	Respiratory System Diagnosis with Ventilator Support ≤ 96 Hours	1,752	12,330	40.3	3.8	11.8	55.9
066	Intracranial Hemorrhage or Cerebral Infarction without CC/MCC	1,738	8,750	39.7	3.4	2.6	45.7
470	Major Hip and Knee Joint Replacement or Reattachment of Lower Extremity without MCC	2,040	104,847	36.8	5.7	15.7	58.2
682	Renal Failure with MCC	1,851	19,609	37.4	4.4	2.3	44.1
885	Psychoses	1,518	12,329	32.9	7.8	20.4	61.1
309	Cardiac Arrhythmia and Conduction Disorders with CC	1,913	21,064	36.2	4.2	1.3	41.7
069	Transient Ischemia without Thrombolytic	1,670	8,767	36.6	3.2	3.4	43.2
483	Major Joint/Limb Reattachment Procedure of Upper Extremities	1,901	16,379	35.5	4.1	28.4	68.0
310	Cardiac Arrhythmia and Conduction Disorders without CC/MCC	1,874	15,866	35.8	3.8	1.0	40.6
313	Chest Pain	1,641	8,733	35.1	4.0	3.4	42.5
308	Cardiac Arrhythmia and Conduction Disorders with MCC	1,836	15,009	34.7	4.2	2.4	41.3
871	Septicemia or Severe Sepsis without Mechanical Ventilation (MV) >96 Hours with MCC	2,034	123,042	34.0	4.6	0.4	39.0
683	Renal Failure with CC	1,926	28,212	33.0	4.3	0.4	37.7
291	Heart Failure and Shock with MCC or Peripheral Extracorporeal Membrane Oxygenation (ECMO)	2,015	71,026	32.8	4.1	0.2	37.1
698	Other Kidney and Urinary Tract Diagnoses with MCC	1,609	10,175	33.1	3.3	6.9	43.3

DRG Number	DRG Description	Number of HSAs	Total Number of Inpatient Claims	Avoidable Bypass to Urban Hospital (%)	Avoidable Bypass to Rural Hospital (%)	Unavoidable Bypass (%)	Total Bypass (%)
312	Syncope and Collapse	1,765	11,758	32.2	3.8	0.9	36.9
177	Respiratory Infections and Inflammations with MCC	1,777	15,433	31.0	4.3	2.8	38.1
389	Gastrointestinal (GI) Obstruction With CC	1,829	11,929	30.3	4.2	1.4	35.9
640	Miscellaneous Disorders of Nutrition Metabolism Fluids and Electrolytes with MCC	1,712	9,165	29.3	4.2	0.9	34.4
392	Esophagitis Gastroenteritis and Miscellaneous Digestive Disorders without MCC	1,992	33,025	27.9	4.2	0.1	32.2
481	Hip and Femur Procedures except Major Joint with CC	1,935	18,049	28.0	2.8	18.9	49.7
812	Red Blood Cell Disorders without MCC	1,775	11,821	26.9	3.9	0.5	31.3
390	Gastrointestinal (GI) Obstruction without CC/MCC	1,744	8,247	25.6	4.2	1.6	31.4
872	Septicemia or Severe Sepsis without Mechanical Ventilation (M) >96 Hours without MCC	1,976	36,569	24.9	4.2	0.1	29.2
292	Heart Failure and Shock With CC	1,974	24,106	25.0	3.8	0.1	28.9
189	Pulmonary Edema and Respiratory Failure	1,936	35,614	24.9	3.9	0.8	29.6
638	Diabetes with CC	1,742	11,434	24.0	4.2	0.6	28.8
178	Respiratory Infections and Inflammations with CC	1,653	8,031	23.3	4.8	0.6	28.7
193	Simple Pneumonia and Pleurisy with MCC	1,991	37,542	23.6	4.3	0.2	28.1
689	Kidney and Urinary Tract Infections with MCC	1,801	16,296	23.1	3.8	0.3	27.2
948	Signs and Symptoms without MCC	1,829	9,794	22.3	4.0	0.3	26.6
603	Cellulitis without MCC	1,980	24,572	22.0	4.1	0.0	26.1
641	Miscellaneous Disorders of Nutrition Metabolism Fluids and Electrolytes without MCC	1,984	24,078	19.1	3.8	0.0	22.9
293	Heart Failure and Shock without CC/MCC	1,836	11,010	18.5	3.7	0.2	22.4
690	Kidney and Urinary Tract Infections without MCC	2,006	35,279	17.7	3.8	0.0	21.5
190	Chronic Obstructive Pulmonary Disease with MCC	1,954	37,743	17.6	3.7	0.1	21.4
191	Chronic Obstructive Pulmonary Disease with CC	1,879	19,750	16.0	3.4	0.2	19.6
194	Simple Pneumonia and Pleurisy with CC	2,015	40,078	14.6	4.1	0.0	18.7
192	Chronic Obstructive Pulmonary Disease without CC/MCC	1,857	12,249	9.6	3.3	0.0	12.9
195	Simple Pneumonia and Pleurisy without CC/MCC	1,951	14,796	8.9	3.9	0.0	12.8
247	Percutaneous Cardiovascular Procedures with Drug-Eluting Stent without MCC	1,946	21,849	11.4	0.7	63.1	75.2

Notes: DRG is the Diagnostic Related Group that is used to classify the type of hospitalization. Unavoidable bypass is the percentage of inpatient stays for which rural Medicare beneficiaries received care in Market 3 or Market 4 because services were not available in Market 1 or Market 2. Avoidable bypass is the percentage of inpatient stays for which rural Medicare beneficiaries received care in Market 3 (other rural hospital) or Market 4 (urban hospital) even though those services were available in Market 1 or Market 2. CC is complication or comorbidity. MCC is major complication or comorbidity. The total rural Medicare inpatient stays with non-missing data for the 50 most common DRGs is 1,168,099.

Source: Estimates were produced using Medicare Provider Analysis and Review files (MedPAR) inpatient claims.

Table A.2. Rural Hospital Bypass for Top 50 DRGs by Inpatient Stay Hospital Location, 2018

	Top 50 DRGs (%)	Bypass to Other Rural Hospital (%)	Bypass to Urban Hospital (%)
No Bypass	59.3	-	-
Unavoidable Bypass	4.7	14.7	12.0
Avoidable Bypass	33.4	85.3	88.0
Missing Data*	2.6	-	-

Notes: The top 50 DRGs are listed in Table A.1. DRG is the Diagnostic Related Group that is used to classify the type of hospitalization. No bypass is the percentage of inpatient stays for which rural Medicare beneficiaries received care in Market 1 or Market 2. Unavoidable bypass is the percentage of inpatient stays for which rural Medicare beneficiaries received care in Market 3 or Market 4 because services were not available in Market 1 or Market 2. Avoidable bypass is the percentage of inpatient stays for which rural Medicare beneficiaries received care in Market 3 or Market 4 even though those services were available in Market 1 or Market 2. The total rural Medicare inpatient stays for the 50 most common DRGs is 1,199,752. The number of inpatient stays that were a bypass to an other rural hospital were 56,614 and the number of inpatient stays that were a bypass to an urban hospital were 400,563.

*Claims had missing or incorrect ZIP codes.

Source: Estimates were produced using Medicare Provider Analysis and Review files (MedPAR) inpatient claims.

Table A.3. Rural Hospital Bypass by Medicare Beneficiary Characteristics, 2018

Beneficiary Characteristics	Number of Inpatient Stays	Unavoidable Bypass (%)	Avoidable Bypass to Other Rural Hospital (%)	Avoidable Bypass to Urban Hospital (%)	Total Bypass (%)
Age Group					
< 65 years	173,737	5.0	4.8	32.8	42.6
65-74 years	367,778	6.3	4.4	33.6	44.3
75-84	368,133	4.7	4.0	29.9	38.6
85+ years	258,451	2.8	3.6	23.7	30.1
Race/Ethnicity					
Non-Hispanic White	1,051,179	4.8	4.1	30.0	38.9
Non-Hispanic Black (or African American)	72,368	3.1	3.5	31.7	38.3
Asian/Pacific Islander	2,404	3.6	2.5	29.9	36.0
American Indian/Alaska Native	19,936	8.2	9.3	27.7	45.2
Hispanic	7,815	6.2	3.7	35.2	45.1
Other	6,212	4.9	4.4	30.1	39.4
Unknown	8,185	7.5	4.1	37.8	49.4
Beneficiary Sex					
Male	523,023	5.2	4.3	32.1	41.6
Female	645,076	4.4	4.0	28.6	37.0
Dual Eligible					
Dual Eligible	385,276	3.6	4.7	26.3	34.6
Non-Dual Eligible	782,823	5.4	3.8	32.0	41.2

Notes: Unavoidable bypass is the percentage of inpatient stays for which rural Medicare beneficiaries received care in Market 3 or Market 4 because services were not available in Market 1 or Market 2. Avoidable bypass is the percentage of inpatient stays for which rural Medicare beneficiaries received care in Market 3 or Market 4 even though those services were available in Market 1 or Market 2. The total rural Medicare inpatient stays with non-missing data for the 50 most common DRGs is 1,168,099.

Source: Estimates were produced using Medicare Provider Analysis and Review files (MedPAR) inpatient claims, Medicare enrollment data.

Table A.4. Unavoidable and Avoidable Bypass Rates by Hospital Characteristics 2018

Rural Hospital Characteristics	Number of Rural HSAs	Unavoidable Bypass (%)	Avoidable Bypass to Other Rural Hospital (%)	Avoidable Bypass to Urban Hospital (%)	Total Bypass (%)
Hospital Type					
Rural PPS Hospital	864	2.2	3.6	29.9	35.8
Critical Access Hospital	1,161	10.9	5.3	30.7	47.0
Tribal Hospital	26	14.9	9.0	24.5	48.4
Hospital Bed Count					
1-15	135	18.0	7.0	27.2	52.2
16-25	917	11.1	5.4	30.6	47.2
26-100	631	4.4	4.0	33.6	42.1
101-200	271	1.2	3.5	30.5	35.3
201+	97	0.3	3.1	20.7	24.1

Notes: Table shows the unavoidable and avoidable bypass rates by hospital type and size. Unavoidable bypass is the percentage of inpatient stays for which rural Medicare beneficiaries received care in Market 3 or Market 4 because services were not available in Market 1 or Market 2. Avoidable bypass is the percentage of inpatient stays for which rural Medicare beneficiaries received care in Market 3 (other rural hospital) or Market 4 (urban hospital) even though those services were available in Market 1 or Market 2.

Source: Estimates were produced using Medicare Provider Analysis and Review files (MedPAR) inpatient claims.

Table A.5. Avoidable Rural Hospital Bypass by State, 2018

State	Number of Rural HSAs	Number of Inpatient Stays	Avoidable Bypass to Other Rural Hospital (%)	Avoidable Bypass to Urban Hospital (%)	Total Avoidable Bypass (%)
Alabama	37	28,227	3.1	38.0	38.0
Alaska	17	3,436	4.9	12.7	12.7
Arizona	25	11,482	4.6	33.0	33.0
Arkansas	48	32,251	5.1	31.9	31.9
California	53	36,618	3.0	30.9	30.9
Colorado	40	10,623	7.4	25.3	25.3
Connecticut	3	3,763	0.2	40.9	40.9
DC	0	N/A	N/A	N/A	N/A
Delaware	2	5,828	0.2	21.1	21.1
Florida	18	14,656	1.6	41.5	41.5
Georgia	51	34,560	3.1	31.8	31.8
Hawaii	7	2,287	2.7	10.8	10.8
Idaho	27	8,882	5.1	24.4	24.4
Illinois	71	46,964	3.9	29.1	29.1
Indiana	51	36,556	0.8	37.3	37.3
Iowa	90	32,948	3.2	27.7	27.7
Kansas	105	31,772	8.2	19.4	19.4
Kentucky	66	55,051	5.2	22.6	22.6
Louisiana	38	23,411	2.1	38.1	38.1
Maine	24	14,204	3.9	25.4	25.4
Maryland	5	6,367	1.1	33.6	33.6
Massachusetts	5	3,533	0.6	34.3	34.3
Michigan	59	40,599	7.5	28.4	28.4
Minnesota	87	18,243	4.9	32.0	32.0
Mississippi	61	44,700	8.3	19.5	19.5
Missouri	58	41,074	4.6	36.9	36.9
Montana	51	11,942	7.6	14.7	14.7
Nebraska	72	19,792	8.3	18.8	18.8
Nevada	12	4,580	2.3	43.3	43.3
New Hampshire	17	13,198	6.9	14.6	14.6

State	Number of Rural HSAs	Number of Inpatient Stays	Avoidable Bypass to Other Rural Hospital (%)	Avoidable Bypass to Urban Hospital (%)	Total Avoidable Bypass (%)
New Jersey	0	N/A	N/A	N/A	N/A
New Mexico	26	11,225	7.3	28.7	28.7
New York	48	36,292	4.0	28.8	28.8
North Carolina	50	64,117	2.2	30.4	30.4
North Dakota	37	6,321	6.8	21.3	21.3
Ohio	63	56,228	1.7	28.3	28.3
Oklahoma	81	46,231	6.9	31.2	31.2
Oregon	32	16,886	2.6	29.0	29.0
Pennsylvania	43	34,221	2.5	32.0	32.0
Rhode Island	0	N/A	N/A	N/A	N/A
South Carolina	21	23,154	1.1	38.0	38.0
South Dakota	46	9,933	5.6	20.7	20.7
Tennessee	49	40,786	4.1	35.3	35.3
Texas	141	66,927	3.5	38.6	38.6
Utah	21	5,139	3.6	30.0	30.0
Vermont	13	12,469	6.8	16.2	16.2
Virginia	25	29,216	1.4	38.2	38.2
Washington	38	17,090	1.3	34.7	34.7
West Virginia	24	17,375	3.8	29.9	29.9
Wisconsin	70	29,640	4.6	32.8	32.8
Wyoming	23	7,302	7.1	23.5	23.5

Notes: Avoidable bypass to a rural hospital is the percentage of inpatient stays for which rural Medicare beneficiaries received care in Market 3 (rural hospitals that are not the closest rural hospital and >30 miles away) even though those services were available in Market 1 or Market 2 (their local hospital). Avoidable bypass to an urban hospital is the percentage of inpatient stays for which rural Medicare beneficiaries received care in Market 4 (urban hospital) even though those services were available in Market 1 or Market 2. The total rural Medicare inpatient stays with non-missing data for the 50 most common DRGs is 1,168,099.

Source: Estimates were produced using Medicare Provider Analysis and Review files (MedPAR) inpatient claims.