NC RHRP

Findings Brief
NC Rural Health Research Program

December 2013
Revised March 2014

# Rural/Urban Differences in Inpatient Related Costs and Use Among Medicare Beneficiaries

Matthew Toth, MSW; Mark Holmes, PhD; Victoria A. Freeman, DrPH; George H. Pink, PhD

*This brief is part of a series of three briefs that provides information for policy makers and stakeholders as policy changes for Critical Access Hospitals (CAHs) are considered. This one focuses on the rural-urban differences in inpatient costs and use among Medicare beneficiaries. The others focus on potential increases in beneficiary travel distance if financially-vulnerable CAHs close, and the projected financial impact that a reduction in Medicare payments might have on CAHs.*

## BACKGROUND

A recent Institute of Medicine report suggests that care received after a hospitalization is a primary driver of regional variation in health care costs in the United States.[1] While evidence suggests that health care utilization varies by rural setting,[2] it is unknown how pre- and post-hospital admission costs and use differ between Medicare beneficiaries admitted to rural and urban hospitals. For example, those discharged from urban hospitals may be more likely to receive post-acute care from specialists or other more expensive providers, while those discharged from a rural hospital may not have access to specialist care, or they may use less follow-up care. There is also mixed evidence regarding potential differences in readmission rates in rural and urban settings.

### KEY FINDINGS

- Isolated rural hospitals received lower average adjusted Medicare Part A and Part B payments than urban hospitals.
- Isolated rural beneficiaries admitted to an urban hospital had higher adjusted Part A payments than urban beneficiaries admitted to an urban hospital.
- Isolated rural beneficiaries admitted to an isolated rural hospital had, on average, $3,643 less in Part B expenditures relative to being admitted to an urban hospital.
- After adjusting for location of hospital, pre- and post-admission Part B expenditures did not vary by beneficiary rural status.
- Large rural hospitals were more likely to have 30- and 60-day readmissions compared to urban hospitals.

To better understand the differences in patient cost, use, and quality of care, this brief examines two research questions on overall Medicare utilization: 1) Do Medicare beneficiary admission costs (including pre- admission and post-admission) vary by rurality of the hospital and beneficiary residence and 2) Do 30-day and 60-day readmission rates vary by rurality of the admitting hospital and beneficiary residence?

## METHODS

This study used the Medicare Current Beneficiary Survey, 2000 to 2009, Cost and Use files. Part A and Part B payments come from Medicare claims; beneficiary cost sharing is not included. Part A makes direct payments from Medicare for inpatient hospital stays, care in a skilled nursing facility, hospice care, and some home health care. Part B payments are for doctors' fees, outpatient care, medical supplies, and other medical services. The location for hospitals and beneficiaries was determined by Rural Urban Commuting Area (RUCA) codes:[3] Urban, Large Rural, Small Rural, and Isolated Rural. Observations were limited to admissions among beneficiaries who were alive at the end of the survey year, were continuously enrolled in Medicare Part B, did not have end-stage renal disease, took place within the 48 contiguous states, and had a valid ZIP code to match a RUCA code. Inpatient, outpatient, and carrier files were used to determine all payments seven days before and 60 days after an inpatient admission. We used a cumulative number of limitations with activities of daily living (ADLs) and instrumental activities of daily living (IADLs), and the Charlson co-morbidity index to adjust for health status. Age, gender, income, and education were used to adjust for socio-demographic characteristics (region was

also used but was statistically insignificant). We used cross-sectional survey weights to account for the complex survey design. T-tests and survey weighted OLS and logistic regressions were used to compare differences.

## RESULTS

Table 1 illustrates the average Part A costs by hospital and beneficiary rurality. Virtually all urban beneficiaries receive care in urban hospitals, whereas rural beneficiaries receive care in many locales, including urban hospitals and hospitals in areas of varying rurality. Without exception, rural hospitals received lower average Part A payments than urban hospitals. Among rural beneficiaries, small rural area beneficiaries admitted to isolated rural hospitals had the lowest average Part A payments ($3,882), while small rural area residents admitted to large rural area hospitals had the highest ($7,536). On the other hand, an admission of any rural resident to an urban hospital resulted in higher average payments to the hospital compared to admissions of urban residents ($7,879 for urban residents vs. $9,762 to $10,211 for rural residents).

**Table 1: Average Medicare Part A Payments by Hospital Location and Beneficiary Residence**

| | BENEFICIARY RESIDENCE | | | | |
|---|---|---|---|---|---|
| **HOSPITAL LOCATION** | **Urban** (N=11,656)* | **Large Rural** (N=3,137) | **Small Rural** (N=1,339) | **Isolated Rural** (N=1,451) | **Total** (N=17,583) |
| **Urban** | | | | | |
| *Payments* | $7,879<br>(8,286)<br>N=11,366 | $10,211<br>(9,258)<br>N=896 | $10,005<br>(9,955)<br>N=418 | $9,762<br>(9,931)<br>N=516 | $8,153<br>(8,396)<br>N=13,196 |
| **Large Rural** | | | | | |
| *Payments* | $6,098<br>(6,253)<br>N=204 | $5,225<br>(4,077)<br>N=2,155 | $7,536<br>(6,486)<br>N=254 | $6,399<br>(5,909)<br>N=327 | $5,624<br>(5,624)<br>N=2940 |
| **Small Rural** | | | | | |
| *Payments* | $3,784<br>(2,233)<br>N=71 | $5,246<br>(4,345)<br>N=50 | $4,393<br>(3,194)<br>N=586 | $5,065<br>(4,308)<br>N=234 | $4,558<br>(3,675)<br>N=941 |
| **Isolated Rural** | | | | | |
| *Payments* | N/A<br><50 cases | N/A<br>< 50 cases | $3,882<br>(2,769)<br>N=81 | $3,960<br>(3,072)<br>N=374 | $3,940<br>(3,149)<br>N=506 |
| **Average Total =** | $7,818<br>(8,073) | $6,690<br>(6,870) | $6,793<br>(7,566) | $6,745<br>(7,640) | |

*Data have been weighted to account for the complex sampling design. Total weighted N is 57,978,757. Standard deviations are in parentheses. (NOTE: an earlier version of this brief incorrectly indicated the numbers in parentheses were standard errors.)

Pre- and post-admission Part B spending (7 days before and 60 days after) also differed by the rurality of the hospital. Table 2 illustrates the average Part B spending by beneficiary and hospital rurality. Once again, all rural hospitals, regardless of location or residence of beneficiary, received lower average Part B payments than did urban hospitals. The difference between urban hospital payments for urban residents compared to rural residents was less marked than Part A payments, but still lower except for beneficiaries residing in small rural areas and getting care in urban settings. Average Part B payments ranged from a high of $8,162 for urban hospitals with beneficiaries from isolated rural areas to a low of $3,584 for small rural hospitals with beneficiaries from large rural areas. Total Part B payments were lower among rural beneficiaries compared to urban patients. When this comparison was adjusted for hospital location, the difference was not statistically significant. Isolated rural beneficiaries admitted to an isolated rural hospital had statistically significant lower Part B expenditures than those admitted to urban hospitals ($4,519 versus $8,162) ($p < 0.001$). This difference remained statistically significant after adjusting for beneficiary health status and socio-demographics.

**Table 2: Medicare Part B Payments by Hospital Location and Beneficiary Residence**

| BENEFICIARY RESIDENCE | | | | | |
|---|---|---|---|---|---|
| **HOSPITAL LOCATION** | **Urban** (N=11,656)* | **Large Rural** (N=3,137) | **Small Rural** (N=1,339) | **Isolated Rural** (N=1,451) | **Total** (N=17,583) |
| **Urban** | | | | | |
| *Payments* | $7,552<br>(11,773)<br>N=11,366 | $8,140<br>(10,777)<br>N=896 | $7,443<br>(9,598)<br>N=418 | $8,162<br>(10,834)<br>N=516 | $7,606<br>(11,477)<br>N=13,196 |
| **Large Rural** | | | | | |
| *Payments* | $7,076<br>(8,850)<br>N=204 | $5,403<br>(7,670)<br>N=2,155 | $5,530<br>(5,347)<br>N=254 | $5,771<br>(7,332)<br>N=327 | $5,580<br>(7,878)<br>N=2,940 |
| **Small Rural** | | | | | |
| *Payments* | $5,250<br>(5,458)<br>N=71 | $3,584<br>(4,267)<br>N=50 | $5,509<br>(7,906)<br>N=586 | $4,024<br>(4,472)<br>N=234 | $5,009<br>(7,075)<br>N=941 |
| **Isolated Rural** | | | | | |
| *Payments* | N/A<br>N<50 | N/A<br>N<50 | $4,773<br>(5,431)<br>N=81 | $4,519 (5,292)<br>N=374 | $4,583<br>(5,465)<br>N=506 |
| **Average Total =** | $7,528<br>(11,463) | $6,168<br>(9,204) | $6,101<br>(8,386) | $6,009<br>(8,500) | |

*Data have been weighted to account for the complex sampling design. Total weighted N is 57,978,757. Standard deviations are in parentheses. (NOTE: an earlier version of this brief incorrectly indicated the numbers in parentheses were standard errors.)

**Table 3: Percentage of Medicare Beneficiaries with a 30-day or 60-day Readmission, by Hospital Location and Beneficiary Residence**

| BENEFICIARY RESIDENCE | | | | | |
|---|---|---|---|---|---|
| **HOSPITAL LOCATION** | **Urban** (N=11,656)* | **Large Rural** (N=3,137) | **Small Rural** (N=1,339) | **Isolated Rural** (N=1,451) | **Total** (N=17,583) |
| | | | | | |
| **Urban** | | | | | |
| 30-day | 19.8 | 18.2 | 18.9 | 17.1 | 19.5 |
| 60-day | 25.2 | 22.6 | 24.3 | 22.5 | 25.0 |
| **Large Rural** | | | | | |
| 30-day | 28.2 | 20.1 | 21.3 | 20.4 | 20.9 |
| 60-day | 32.9 | 26.1 | 27.1 | 26.4 | 26.7 |
| **Small Rural** | | | | | |
| 30-day | 30.0 | 17.9 | 20.8 | 23.3 | 22.1 |
| 60-day | 37.9 | 24.9 | 27.2 | 27.7 | 28.1 |
| **Isolated Rural** | | | | | |
| 30-day | 26.1 | 15.0 | 20.5 | 24.5 | 23.2 |
| 60-day | 33.2 | 29.9 | 27.4 | 30.4 | 30.0 |

*Data have been weighted to account for the complex sampling design. Total weighted N is 57,978,757.

Table 3 outlines the proportion of 30-day and 60-day readmissions by hospital location and beneficiary residence. Readmission rates varied widely, from 15.0% to 37.9%, but there are no statistically significant differences in the probability of having a readmission within 30 days by hospital rurality, with the exception of large rural hospitals. After adjusting for beneficiary rural status, health status, and socio-demographic characteristics, large rural hospitals had 3% greater probability of having a 30-day and 60-day readmission compared to urban hospitals ($p < 0.05$). Additionally, urban beneficiaries admitted to a large rural hospital had a statistically significantly greater probability of having a readmission (28%), relative to an urban hospital (20%) ($p < 0.05$).

## DISCUSSION

*What did we find?*
Inpatient-related payments varied considerably by the rurality of the beneficiary and the hospital, even after adjusting for health and socio-demographic characteristics. However, Part B payments were driven more by hospital location than beneficiary residence. Rural beneficiaries admitted to a rural hospital consistently had lower Part A and Part B expenditures than urban beneficiaries with only one exception: Part A payments were greater for rural patients visiting an urban hospital than urban patients visiting an urban hospital. In general, there were no statistically significant differences in the likelihood of 30-day or 60-day readmission across rural and urban hospitals and beneficiaries.

*What are the policy implications?*
First, rural beneficiaries admitted to rural hospitals are receiving less costly and, likely, less intensive inpatient and outpatient care pre- and post-admission than urban beneficiaries. One reason for this may be that rural patients with more complex health care needs could be receiving care in urban settings. Critical Access Hospitals (CAHs) are required to have an average length of stay of less than 96 hours, which may also prompt patient transfer to urban hospitals. Urban hospitals may have more resources to manage complex patients, drawing a more expensive patient population from rural settings. Indeed, we found that Part A payments were higher among rural beneficiaries who visited an urban hospital, relative to urban beneficiaries, which may support this line of thinking. However, the urban patient mix at urban hospitals may be broader than the rural patient mix, which may explain the difference in payments between these two groups. Additionally, Part A and Part B payment differences remained significant after adjusting for health status and socio-demographics, suggesting factors other than the health of the patient may affect pre-and post-admission expenditures.

Second, lower Part B expenditures may suggest that rural patients receiving care in a rural setting might rely more heavily on family practice, general medicine or other non-specialty primary care, rather than specialist, for their pre- and post-admission care, or they simply receive less care. This finding suggests the possibility of a nuance not captured in the 2012 MedPAC report [4] finding similar levels of utilization between urban and rural beneficiaries; it may be that although use rates are similar, the type of care received in the urban versus rural settings is different. These findings imply that utilization patterns of rural Medicare beneficiaries may modify (in unknown ways) the effect of any Medicare payment reform; rural beneficiaries seem to access the health care system in different ways. Because of this difference, as delivery system reforms move toward more team-based and integrated care across primary and specialty care, rural beneficiaries may be excluded from the benefits of better integration with specialty care services.

Finally, it is unclear whether the differential Part A and Part B payments indicate differences in volume or quality of care or differences in reimbursement rates for inpatient-related services. We were unable to detect a statistically significant difference in 30- and 60-day readmission, which suggests similar quality between rural and urban settings. However, payment differences may lead to differences in outcomes not considered here, such as mortality and quality-of-life. Given that some studies suggest that rural hospitals have lower performance on process and other quality measures [4,5] this line of future research could be especially fruitful.

## LIMITATIONS

More study is needed to have a true understanding of what these differences may mean. To understand if urban hospitals are drawing sicker patients from rural areas, future studies should consider severity of diagnosis and drivers of patterns of care in addition to specific health conditions. Related health care costs outside what Medicare Part A and Part B cover should also be considered. For example, Part A and Part B payments do not account for personal care or home care services financed by Medicaid or other community organizations.

The average Part A costs by hospital and beneficiary rurality adjusts for overall health condition but not severity of diagnosis (or even specific diagnosis). Unadjusted mean expenditures were adjusted by number of ADLs, IADLs, and the Charlson Comorbidity Index, but other measures of severity could be important. Additional limitations include:

- Small sample sizes prevented any conclusion to be drawn from Part A and Part B payments among Urban and Large rural beneficiaries admitted to an Isolated Rural hospital.
- Some payments to CAHs are based on the administrative claims data, which are derived from the fee schedule rather than the year-end cost report settlement.
- This project excludes beneficiaries who died by the end of the survey year. Therefore, it does not account for variation in payments caused by high intensity utilization near the end of life.


1. Newhouse JP, Garber AM. Geographic variation in health care spending in the United States: Insights from an Institute of Medicine report. *JAMA*.2013;310(12):227-1228.
2. Larson SL, Fleishman JA. Rural-urban differences in usual source of care and ambulatory service use: analyses of national data using Urban Influence Codes. *Medical Care*. 2003:III65-III74.
3. RUCA codes were aggregated into the "Categorization A" classification outlined in http://depts.washing ton.edu/uwruca/ ruca-uses.php
4. MedPAC. 2012. Report to Congress: Medicare and the Health Care Delivery System. In C. f. M. a. M. Services (Ed.). Washington, DC.
5. Lichtman JH, Leifheit-Limson EC, Jones SB, Wang Y, Goldstein LB. 30-Day risk-standardized mortality and readmission rates after ischemic stroke in critical access hospitals. *Stroke.* 2012;43(10):2741-2747.



*This study was funded through cooperative agreement U1GRH07633, Rapid Response to Requests for Rural Data Analysis and Issue Specific Rural Research Studies, with the Federal Office of Rural Health Policy, Health Resources and Services Administration, U.S. Department of Health and Human Services. The conclusions and opinions expressed in this paper are the authors' alone; no endorsement by the University of North Carolina, ORHP, or other sources of information is intended or should be inferred.*