South Carolina
Rural Health Research Center

Findings Brief
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Kevin J. Bennett, PhD • Jarrod Bullard, MPA • Yu-Hsiu Lin, PhD • Janice C. Probst, PhD

Transitions in Care among Rural Residents with Congestive Heart Failure, Acute Myocardial Infarction, and Pneumonia

KEY FINDINGS

Critical Access Hospitals serve a substantial proportion of residents of small and remote rural counties

- Among persons with the three conditions studied, more than 40% of beneficiaries in living in small and remote rural counties obtained initial care from a CAH.

Nationally, 5.8% of all admissions were transferred to another facility

- The transfer rate was higher among rural (10.5%) and critical access (11.8%) hospital admissions than among urban hospital admissions (4.2%).

The most common discharge destination after the transfer admission is home (42.5%)

- Within rural transfer patients, critical access hospital (CAH) patients were less likely to be discharged to home than patients from other rural hospitals (41.7% versus 44.3%).
- A discharge of death from the second hospital was more common for CAH transfer patients than for patients at other rural hospitals (11.0% versus 6.0%).

Patients transferred from rural hospitals had a lower 30-day readmission rate than urban patients

- Patients transferred from a rural hospital or CAH had lower readmission rates (16.4%) than urban transfer patients (25.3%).
- Among those with a readmission, rural transfer patients were less likely to be readmitted to the original facility than urban transfer patients.

Introduction

Both rural and urban hospitals vary with regard to the levels of care they are able to provide, requiring that a subset of patients be transferred from the first point of encounter to a second facility. Because of their generally smaller size, rural hospitals are more likely than urban institutions to transfer patients to a second hospital for definitive care. Critical access hospitals, which are limited to 25 inpatient beds and may only keep patients for 96 hours, are required to have transfer and referral agreements with one or more larger acute care hospitals. All rural hospitals, whether through inpatient services or emergency department stabilization, offer important initial care for rural residents.

The degree to which inter-hospital transfers occur, and the outcomes for transfer patients, have not been studied across rural and urban institutions. The analysis reported here examines the continuum of care of Medicare beneficiaries as they experience transfers to other facilities, including their post-discharge status (death vs. discharge), post-discharge care (such as nursing home care, skilled nursing care, home health care, and primary care follow-up), and potentially preventable readmissions, either to their local hospital or another facility. Inpatient and outpatient claims data were drawn from the Medicare five percent sample files, 2013. To allow comparability across rural and urban patients, the study was restricted to beneficiaries admitted for congestive heart failure (CHF), AMI, or pneumonia. Patients were followed from their first billed encounter with a hospital, including patients who were seen at an emergency department at the initial hospital and immediately transferred to a second facility. Details are provided in the Technical Appendix (page 10).

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Study Sample

The initial sample consisted of 2,906,607 beneficiaries, based on a five percent sample of 2013 Medicare claims (see details in Technical Notes). Among these beneficiaries, 298,783 were admitted as inpatients to a hospital and 117,416 were initially seen in an emergency department. The final study sample was limited to beneficiaries with an encounter for CHF, AMI, or pneumonia (41,852).

Among beneficiaries with an admission for a studied diagnosis, 31.5% lived in a rural county (See Figure 1). Differences did exist by condition; a smaller proportion of beneficiaries with CHF lived in rural counties (29.5%), whereas both AMI and pneumonia had higher proportions of rural residents (See Table 1).

Figure 1: Distribution of Medicare Admissions by Patient Residence, among Beneficiaries with an Admission for AMI, CHF, or Pneumonia, 2013 (n=41,852)

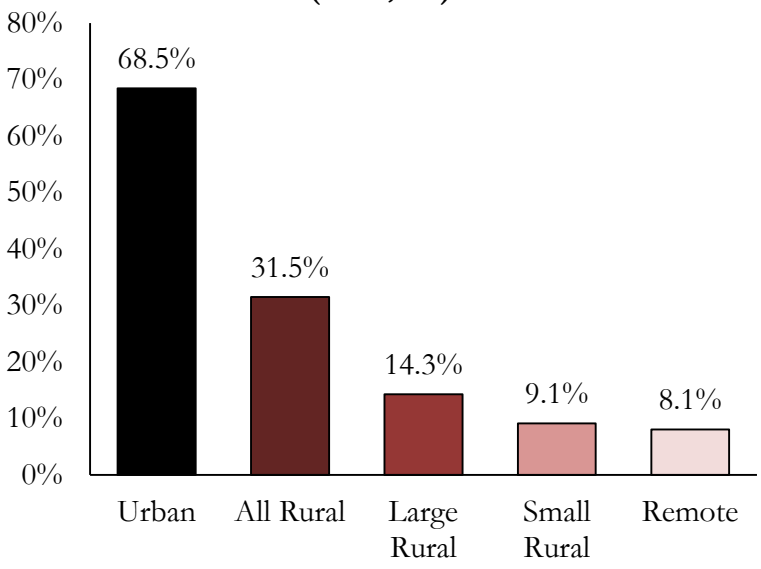


Table 1: Distribution of Beneficiaries with a Qualifying Admission, by Patient Residence and Condition, 2013 (n = 41,852).

	Urban	All Rural†	Within Rural Counties		
			Large Rural†	Small Rural†	Remote†
CHF (n=21,344)	70.5%	29.5%	13.7%	8.9%	6.9%
Pneumonia (n=13,940)	64.8%	35.2%	14.9%	9.8%	10.6%
AMI(n=6,568)	69.7%	30.3%	15.2%	8.4%	6.7%

† Significantly different from urban residence, p = 0.05

Admitting Hospital Location

Among all beneficiaries with any of the three conditions, 26.6% were first admitted to a rural hospital or CAH (see Figure 2). This proportion is smaller than the study population distribution (31.5% living in rural areas), as some rural residents were initially admitted to urban institutions.

Among rural beneficiaries with an admission, 64.6% were admitted to a rural facility, compared to 3.0% of urban beneficiaries admitted to a rural facility (See Table 2).

Among all patients admitted to a rural facility, 27.6% were admitted to CAHs (data not in table). Given the preponderance of CAH facilities in rural areas (1,242 vs. 91 in urban areas), it is not surprising that among beneficiaries admitted to a rural hospital, rural residents were more likely to have a CAH admission (28.1% of all admissions in rural facilities compared to 23.0% among urban residents; data not in table). More than half of rural facility admissions among residents of small adjacent and remote rural areas were to CAH facilities.

Figure 2: Distribution of Medicare Admissions by Hospital Location, Beneficiaries with an Admission for AMI, CHF, or Pneumonia, 2013 (n = 41,852)

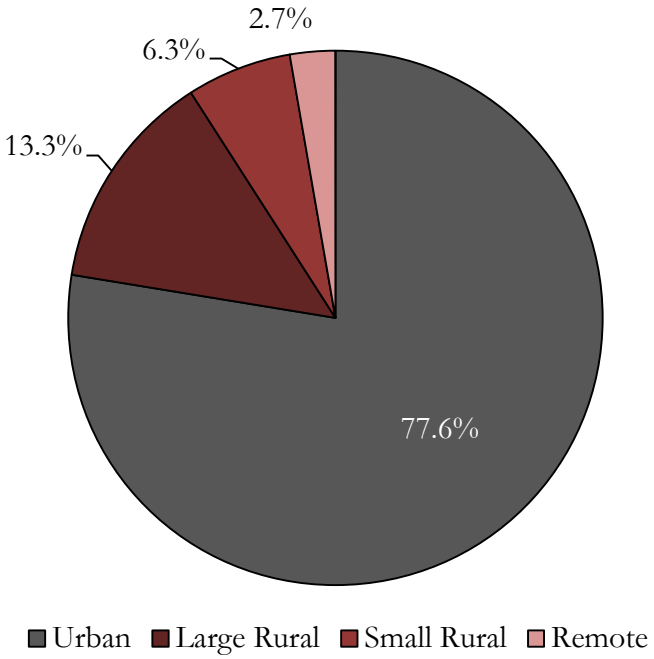


Table 2: Distribution of Admitting Facility Type, by Patient Residence and Facility Location, 2013 (n = 41,852).

	Urban	Rural & CAH	Rural (not CAH)	CAH
All Beneficiaries	77.6%	22.4%	16.2%	6.2%
Rural-Only Residence†	35.4%	64.6%	46.4%	18.1%
Large Rural Residence†	31.7%	68.3%	61.3%	7.0%
Small Rural Residence†	40.2%	59.8%	34.6%	25.2%
Remote Rural Residence†	36.6%	63.4%	33.5%	29.9%
Urban Residence†	97.0%	3.0%	2.3%	0.7%

† Significantly different from urban hospitals, p = 0.05

Transfer Patterns

A patient is defined as having been transferred if a claim is submitted by one hospital, either for emergency department or inpatient services, followed immediately by a claim for inpatient admission at a second hospital. Thus, transfers could occur directly from an emergency room as well as subsequent to admission. Transfer rates differed by condition, with AMI patients having the highest transfer rate (15.6%) among the three conditions. Rural AMI admissions had more than twice the rate of transfers of urban admissions (26.0% versus 12.5%, respectively). CAH transfer rates were higher than those at other rural hospitals for all three conditions.

Table 3: Proportion of Hospitalizations with a Transfer, by Facility Location and Condition, 2013, n = 2,416

	All	Urban	Rural & CAH	Rural (not CAH)	CAH
Transfers, Total	5.8%	4.2%	10.5%†	10.0%†	11.8%†
Transfers, CHF	4.0%	3.0%	7.7%†	6.9%†	9.7%†
Transfers, Pneumonia	3.8%	2.1%‡	8.1%†	7.1%†	10.2%†
Transfers, AMI	15.6%‡	12.5%‡	26.0%†‡	24.8%†‡	31.8%†‡

† Significantly different from urban hospitals, α = 0.05 ‡ Significantly different from CHF, α = 0.05

Among all patients who were transferred, more than one-half were transferred from one urban facility to another (53.0%, data not shown) and 38.1% were transfers from rural hospitals or CAHs to urban hospitals. The remaining were transfers to a rural facility.

Examining only transfers from rural facilities (n = 1,078), 85.4% were transferred to an urban hospital (See Table 4). CAH transfers had a lower proportion transferred to an urban facility (78.6%), with a higher proportion transferred to another rural facility. In both types of rural facilities, urban residents were more likely to be transferred to an urban facility than were rural residents.

Table 4: Transfer Patterns Among Beneficiaries Initially Admitted to Rural Hospitals or CAHs, 2013, n = 1,078

Transfer patterns	All Rural Hospitals and CAHs			CAHs Only		
	All Residents	Rural Residents†	Urban Residents	All Residents	Rural Residents†	Urban Residents
Rural to urban	85.4%	82.8%	97.7%			
Rural to rural/CAH	14.6%	17.2%	2.3%			
CAH to urban				78.6%	74.5%	100.0%
CAH to rural/CAH				21.4%	25.5%	0.0%

† Significantly different from urban hospitals, p = 0.05.

Post-Discharge Follow-up for Transferred Patients

To examine post-discharge follow-up care, the final discharge disposition was examined. That is, among transferred individuals, patient disposition subsequent to the *transfer* admission was examined to determine post-discharge care.

More than two-fifths of all transferred beneficiaries were discharged back to home at the conclusion of their stay in the second hospital (42.5%; See Table 5). The next most common destination was long-term care (24.6%), followed by home health care (18.8%). Another 3.5% were transferred to yet another hospital, and 6.9% died in the facility. In comparison, non-transferred patients had a substantially lower mortality rate (3.1%, data not in table).

When all rural transfer patients (CAHs and other hospitals) were compared to urban transfer patients, there were small but statistically significant differences in post-discharge care. Rural admissions were more likely to be discharged to home (43.5%), and hospice (4.1%) than urban admissions. Rural admissions were also more likely to die (7.6%) than urban patients (6.4%). Rural admissions were less likely to be discharged into long term care (24.3%) or home health (17.3%) than urban admissions (See Table 5).

Comparisons between CAHs and other rural hospitals showed larger differences. Although home remained the most common discharge outcome, this was less likely among transferred CAH patients than among patients transferred from other rural facilities (41.7% versus 44.3%). CAH transfer patients were less likely to be discharged to home health care than other rural patients (13.0% versus 19.2%) and more likely to be discharged to long-term care (27.0% versus 23.1%). A discharge of death from the second hospital was more common for CAH transfer patients than for similar patients at other rural hospitals (11.0% versus 6.0%).

Table 5: Discharge Status Following Transferred Admission, by Initial Admission Location and Hospital Type, 2009 (n = 2,416)

Discharge Status	All	Location of initial hospital admission			
		Urban	Rural & CAH	Rural (not CAH)	CAH Only
Home	42.5%	41.8%	43.5%†	44.3%†	41.7%‡
Death	6.9%	6.4%	7.6%†	6.0%†	11.0%‡
Long-Term Care	24.6%	24.9%	24.3%†	23.1%†	27.0%‡
Home Health	18.8%	19.9%	17.3%†	19.2%†	13.0%‡
Hospice	3.4%	2.8%	4.1%†	4.5%†	3.2%‡
Transfer*	3.5%	3.9%	3.1%	2.6%	4.1%
Other	0.1%	0.2%	0.3%	0.3%	0.0%

† Significantly different from urban hospitals, p = 0.05

‡ Significantly different from rural-only hospitals, p = 0.05

*Indicates a transfer from the second facility

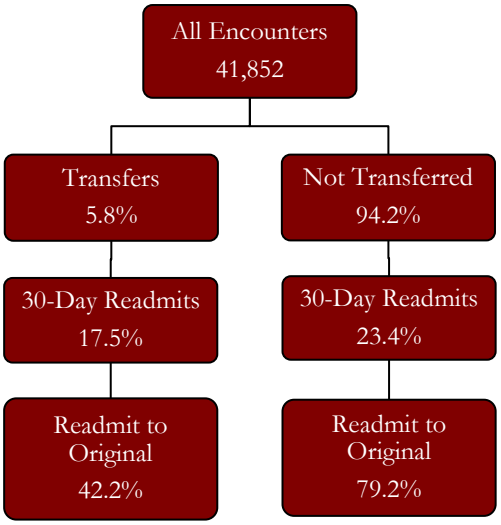
30-Day Readmissions among Transferred and Other Patients

Unplanned readmission rates

An unplanned readmission to the hospital within 30 days can be an indication of poor transition planning, which might be particularly problematic for transferred rural patients.

Overall, 23.0% of beneficiaries admitted for AMI, CHF, or pneumonia had an additional unplanned admission within 30 days of discharge from their final hospital (n = 9,641).* This proportion was significantly higher for non-transfers than transfers (23.4% vs. 17.5%, See Table A-1 and Figure 3).

Figure 3. Readmission Rates by Transfer Status, by Patient Residence and Condition, 2013 (n = 41,852)



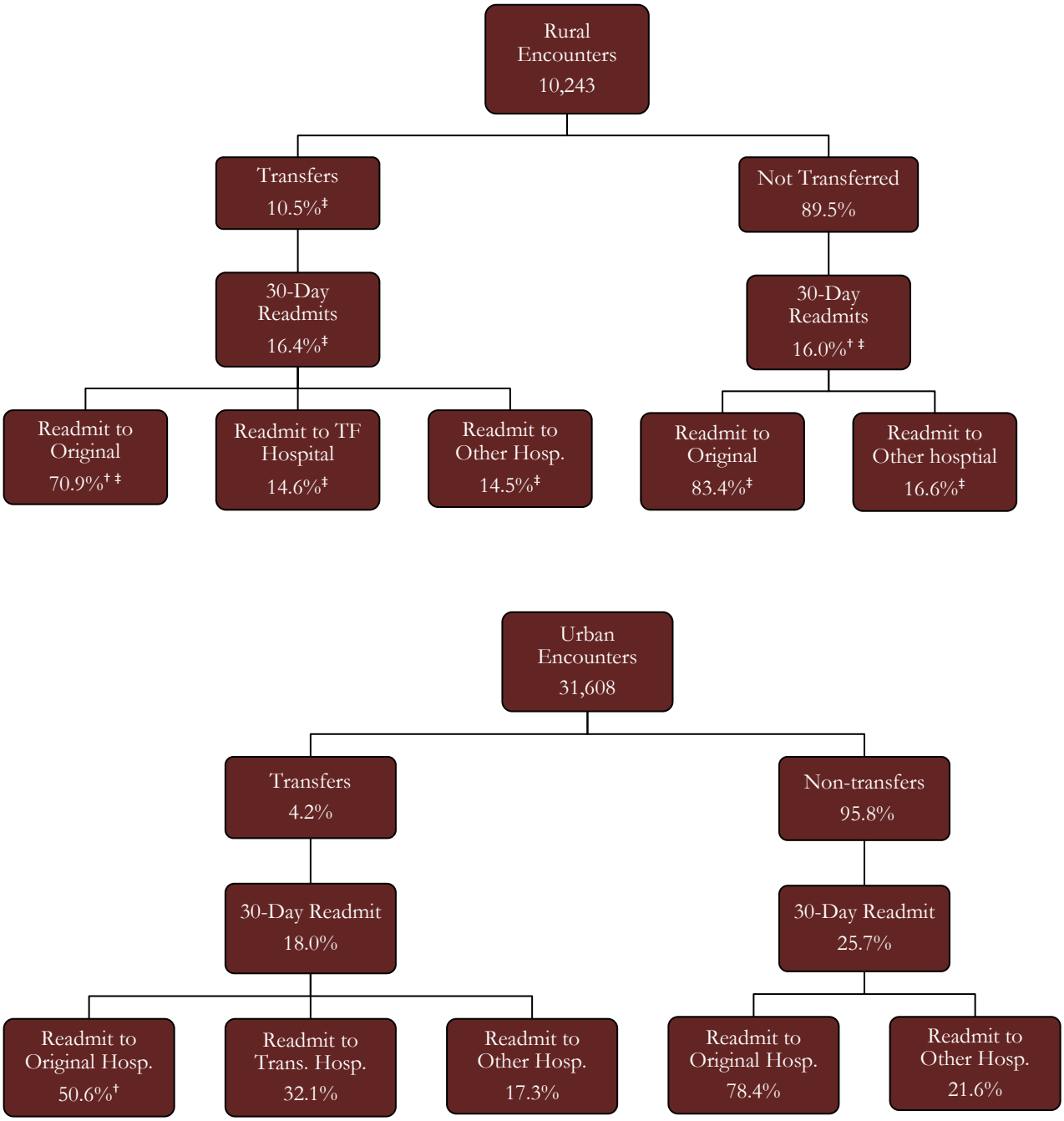
All patients: Among all beneficiaries one of the three qualifying diagnoses, including transfers and other patients, those initially presenting at a rural hospital or CAH for were less likely to experience rehospitalization within 30 days than were those admitted to an urban hospital (16.0% compared to 25.3%; $p < 0.001$; data not displayed). Among beneficiaries first seen at a rural hospital, the readmission rate was lower among those initially seen at a CAH than among those admitted to another type of rural hospital, regardless of transfer status (6.5% versus 19.8%; See Table A-1).

Transferred patients: Across all rural patients, readmission rates were similar among rural patients with a transfer (16.4%) and without (16.0%). With patients first presenting at a CAH, non-transfer patients were less likely to experience an unplanned readmission than transferred patients (6.3% compared to 9.1%, Table A-1). Within patients at other rural hospitals, rehospitalization rates were similar among non-transferred than transferred patients (19.8% versus 19.0%).

The care course of studied patients is graphically presented by rural/urban location of the first facility on the next page (Figure 4) and presented in table form in the Technical Appendix (Table A-1).

* For beneficiaries who were not transferred, the 30-day count started with discharge from the first and only admitting hospital. For those who were transferred, the measurement period started with discharge date from the second hospital.

Figure 4: Readmission Rate and Follow-up Location, by Transfer Status, 2013, n = 3,367



† Significantly different from non-transfers, $p \leq 0.05$
‡ Significantly different from urban hospitals, $p \leq 0.05$
s Indicates value suppressed due to small sample size
n/a Indicates "not applicable"

Reason for readmission

Across both rural and urban admissions, 52.7% of all unplanned readmissions were for the same condition as the index admission. This proportion was higher among transfers (59.5%) than non-transfers (52.4%; $p < 0.0001$). This proportion also was higher among those initially admitted to CAH facilities among non-transfers but was lower among transfers (see Table A-1).

Location of readmission hospital

Among beneficiaries with an unplanned readmission, the location of the readmitting hospital differed by transfer status. Overall, 77.6% of all readmissions were to the original hospital. Among beneficiaries who had a transfer, the proportion returning to the initial facility was substantially lower (42.2%), as 41.2% were readmitted to the transfer hospital. Among all those admitted to a rural facility, 82.6% were readmitted to the initial hospital. This proportion was lower (78.8%) among CAH admissions. Among transfers, a smaller proportion was readmitted at the original hospital (70.9%), with 14.5% being readmitted back to the transfer hospital.

Conclusions

We analyzed the experience of rural and urban Medicare beneficiaries who were hospitalized for a group of common conditions (AMI, CHF, and pneumonia) to ascertain the frequency of inter-hospital transfer and the subsequent experience of patients. Findings illustrated the reliance that residents of small adjacent and remote rural counties have upon CAHs. Among persons with the three conditions studied, more than 40% of beneficiaries in living in small and remote rural counties obtained initial care from a CAH.

Patient transfers (5.8% overall) were more common among patients initially presenting at rural hospitals (10.5%) than at urban hospitals (4.2%). Given CAH limitations on length of stay and requirements for transfer arrangements to more advanced care associated with the CAH designation, a higher rate of transfers from CAHs (11.6%) than from other rural hospitals (9.3%) was anticipated. Transfer rates within the three conditions studied were clinically logical, with the highest transfer rate noted for AMI, a condition for which intensive technological intervention is more likely than for heart failure or pneumonia.

Among patients initially seen at a rural hospital, patients who were transferred had 30 day unplanned admission rates close to those of patients who were not transferred (16.4% versus 16.0%). Within patients first presenting at CAH hospitals, transferred patients were more likely to be readmitted (9.1%) than non-transferred patients (6.3%). Further research is needed to clarify whether and how readmission rates among rural residents can be reduced. Wider implementation of Medicare Accountable Care Organizations (ACOs) may improve coordination between hospital discharge planners and outpatient providers. Preliminary evidence based on trauma patients suggests that patients transferred within ACO member institutions had lower costs for hospitalization than those transferred from other institutions;[1] outcomes for rural ACOs have not yet been published.

The finding that transferred patients from all hospitals were more likely to die during hospitalization than non-transferred patients (5.4% versus 2.9%) is consistent with transfer being used only for more severely ill patients. However, it is also possible that delays in definitive care associated with the transfer process resulted in excess mortality. More detailed clinical research is needed to ascertain whether better transfer coordination or earlier treatment initiatives could be beneficial. Further research is needed to identify successful procedures for transitioning at-risk patients back to usual care in the community. Rural ACOs, when data become available, may provide inter-institutional relationships that facilitate care across a continuum of hospitals and outpatient providers. A CMS experiment in global budgeting, the Pennsylvania Rural Health Model, may yield a different approach to coordinating care so as to improve population health outcomes; however, this program was only initiated in January, 2017 and will not be concluded until 2023.[2] Additional work to explore successful relationships in would be beneficial not only for the patient, but for insurers and health systems.

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[1] Geyer BC, Peak DA, Velmahos GC, Gates JD, Michaud Y, Petrovick L, Lee J, Yun BJ, White BA, Raja AS. Cost savings associated with transfer of trauma patients within an accountable care organization. *Am J Emerg Med.* 2016 Mar;34(3):455-8.

[2] Medicare Program; Funding in Support of the Pennsylvania Rural Health Model—Cooperative Agreement; Centers for Medicare and Medicaid Services, U.S. Department of Health and Human Services. Federal Register 82:17 (Friday, April 14, 2017); 17998-18000.

Technical Appendix And References

Data Source

Data for the analysis were drawn from the 2013 Medicare Claims files obtained from the Research Data Assistance Center (ResDAC). Claims were merged by a unique identifier, with visit types classified by their place of service codes or other identifiers in each claim file. Records with missing data for the variables of interest were excluded.

Cases were included if their index admission was for AMI, CHF, or pneumonia. All other admissions for those individuals were included. Transfers were defined as an admission to another facility immediately after discharge from a prior inpatient admission or emergency department visit. Transfers to any facility other than a general acute care facility were excluded.

Geographic definitions

Because of differences in data availability associated with patient confidentiality, two different definitions of rural were used:

- Analyses based on *patient residence*: Geographic analysis was based on county of residence using Urban Influence Codes (UICs): metropolitan (UICs 1, 2), micropolitan (UICs 3, 5, 8), small adjacent (UICs 4, 6, 7), and remote rural (UICs 9, 10, 11, 12).[3]
- Analyses based on *hospital location*: For the hospital locations, we used ZIP Code approximations[4] of the 2010 Rural-Urban Commuting Area Codes.[5] Codes 1.0, 1.1, 2.0, 2.1, and 3.0 were classified as urban, with the remaining classified as rural.

Limitations

Analyses are based on claims data alone. Thus, the clinical condition of transferred and non-transferred patients cannot be defined fully. The analysis provides no information regarding whether transfers were necessary or appropriate.

Funding Acknowledgement:

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[3] Economic Research Service, U.S. Department of Agriculture. Urban Influence Codes. Updated October 12, 2016. https://www.ers.usda.gov/data-products/urban-influence-codes/

[4] WWAMI Rural Health Research Center, Temporary Zip Ruca 3.10 File Access Page**,** August 4, 2014 https://ruralhealth.und.edu/ruca

[5] Economic Research Service, U.S. Department of Agriculture. Rural – Urban Commuting Areas Codes. Updated October 12, 2016. https://www.ers.usda.gov/data-products/rural-urban-commuting-area-codes/

Table A-1: Readmission Rate and Follow-up Location, by Transfer Status, 2013, n = 3,367

	All Discharges				Transfers				Non-Transfers			
	All (Urban plus Rural)	Rural Hospitals Only			All (Urban plus Rural)	Rural Hospitals Only			All (Urban plus Rural)	Rural Hospitals Only		
		All Rural	Rural (not CAH)	CAH		All Rural	Rural (not CAH)	CAH		All Rural	Rural (not CAH)	CAH
30-Day Readmission Rate	23.0%	16.0%‡	19.8%‡	6.5%‡	17.5%†	16.4% ǂ	19.0% ǂ	9.1% ǂ	23.4%	16.0%‡	19.8%‡	6.3%‡
Readmitted for Same Condition	52.7%	50.7%‡	50.2%‡	55.0%‡	59.5%†	47.3% ǂ	47.9% ǂ	43.8% ǂ	52.4%	50.9%‡	50.3%‡	56.1%‡
Readmission Location												
Readmitted to Original Hospital	77.6%	82.6%‡	83.1%‡	78.8%‡	42.2%	70.9% ǂ	s	s	79.2%	83.4%‡	84.1%	78.0%‡
Readmitted to Transfer Hospital	1.8%	1.0%‡	1.1%‡	0.0%‡	41.2%	14.5% ǂ	s	s	0.0%	--	--	--
Readmitted to Neither Original nor Transferred Hospitals	20.6%	16.4%‡	15.8%‡	21.2%‡	16.6%	14.5% ǂ	s	s	20.8%	--	--	--

† Significantly different from non-transfers, $p \leq 0.05$ ‡ Significantly different from urban hospitals, $p \leq 0.05$
s Indicates value suppressed due to small sample size n/a Indicates "not applicable"