Intensive Care Unit Utilization and Interhospital Transfers As Potential Indicators of Rural Hospital Quality

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ABSTRACT: ***Context:*** *Obtaining meaningful information from statistically valid and reliable measures of the quality of care for disease-specific care provided in small rural hospitals is limited by small numbers of cases and different definitive care capacities. An alternative approach may be to aggregate and analyze patient services that reflect more generalized care processes.* ***Purpose:*** *To evaluate the applicability of intensive care unit (ICU) utilization and interhospital transfers as potential indicators of quality in rural hospitals.* ***Methods:*** *Secondary data analysis of ICU utilization and interhospital transfer practices in Iowa's Critical Access (CAH), rural, rural referral, and urban hospitals.* ***Findings:*** *Rural hospitals have fewer resources, provide a more limited range of definitive care services, and rely to a greater extent on transferring patients to other hospitals capable of providing the required definitive care. Examining ICU utilization and interhospital transfer patterns we found (1) that lower percentages of patients receive ICU care in smaller facilities; (2) higher transfer rates for both ICU and non-ICU patients in CAH hospitals; (3) shorter average lengths of stay for ICU patients from smaller hospitals who were transferred; and (4) lower mortality rates for CAH and rural hospital ICU patients.* ***Conclusions:*** *Examining ICU utilization and interhospital transfer patterns offers potential insights into rural hospital quality measurement and comparisons.*

Two Institute of Medicine (IOM) reports, *To Err is Human*[1] and *Crossing the Quality Chasm*,[2] raise serious questions related to the safety and quality of health care services provided to the American public. These reports have stimulated great interest in measuring and comparing hospital care quality and safety. Entities such as the Leapfrog Group[3] are also actively promoting patient safety enhancements through health care purchasing decisions tied to condition-specific patient volume thresholds and the presence of computerized physician order entry systems and intensivist-only staffing in intensive care units (ICUs). Unfortunately, these Leapfrog Group[3] safety standards are generally not feasible in most rural hospitals. A more encouraging but still limited approach is being taken by the Centers for Medicare and Medicaid Services (CMS) through its National Voluntary Hospital Reporting Initiative. This initiative focuses on 10 process-of-care indicators for 3 common conditions: heart attack care, heart failure care, and pneumonia care.[4] Unfortunately, for many rural hospitals annual patient volumes for these 3 conditions are too low to yield statistically reliable and valid measures. Likewise, limitations in equipment and/or information technology capabilities in rural hospitals make some indicators, such as average minutes until first antibiotic for pneumonia care or assessment of left ventricular function for heart failure care, not practical.

Recent work highlights the interplay between a hospital's resources, the nature and scope of services provided, and potential implications for care quality and patient safety (see Wholey et al[5] and Moscovice et al[6] in this issue of *The Journal of Rural Health*). Each hospital's specific scope of definitive care services is

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limited by its unique combination of available human (eg, knowledge, skills, numbers) and capital (eg, physical plant and equipment) resources. This in turn has a direct effect on their specific care quality and patient safety challenges. Given the wide variation in resources available in different-sized hospitals (rural, rural referral, urban), it is not surprising that there are relatively few condition-specific measures of care quality that allow for meaningful comparisons among all sizes of hospitals.

At a more global level, quality can be conceptualized and assessed in terms of whether the "right care" is given to the "right patient" in the "right way" in the "right amount" and at the "right time" *given available resource limitations.* For rural hospitals these 5 "rights" apply equally to both definitive care services being provided and the timely recognition for, and execution of, transfers to other hospitals capable of providing the needed care. Thus, although rural hospitals cannot be expected to provide the same scope of services as their urban counterparts, they can be expected within resource limitations to appropriately use the highest level of care necessary and available to meet a patient's definitive care needs, and if this is insufficient, to execute a timely transfer to an appropriate hospital. We argue here that valuable insights about rural hospital quality can be gained by examining the more generalized care processes and practice patterns related to the use of ICUs and interhospital transfers.

Scenario

Assume there are 2 hospitals. One is a large urban academic medical center (AMC) with 500+ staffed beds (including separate ICUs) and the full complement of medical and surgical specialists and subspecialists. The second is a 20-bed critical access hospital (CAH) with 1 staffed ICU bed, no inpatient surgery services, and a medical staff of 4 family practitioners. Clearly there is a great difference in the scope and complexity of the definitive care services that each hospital can provide. For example, because it has round-the-clock access to residents and attending faculty, and a more specialized nursing staff, the AMC's general medicine units are more capable than the CAH's inpatient unit of appropriately caring for patients who are more clinically complex and ill. Likewise, the AMC's ICUs have greater definitive care capacities than does the CAH's ICU.

Can high-quality care be provided in both hospitals? Absolutely. Do the 5 rights described above apply equally to both hospitals? Absolutely. Can we measure and compare care quality in both using the same measures? Yes, but only so long as the definitive care being compared is the same. For example, unless otherwise medically contraindicated, good quality requires that acute myocardial infarction (AMI) patients discharged home from either the CAH or AMC be instructed to take aspirin on a daily basis. However, for more medically complex patients requiring definitive care services beyond the capabilities of the CAH, good quality care requires timely transfer to an appropriate facility such as the AMC.

Potential Rural Hospital Quality Measures: ICU Utilization and Transfer Care

Depending on both the patient's specific condition and care needs and the care capabilities of the local hospital and its ICU, the care that can be provided may not meet the patient's definitive care needs. All things being equal, the sooner it is determined whether a patient's care needs can or cannot be met locally, the sooner the transfer can and should be executed. For rural hospitals this implies that quality of care assessment should focus on both the care provided *and* interhospital transfers when the required definitive care services cannot be provided. Failure to recognize the need for transfer in a timely manner results in delays in receiving appropriate diagnostic and therapeutic interventions, and ultimately in poorer outcomes. Avoidable delays represent opportunities for improvement.

Thus, in the case of ICU care we assume that in general the sooner the need for transfer is recognized, and that the transfer is made, the greater the likelihood of good patient outcomes. This assumption suggests that at least 3 basic measures, when used together, might provide new insights into rural hospitals' quality. First is the percentage of rural hospital ICU patients transferred to other acute care hospitals. A rural hospital with 1 or 2 ICU beds will have a much more limited capability to provide a broad range of high-quality and appropriate definitive care services than its large urban counterpart. In small hospitals with marked resource limitations (ie, limited staffing and expertise, equipment, and supplies), quality of care might be viewed in terms of medical stabilization in conjunction with timely transfers to hospitals having the required definitive care services. Therefore from a quality of care standpoint, one would expect to see a relatively higher transfer rate of rural hospital ICU patients than would be true for the larger urban counterparts.

A second potential measure of rural hospital quality would be time until transfer. The inability to provide needed definitive care services, combined with the greater severity of illness of ICU patients, suggests that

for patients requiring transfer, the sooner the transfer occurs the better the quality of care. By definition, interhospital transfers automatically result in delay in receiving the needed definitive care. Therefore from a quality of care standpoint, patients whose definitive care needs cannot be met in the local rural hospital ICU should be stabilized and transferred as soon possible. Therefore, one would expect rural hospital ICU transfer patients to have shorter average lengths of stay (ALOS) as compared with both other rural hospital ICU patients not being transferred and to ICU patients receiving their definitive care in the referral hospital and ICU.

A third potential measure is based on a comparison of the mortality rates of transferred and nontransferred ICU patients. Deaths of patients who receive ICU care are not necessarily unexpected. In fact one might anticipate, excluding do-not-resuscitate (DNR) patients, that the majority of patients dying in a hospital may have received ICU care. Given that the rural hospital is expected to provide a limited range of definitive care services in comparison with large urban hospitals, good quality care would suggest that if rural hospital ICUs have higher rates of transfers and the time to transfer is low that they should have similar or perhaps even lower mortality rates than their larger urban hospital counterparts.

To evaluate these proposed measures related to rural hospital ICU utilization and transfer patterns, we conducted an exploratory retrospective study of ICU utilization and interhospital transfers using 1 year of data from Iowa to answer the following questions:

- How do the percentages of patients who receive ICU care vary among CAHs, rural, rural referral, and urban hospitals?
- Of those receiving ICU care, are proportionately more patients in CAHs and rural hospitals transferred to acute care hospitals to receive definitive care?
- Of patients in CAHs and rural hospitals, is the ALOS of ICU patients transferred to another acute care hospital shorter than the ALOS of ICU patients not being transferred, or shorter than the ALOS of non-ICU patients who are transferred?
- Is the mortality rate of CAH and rural hospital ICU patients lower than the mortality rates of ICU patients cared for in larger urban hospitals?

Methods

Data and Analyses. In order to address these questions, we first identified hospitals with staffed ICU beds and then patients who received services within these units. We used the 2001 American Hospital Association (AHA) Annual Hospital Survey data[7] to identify the number of reported staffed ICU beds for each Iowa hospital. We classified hospitals as CAH, rural, rural referral, and urban, with urban defined as those in Metropolitan Statistical Areas (MSAs) and rural defined as those outside MSAs. Rural referral hospitals were a subset of nonmetropolitan hospitals based on the Iowa Hospital Association's classification of these as rural hospitals with operating characteristics similar to those of a typical urban hospital. We also developed descriptive profiles of the organizational characteristics of CAH, rural, rural referral, and urban hospitals and of their ICU bed complements.

Because our data set did not contain information indicating whether a specific patient was actually admitted to a staffed ICU bed during a hospitalization, we used an indirect method relying on ICU-related charges to classify inpatients as those having vs those not having ICU care during their inpatient stay. The Iowa Hospital Association State Inpatient Database[8] contains patient demographic (eg, age, gender); clinical (eg, diagnosis, diagnosis-related group [DRG], discharge status); and financial (eg, charges, payer category) information for every patient discharged from nonfederal acute care hospitals in Iowa. Also included are ICU-related charges. To identify potential ICU patients, we assumed that because of the very expensive nature of ICU care, patients admitted to an ICU would have entries in the ICU charge field in the database. Using this approach we found that 96 hospitals (and not the expected 81 hospitals that reported staffed ICU beds) had patients with entries in the ICU charge field in the database.

In order to understand the discrepancy between the number of hospitals reporting having 1 or more staffed ICU beds vs those with patients having ICU charges, we contacted the Iowa Hospital Association and found that ICU charge data can include both patients admitted to an ICU and patients not admitted to an ICU but who may have received selected ICU-type services such as central venous lines, chest tubes, drainage of fluid from thorax, and spinal taps. Likewise, it is also possible that a hospital with a staffed ICU bed might not have reported any ICU charges. To determine whether such a discrepancy existed, we analyzed all patient discharges containing ICU charge field data. In doing this we found 78 of the 81 Iowa hospitals that reported staffed ICU beds in the 2001 AHA survey data also had patients with entries in the ICU charge field. The 3 hospitals with reported staffed ICU beds that did not report any ICU charges included 3 rural hospitals, each having reported 2 staffed ICU beds. The 18 hospitals that reported ICU charges but no staffed ICU beds were all small rural hospitals. A total of 1,108 patients with ICU charges, representing only 1.71% of all Iowa

Intensive Care Unit (ICU) Utilization and Interhospital Transfer in Iowa Hospitals (2001)*

	Critical Access Hospitals With ≥1 ICU Bed (n = 15)		Rural Hospitals With ≥1 ICU Bed (n = 36)		Rural Referral Hospitals With ≥1 ICU Bed (n = 7)		Urban Hospitals With ≥1 ICU Bed (n = 20)	
All patients (N = 348,184)	10,062 (1.9%)		60,307 (17.3%)		54,320 (15.6%)		234,985 (67.5%)	
All ICU patients (n = 56,333)	593 (1.1%)		5929 (11.0%)		8,553 (15.2%)		41,258 (73.2%)	
Percent of patients in ICU (%)	5.9		9.8		15.8		17.6	
	Medical DRG	Surgical DRG	Medical DRG	Surgical DRG	Medical DRG	Surgical DRG	Medical DRG	Surgical DRG
% ICU by DRG	6.0	4.4	10.0	8.6	15.9	15.3	13.4	28.9
% ICU transfers	16.6	12.8	17.3	7.9	11.0	3.4	4.0	1.2
% Non-ICU transfers	6.7	1.7	5.8	2.3	3.6	1.4	1.4	0.4
ALOS ICU transfers (days)	2.0	6.8	2.3	7.6	3.5	11.9	3.7	16.7
ALOS ICU nontransfers	2.7	7.7	3.7	7.6	4.5	7.8	5.2	8.6
% ICU in-hospital mortality	4.3	2.6	5.0	5.1	5.2	6.1	8.6	5.3
% Non-ICU in-hospital mortality	3.2	0.2	3.0	1.8	2.5	1.2	3.2	2.6

* DRG indicates diagnosis-related group; ALOS, average length of stay.

patients with ICU charges and only about 0.5% of all ICU charges, were cared for in these 18 hospitals.

Because the discrepancy between the reporting of ICU charges and the reporting of staffed ICU beds appeared to only involve small hospitals and accounted for a small fraction of patients or total ICU charges, we subsequently focused our analysis of ICU utilization and transfers for 78 hospitals reporting staffed ICU beds and for whom patient-specific ICU charges were recorded. Finally, because there was no exact way to identify patients admitted to an ICU vs those not admitted but having ICU charges, we assumed in this exploratory analysis that all patients with ICU charges had been admitted to an ICU. Thus, based on these assumptions, our analysis includes the 78 Iowa hospitals reporting 1 or more staffed ICU beds that also reported ICU patient charges in 2001. We grouped patients into either medical or surgery DRG categories, and we developed descriptive statistics to explore the differences in ICU patients in the 4 Medicare hospital categories. We then used the Iowa Hospital Association State Inpatient Database[8] to classify patients as having received ICU care or not (described above) and to identify their transfer status, length of stay before and after transfer, and discharge status. These variables were used to assess the measures of quality examined in this paper.

Findings. In 2001, Iowa had 116 acute care hospitals including 89 rural (comprised of 45 CAH, 44 rural); 7 rural referral; and 20 urban hospitals.[7] A total of 81 (70%) of the acute care hospitals reported having 1 or more staffed ICU beds. Of the 81 hospitals with 1 or more staffed ICU beds, 2 reported 50 or more staffed ICU beds, 5 were in the 22 to 35 ICU bed range, 15 were in the 10 to 19 ICU bed range, 14 were in the 5 to 9 ICU bed range, and 35 were in the 1 to 4 staffed ICU bed range. The remaining 35 hospitals did not report having any staffed ICU beds. Not surprisingly, hospitals not reporting any ICU beds were among the smallest rural hospitals.

To explore the nature and variation in the different types of ICU patients seen in these hospitals, we subgrouped the cases into the 4 Medicare hospital payment categories (eg, CAH, rural, rural referral, and urban). The resulting sample includes 348,184 patients comprised of 56,333 (16.2%) ICU patients and 291,851 (83.8%) non-ICU patients (Table). In this analysis the 15 CAHs accounted for about 1.9% of all patients and 1.1% of all ICU patients, whereas the 36 rural hospitals accounted for 17.3% of all patients and 11% of all ICU patients. In contrast, the 7 rural referral hospitals accounted for 15.6% of all patients and 15.2% of all ICU patients, whereas the 20 urban hospitals accounted for 67.5% of all patients and 73.2% of all ICU patients. The percent of hospitalized patients receiving ICU care ranged from 5.9% in CAH to 9.8% in rural, 15.8% in rural referral, and 17.6% in urban hospitals (Table). The greater use of ICU care in the rural referral and urban hospitals reflects both a much broader scope of definitive care services and higher case-mix intensity than would be expected in the CAH and rural hospitals.

Next, we subgrouped patients by medical and surgical DRG. As might be expected, the percentage of

patients with medical DRGs was inversely related to hospital size. Medical DRGs accounted for 91.2% of the CAH patients, 85.4% of the rural hospital patients, 73.6% of the rural referral hospital patients, and 64.0% of the urban hospital patients (Table). In examining ICU use at the DRG level, several observations can be made. The relationship between hospital size and the percentage of patients classified as receiving ICU care was generally linear for both medical and surgical DRGs. That is, about 6% of medical DRG patients in CAHs received ICU care vs 10% in rural hospitals, 16% in rural referral hospitals, and 13% in urban hospitals (Table). About 4% of surgery DRG patients in CAHs received ICU care vs 9% for rural hospitals, 15% for rural referral hospitals, and 29% for urban hospitals.

In examining transfer patterns, several differences emerged among the 4 hospital categories. Higher percentages of ICU patients were transferred by smaller facilities. As shown in the Table, among patients receiving care in ICUs, CAHs transferred 16.4%, rural hospitals transferred 16.1%, rural referral hospitals 9.3%, and urban hospitals transferred only 2.6%. Turning to non-ICU patients who were also transferred, we found a similar but somewhat attenuated pattern. CAHs transferred 6.7% of non-ICU patients vs 5.8% for rural hospitals, 3.6% for rural referral hospitals, and 1.4% for urban hospitals.

We next examined the ALOS of transferred and nontransferred ICU patients in the 4 hospital groups. Assuming that the underlying cause driving a transfer is related to the patient's admitting condition and not the result of care received during the initial hospitalization, good quality transfer care would be reflected by shorter initial hospital lengths of stay prior to transfer. In contrast, a pattern of prolonged stay followed by transfer might be indicative of an attempt to provide a higher level of definitive care than appropriate given available resources. Turning first to medical DRG ICU patients who were transferred vs those not transferred, shorter ALOSs were found in the smaller hospitals (Table). The ALOS for CAH medical DRG ICU patients who were transferred vs nontransferred patients was 2.0 vs 3.6 days, 2.3 vs 3.7 days in rural hospitals, 3.5 vs 4.5 days in rural referral hospitals, and 3.7 vs 5.2 days in urban hospitals. A mixed pattern emerged for surgical DRG ICU patients. A shorter ALOS was found for transferred surgical DRG ICU patients from CAHs (6.8 vs 7.7), equal ALOS for the 2 groups in rural hospitals (7.6), and longer ALOS for transferred surgical DRG ICU patients from rural referral (11.9 vs 7.8) and urban (16.7 vs 8.6) hospitals.

Finally we examined differences in the percentages of in-hospital mortality for ICU vs non-ICU patients. Our analysis found the lowest percentage of in-hospital deaths among medical DRG ICU patients in the CAHs (4.3%) followed by slightly higher percentages in rural (5.0%), rural referral (5.2%), and urban hospitals (8.6%; Table). In contrast, among medical DRG patients who did not receive ICU care, the percentage of in-hospital deaths was lower and relatively consistent at about 3.1% across hospital category, except for rural referral hospitals (2.5%). For surgical DRG ICU patients, the percent of in-hospital deaths did not follow a consistent pattern across the 4 hospital groups (eg, 2.6% in CAH, 5.1% in rural, 6.1% in rural referral, and 5.3% in urban hospitals). As might be expected, the mortality rates were lower in all hospital groups for the non-ICU surgical DRG patients.

Discussion

This paper presents an exploratory analysis of potential measures of rural hospital quality based on ICU utilization and transfer patterns. The findings based on 1 year of data for 1 Midwest state found markedly different patterns of ICU utilization and transfer patterns among CAH, rural, rural referral, and urban hospitals.

The potential importance of assessing transfer care provided in rural hospital ICUs is reflected in the growing literature highlighting the importance of patients' transfer status as a predictor of referral hospital[9-14] and referral hospital ICU[15-17] resource use and mortality. In these studies both overall and ICU resource use were significantly higher for transfer patients. Likewise, being transferred was also associated with significantly higher mortality rates. Although none of these studies have looked specifically at the referring hospital's quality of care prior to transfer, implicit in their findings is the notion that the appropriateness and timeliness of care received prior to transfer may contribute to higher referral hospital resource use and mortality rates. For hospitals, particularly AMCs that receive large numbers of referral patients, the need to risk adjust resource use and mortality for transfer status has been recognized in several studies.[10,11,15,16] To date, sufficient attention has not been paid to understanding the nature and timing of such interhospital transfers. Therefore if risk adjustments should include transfer status, then it is logical to focus on what happens prior to the transfer. This paper provides an initial approach to examining 1 major subgroup of transfers, those receiving ICU care in the referring hospital.

The evaluation of ICU utilization and interhospital transfer patterns extends our ability to measure and compare some aspects of rural hospital quality. By focusing on ICU utilization, we can evaluate what happens to a hospital's sickest patients as determined

by that hospital's medical staff's judgment of the required level of care. This assumes that within a given hospital patients receive much more resource-intensive and expensive ICU care only because the appropriate level of care could not be provided with the resources available on the general inpatient unit. By focusing on ICU patients' interhospital transfer patterns, one can identify a major patient subgroup for which the appropriate definitive care has been determined to be unavailable locally. Again this determination is based on the hospital's own medical staff's judgment of whether local resources are adequate to meet their patients' definitive care needs.

Therefore, within the quality assessment framework of the right care given to the right patient in the right way in the right amount and at the right time, given available resource limitations, one might compare variations in ICU patient length of stay, mortality rates, and transfer patterns among similar types of hospitals. As a screening tool looking only at CAHs in a single state, one could calculate and compare expected to observed ICU mortality and transfer ratios. If ICU mortality was higher and the transfer rate lower than expected, this could serve as an indicator that further study is required to look at whether (1) ICU patients are receiving the appropriate care, and (2) whether there are market, patient preference, or other barriers preventing timely transfers.

Local demographic, geographic, and market factors can influence a particular rural hospital's available resources and transfer patterns. This paper evaluates data for 1 "heartland rural" state that has good transportation networks, relatively short travel distances between rural and potential referral hospitals, a generally adequate and reasonably distributed physician supply, a well-educated population, and a relatively small number of uninsured people. Rural hospitals in frontier rural states facing far greater travel distances and times, less adequate physician supplies, and less well-educated and insured populations might well be expected to have different ICU utilization and interhospital transfer patterns.

The acute care hospital's ICU environment is complex and at times chaotic. The Leapfrog Group advocates that "... hospital ICU care should be managed by physicians certified (or eligible for certification) in critical care medicine who are present during daytime hours, provide care exclusively in the ICU, and at other times can return ICU pages promptly."[3] Although there is growing evidence supporting the Leapfrog Group's advocacy for intensivist-only staffing models in ICUs,[18-28] should every ICU have intensivist-only staffing? Our data do not support the notion that there is evidence that patients in rural Iowa ICUs receive poor care. Because an intensivist-only ICU staffing model would require significant increases in both the supply of and resources for paying and supporting intensivists, specific evidence of poor quality ICU care is needed. Such evidence might be gained by studying ICU utilization and interhospital transfer practices.

This study has several limitations, which should be addressed in future research. First, data for only 1 year from 1 Midwestern state were examined. Multiyear analyses are required in order to assess the stability of the resulting transfer rates, lengths of stay, and mortality rates. Likewise as noted earlier, transfer arrangements and factors influencing the timely patient transfers may be different in a heartland rural state like Iowa than in "frontier rural" states. Better understanding of the relative importance of organizational, geographic, and economic barriers to timely transfers is required to determine the potential utility of measures of transfer care quality.

A second major potential limitation is our reliance on charge data from discharge abstracts to categorize patients as having received ICU care. Our evaluation revealed that some patients may receive some types of ICU patient care procedures in hospitals that may not have staffed ICU beds or were not actually admitted to an ICU if 1 were available. For example, patients admitted with DNR orders may receive comfort care services either in or outside an ICU that generate ICU charges. Future research should attempt to identify in different-sized hospitals the extent to which patient charge data accurately reflect who actually was admitted to an ICU.

Charge data inherently convey very little information about the clinical status or care needs of patients or the care capacities of the hospital. For example, given available data we were not able to evaluate the case mix of patients at the time of admission to the ICU or transfer to another hospital. Needed to supplement charge data are patients' clinical status and care needs at different points in their hospitalization, as well as information about hospitals' personnel, equipment, and facilities that may determine whether definitive care might be appropriately provided. Consider the case of "e-ICU" care in which a rural hospital ICU could be directly connected via the Internet or satellite to an ICU consultation center staffed with intensivists. This hospital would have greater ICU definitive care capacity than 1 without real-time access to intensivists.

There is also a need to link measures of quality within an episode of care that is provided across a care spectrum. Using mortality as an example, whether the patient died in route during the transfer, died shortly after admission to the referral hospital, or died after

some time in the referral hospital would be important to consider when evaluating a rural hospital's transfer practices. In doing this one also needs to follow the care process and potential delays in receiving care prior to being admitted to the rural hospital. Clearly, risk adjustment models incorporating patient severity and characteristics as well as the care provided throughout the entire episode of care must be developed.

The proposed measures of rural hospital ICU utilization and interhospital transfer practices presented here provide some new insights in measuring and comparing rural hospital quality. Combined, these measures can present a useful picture of how the sickest patients are cared for. Used together they provide hospital-specific profiles that could be helpful in identifying hospitals that may have problems in transferring patients from the rural ICU to the urban medical center in a timely manner. Subsequent to such identification, more targeted analyses could explore specific quality of care issues. These 3 measures also have the advantage of being based on existing data and thus require no additional data acquisition costs. Finally, these measures may help stimulate thinking about other sources of interhospital transfer. These include both those transferred from the rural hospital emergency rooms and those not receiving ICU care who are transferred from the general inpatient units.

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