

# Analysis of federal process of care data reported from hospitals in rural westernmost North Carolina

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## Summary

**Objective:** To evaluate standardized process of care data collected on selected hospitals serving a remote, rural section of westernmost North Carolina. **Materials & Methods:** Centers for Medicare & Medicaid Services (CMS) data were retrospectively analyzed for 21 clinical parameters at Fannin Regional Hospital (FRH), Murphy Medical Center (MMC), and Union General Hospital (UGH). A binomial test was used to compare each study site to state (NC) and national (USA) average. **Results:** Summary data showed FRH to have higher scores on a significant number of standardized clinical process of care measures compared to state ( $p < 0.05$ ) and national ( $p < 0.005$ ) averages. Too few process of care measures at UGH were significantly higher than state and national averages to conclude that differences were not due to Type I error. Similarly, at MMC too few process of care measures were significantly higher than national averages to conclude that observed differences were not attributable to Type I error. MMC did not achieve a significantly higher score on any process of care measure when compared to state averages. **Conclusion:** Despite limitations associated with summary data analysis, the CMS "Hospitals Compare" information suggests that process of care scores at FRH are significantly higher than the state and national average. As these hospital quality data are freely available to patients, it remains to be determined what impact this may have on hospital volume and/or market share in this region. Additional research is planned to identify process of care trends in this geographical area.

**Key words:** Hospital quality; Process of care; Rural health; North Carolina.

## Introduction

How patients make decisions about where to obtain medical services has been the focus of considerable study, particularly in the setting of a competitive health-care marketplace. Some patients appear to base their choices mainly on characteristics of care delivery rather than location of care [1], but hospital quality and/or proximity could also influence this decision.

Beginning in 2004, acute care hospitals in the USA could voluntarily elect to report quality data in order to receive incentive payments established by Section 501(b) of the Medicare Prescription Drug, Improvement and Modernization Act of 2003 (MMA). To obtain the increased payment, eligible hospitals were required to report on an initial set of ten quality performance measures and to agree to have their data publicly displayed. Initially, almost all hospitals eligible for the payment incentive provided these data, reflecting care delivered during 2004. Under Section 5001(a) of the Deficit Reduction Act of 2005, the set of measures included in the incentive was expanded, the magnitude of the incentive was increased, and the time-limit for the provision removed.

In the present study, standardized process of care figures derived from this dataset were examined for the hospitals serving westernmost North Carolina. This is a remote area of Appalachia where three independent hospitals of comparable size offer similar coverage for

several thousand patients within a shared 30-mile radius. We compared each hospital's performance to state and national averages using the same standardized data publicly available to patients.

## Materials and Methods

### Data source

This analysis utilized standardized federal data on adult hospital care tabulated by Centers for Medicare & Medicaid Services (CMS), an agency of the U.S. Department of Health and Human Services (HHS), along with the Hospital Quality Alliance (HQA). The HQA initiative was launched in December 2002 and resulted from coordinated efforts by the American Hospital Association (AHA), Federation of American Hospitals (FAH), and Association of American Medical Colleges (AAMC). The HQA promotes reporting on hospital quality of care and consists of organizations representing consumers, hospitals, doctors and nurses, employers, accrediting organizations, and U.S. Federal agencies.

Data were collected retrospectively on process of care measures originating from information extracted from the study hospitals' medical records maintained at each facility, in accordance with federal law. The source data are indicative of how often hospitals provide selected care recommended for patients being treated for myocardial infarction, heart failure, pneumonia, or care provided immediately following surgery. These process of care measures have evolved to include eight measures related to myocardial infarction care, four measures related to heart failure care, seven measures related to pneumonia care, and five measures related to surgical infection prevention. Process of care information regarding children's medical serv-

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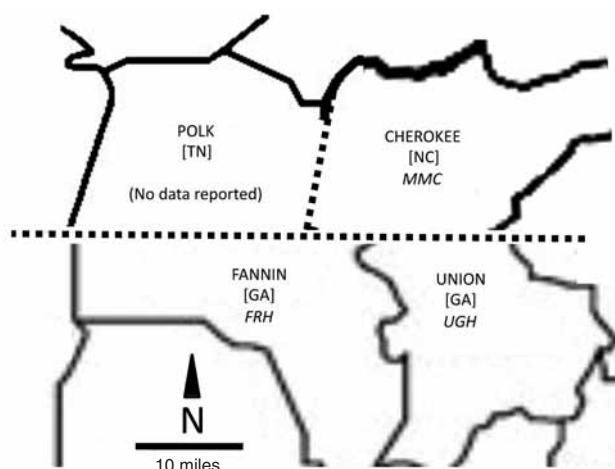


Figure 1. — County geography of Appalachian tri-state region covered in the federal process of care analysis, demonstrating intersections of Tennessee, North Carolina and Georgia (dashed lines), and relative locations of Murphy Medical Center (MMC), Fannin Regional Hospital (FRH) and Union General Hospital (UGH).

ices, psychiatric hospitals, rehabilitation facilities, or long-term care hospitals was excluded. Updated versions of these data are periodically published and are publicly accessible via the HHS website, Hospitals Compare. Data used for this study were reported current to September 2007.

#### Individual facility performance rate calculations

For this study, denominators were the sum of all eligible cases (as defined in measure specifications) submitted to the QIO Clinical Data Warehouse for the reporting period, while numerators were the sum of all eligible cases submitted for the same reporting period where the recommended care was provided. Performance rates were then calculated by dividing the numerator by the denominator. Hospital sampling methodology was determined by rules established by The Joint Commission and CMS.

#### Study region and vicinity hospitals

Extreme western North Carolina describes a difficult to access geographical region in rural Appalachia where the state boundaries of Georgia, North Carolina, and Tennessee intersect (Figure 1). While the largest population center over 50,000 is approximately 90 minutes away by car, health care for local residents is available in the three contiguous counties of Union (Georgia), Fannin (Georgia) and Cherokee (North Carolina). Each of these counties has one accredited hospital with a 24-hour emergency department. As these hospitals are situated either in or near western North Carolina (*i.e.*, within 30 miles), the facilities share a common patient service area.

Fannin Regional Hospital (FRH) is a nonprofit community hospital located in Blue Ridge, Georgia. It opened in 1979 and is licensed for 50 beds. The total population of Fannin County, Georgia was 22,319 (est.) in 2006.

Murphy Medical Center (MMC) is a nonprofit community hospital located in Murphy, North Carolina. It opened in 1979 and is licensed for 57 beds. MMC also operates a long-term care/nursing home facility with an additional 106 inpatient beds. The total population of Cherokee County, North Carolina was 26,309 (est.) in 2006.

Union General Hospital (UGH) is a nonprofit community hospital located in Blairsville, Georgia. It opened in 1959 and is licensed for 45 beds. The total population of Union County, Georgia was 20,652 (est.) in 2006.

Residents of westernmost North Carolina also have access to a fourth facility, Copper Basin Medical Center, located immediately west of the study area in Polk County, Tennessee (est. population 15,939 in 2006). However, this small 25-bed hospital did not report any data to CMS and therefore was excluded from study.

#### Statistical analysis

Process of care measurements were reported from the three study sites in aggregate form and compared to national (USA) and state (North Carolina) averages using the binomial test (R version 2.6.2). A process of care measurement was considered significantly better than average at a 90% confidence level. Due to the large number of comparisons, the fraction of process of care measurements that were significantly better than average was compared to the expected Type I error rate of 10% using a binomial test; a hospital was considered significantly better if this test yielded a  $p$  value  $< 0.05$ . As patient-level data were not available, multiple regression analysis was not possible.

#### Results

A summary of CMS data on the three study hospitals is presented in Table 1. Because the study hospitals did not offer the full range of services that were evaluated by the national CMS template, some data cells were intentionally empty. Specifically, FRH reported no data on frequency of administration of fibrinolytics to patients with myocardial infarction within 30 min of arrival, or on the number of patients given percutaneous coronary interventions within 90 min of arrival due to insufficient patient volume. This hospital also reported no data on smoking cessation counseling for myocardial infarction patients. We found process of care determinants at FRH to be significantly higher than state ( $p < 0.05$ ) and national ( $p < 0.005$ ) reference groups.

At MMC, no data were reported on the number of patients given percutaneous coronary interventions within 90 min of arrival. No data was reported from UGH on frequency of administration of fibrinolytics to patients with myocardial infarction within 30 min of arrival, or on the number of patients given percutaneous coronary interventions within 90 min of arrival.

Table 1. — Summary of process of care measurements ( $n = 21$ ) at three hospitals serving westernmost North Carolina.

	Significantly better than national average?			Significantly better than state (NC) average?		
	N	Y	$p^1$	N	Y	$p^1$
FRH	12	7	$< 0.005$	14	5	$< 0.05$
MMC	20	1	ns	21	0	ns
UGH	18	2	ns	19	1	ns

FRH = Fannin Regional Hospital (Georgia), MMC = Murphy Medical Center (North Carolina), UGH = Union General Hospital (Georgia). Some hospitals did not report data for all 21 categories ( $^1$  by binomial test). ns = not significant.

## Discussion

This is the first report on process of care data on hospitals available to medical consumers in the mountainous area of extreme westernmost North Carolina. The hospital "report card" used in this analysis is one source of information attracting significant consumer interest [2] particularly when data are considered reliable and collected in a highly standardized format. The present study focused on westernmost North Carolina because this region is remote and represents an essentially captive, rural healthcare market where outside influences are unlikely to play a major role.

It is reassuring that patients in westernmost North Carolina have access to these key medical services at multiple locations; the CMS data do not suggest that any of the study hospitals performed significantly below state (North Carolina) or national (USA) average. Although direct comparisons were not made among the three study hospitals, Fannin Regional Hospital emerged as the institution where process of care measures were significantly better than state and national average. In contrast, this investigation found one study hospital (MMC) that achieved no process of care score above the state average. It was beyond the scope of the current study to identify institutional or administrative factors that may be associated with variable process of care performance.

This descriptive pilot study was limited in several ways. Since CMS information is not provided as patient-level data, it was impossible to undertake a regression analysis for a more detailed assessment of clinical factors. Whether these aggregate data depicted a series of independent observations must also be questioned, since it cannot be confirmed that each patient was counted only once and the treatments assessed were themselves independent. Our analysis depended on hospital self-reported data collected retrospectively by manual tabulation from medical records, although the accuracy and consistency of this methodology have not been rigorously validated. Accordingly, confusion exists in "ranking" hospitals on the basis of CMS data [3] since information available via the Hospitals Compare website does not always agree with other publicly available evaluation instruments [4]. This can present a conflicting picture on hospital performance to patients and their families. Given these lim-

itations, we prefer to advance our conclusions as preliminary (rather than definitive) until further studies with greater robustness are undertaken. Nevertheless, this pilot investigation suggests a methodology for further research on how CMS data may be associated with patient decisions regarding hospital choice in westernmost North Carolina.

CMS data available on the Hospitals Compare website represents a highly accessible tool to empower patients with current and standardized information about hospitals. In other settings, hospital market share has been influenced by factors including population density, number of nearby hospitals, medical school affiliation, percentage of Medicaid admissions, and medical/surgical service offerings [5, 6]. To determine if the CMS Hospitals Compare dataset plays a similar role for medical consumers in westernmost North Carolina, and if this information influences patient choice or contributes in other ways to this market dynamic, represents the aim of ongoing research.

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