Rural Hospital Emergency Department Quality Measures: Aggregate Data Report

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INTRODUCTION

While emergency care is important in all hospitals, it is particularly important in rural hospitals. Because of their size, rural hospitals are less likely to be able to provide more specialized services, such as cardiac catheterization or trauma surgery. Rural residents often need to travel greater distances than urban residents to get to a hospital initially. In addition, their initial point of contact is less likely to have specialized services and staff found in tertiary care centers so they are also more likely to be transferred. These size and geographic realities increase the importance of organizing triage, stabilization, and transfer in rural hospitals which in turn suggests that measurement of these processes is an important issue for rural hospitals.

PROJECT BACKGROUND

This report presents the aggregate findings from a project that tested emergency department quality measures in a voluntary sample of critical access hospitals (CAHs) in Washington State. The project was completed by the Washington Rural Health Quality Network (RHQN), a network of 37 hospitals, and the University of Minnesota Rural Health Research Center, with assistance from Stratis Health, the Minnesota Quality Improvement Organization (QIO). A total of 17 rural hospitals from the network participated in the project.

The quality measures that were tested focused on patients presenting to the emergency department with chest pain/acute myocardial infarction (AMI, or heart attack) or trauma, and patients seen in the emergency department who were transferred to another hospital for care. The relevant measures reflect: (a) decision-making and protocol availability and their use in decisions about where to treat a patient (in the local rural hospital or elsewhere); (b) processes for stabilizing and transporting patients; and (c) care integration with referral hospitals and other care delivery systems. Chest pain/AMI and trauma are frequent emergency department diagnoses and were included in the study.

The measures were developed based on a review of the quality measurement literature and consultation with experts in the field. Existing quality indicator and performance measurement systems (e.g., those developed by the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO), Agency for Healthcare Research and Quality, National Quality Forum, Centers for Medicare and Medicaid Services and four rural-oriented performance measurement systems), were reviewed with attention to identifying high priority areas for rural hospitals (e.g., emergency room stabilization and transfer) that were not currently being systematically collected. The chest pain/AMI and trauma measures were derived from existing inpatient measures, while the transfer communication measure includes components from the Federal Emergency Medical Treatment and Active Labor Act (EMTALA) and the Continuity of Care Record (CCR) developed jointly by the Massachusetts Medical Society, the American Academy of Family Physicians, the Health Information Management and Systems Society, and ASTM International.

The measures were refined following an initial field test in 2004 in 22 rural hospitals in Minnesota, Utah and Nevada conducted by the University of Minnesota, Stratis Health, and HealthInsight, the QIO for Utah and Nevada.[1] Since national quality measurement efforts such

as Hospital Compare are collecting detailed information on inpatient quality measures, this second field test concentrated on ED measures. Between the first and second field tests, measure refinement efforts focused on broadening the set of transfer conditions covered by the measures and adapting the inclusion criteria for the ED chest pain/AMI measures to exclude patients whose pain was non-cardiac in nature.

The training method for this field test differed from the direct to hospital training done in the previous field test with rural hospitals in Minnesota, Nevada and Utah. Previously University of Minnesota and QIO staff trained hospital staff directly. For this field test, University of Minnesota and Stratis Health staff trained RHQN representatives with abstraction and quality experience on the measures and the inter-rater reliability (IRR) method of assuring comparability of measure understanding and data collection.. The RHQN staff were trained in a one day training session in Seattle in January 2006. The RHQN staff then trained hospital staff in small group settings. After hospital staff training was completed in March 2006, data collection began. Inter-rater reliability testing was completed by RHQN staff to assure consistency in data collection across hospitals. Data were sent to RHQN and forwarded to the University of Minnesota for data entry and report generation. Data entry was completed by University of Minnesota staff in an ACCESS file previously developed by computer personnel from the QIOs in Minnesota and Utah/Nevada.

This report presents the results of two quarters (10/05 to 03/06) of data collected as part of the project. Emergency department measures are reported in three categories: chest pain/AMI assessment, trauma/vital signs, and transfer communication. For each category, a description of the measures is presented, followed by national comparison data where available. Results from the field test conclude each section. The report includes data on the quality measures for the total sample of participating rural hospitals. The appendix includes a description of the specific rural hospital quality measures included in the report.

EMERGENCY DEPARTMENT CHEST PAIN/AMI ASSESSMENT MEASURES

Three quality measures were field tested that focused on chest pain/AMI assessment: time to electrocardiogram (ECG), aspirin within 24 hours, and time to thrombolytics.

Time to ECG
Efficient assessment of emergency department patients with chest pain or suspected AMI leads to quick identification of AMI and appropriate and timely treatment. This in turn, may result in decreased morbidity and mortality. The American Hospital Association and American College of Cardiology recommend ECG immediately upon arrival, and collection of cardiac enzymes and cardiac troponins within 10 minutes of arrival for patients presenting to the emergency department with chest pain suspected to be of cardiac origin.

In this field test, 36.7% of charts met the time to ECG standard of 10 minutes (Table 1).

Aspirin within 24 hours
Aspirin (ASA) is estimated to prevent a subsequent AMI in 3.5% to 4% of patients previously treated for AMI. Current guidelines recommend that upon arrival to the emergency department

(ED), a patient with suspected AMI should immediately receive aspirin unless contraindicated. A relevant quality indicator is whether aspirin has been administered at any time over the 24 hours prior to arrival and 24 hours after arrival at the hospital.

CMS reports a national rate of 86.4% of Medicare inpatient AMI patients in 2003 and a 2004 rate of 94% of Washington State Medicare inpatients that received aspirin within 24 hours of arrival in 2003. Using data from a 2000 measurement pilot study, JCAHO reports a rate of 84% of AMI patients that received aspirin within 24 hours of admission at accredited hospitals. The rate observed in our field test was lower than national rates; 71.5% of charts in participating hospitals met that standard (Table 1).

Table 1
Emergency Department AMI/Chest Pain Assessment and Care Delivery Measures (10/05-3/06)[2]

		Field Test (2005-2006) 17 Hospitals in WA	
Measure	**N**	**Percent of Charts that Met the Standard**	**Median Time in Minutes**
Time to ECG (Standard = within 10 minutes)	474	36.7%	13
ASA within 24 hours	393	71.5%	NA
Time to Thrombolytics* (Standard = within 30 minutes)	25	8.0%	90

***Note:** The data reported for thrombolytics include only those patients who received thrombolytics at the reporting hospital.

Time to thrombolytics
Evidence indicates that the timing of reperfusion therapy (i.e. the use of pharmacological or mechanical methods to restore blood flow to the affected area of the heart) is critical to the effective management of AMI patients and the earlier therapy is initiated, the better the outcome. Patients presenting with AMI and ST segment elevation or left bundle branch block (LBBB) are at a relatively high risk of death. This risk may be reduced by thrombolytic therapy or Percutaneous Transluminal Coronary Angioplasty (PTCA), but only if administered in a timely manner. The greatest benefits of thrombolytic therapy are evident in the first 3 hours after the onset of symptoms, but there is proven benefit for up to 12 hours after the onset of symptoms.

CMS reports a national rate of 29% of Medicare inpatient AMI patients that received thrombolytics within 30 minutes of arrival in 2003. CMS reports a median time to thrombolytics for these patients of 46 minutes in 2003. JCAHO reports an average of 40 minutes from door to receiving thrombolytics for AMI patients in accredited hospitals.[3]

In the current field test, 25 patients received thrombolytics at a reporting hospital. Of these, 8% met the standard of receipt within 30 minutes of arrival.

EMERGENCY DEPARTMENT TRAUMA VITAL SIGNS MEASURE

The ED trauma vital signs measure assessed the proportion of trauma patients with systolic blood

pressure, pulse rate, or respiratory rate documented on arrival to the emergency department and at least hourly (or until the patient is released, admitted or transferred).

The data collected on ED visits for trauma patients provide several opportunities for quality assessment and improvement. First, ongoing monitoring of a patient's vital signs provides a quantitative measurement of a patient's clinical status. This ongoing assessment assists in the determination of appropriate medical intervention. The average number of vital signs per hour was reported for all patients, for patients by diagnosis group and by discharge status, for patients who arrived by ambulance, and for patients in the ED longer than two hours.

Second, examination of patients whose stay in the ED is longer than four hours provides an opportunity for process improvement related to ED assessment and treatment in an effort to decrease waiting time and increase patient satisfaction.

Finally, patients who leave the ED prior to complete assessment of care or 'Against Medical Advice' (AMA) may be under-treated. Each AMA occurrence provides an opportunity for process improvement related to assessment and treatment in order to decrease waiting time and increase patient satisfaction.

The intensity or frequency of vital signs monitoring should be determined by the event history as well as the current condition of the trauma patient. The abstraction data contain three indicators of severity of condition: principal diagnosis category; discharge status, and whether the patient arrived by ambulance. Figure 1 presents the ICD-9 code categories and discharge status categories used to categorize trauma patients for this project.

Figure 1
ICD-9 Code Categories and Discharge Status Categories
Used to Categorize Trauma Patients

Principal diagnosis ICD – 9 code categories:
Fractures (800-829)
Intracranial Injury (850-854)
Internal Injury (860-869)
Open Wounds (870-897)
Injury to Blood Vessel (900-904)
Crushing Injury (925-929)
Effects of Foreign Bodies (930-939)
Burns (940-949)
Injury to Nerves and Spinal Cord (950-957)
Discharge Status Categories
Discharged to home care or self care (routine discharge)
Discharged/transferred to another short term general hospital for inpatient care
Discharged/transferred to a skilled nursing facility (SNF) with Medicare certification
Discharged/transferred to an intermediate care facility (ICF)
Left against medical advice or discontinued care
Admitted as an inpatient to this hospital

The majority of trauma patients for the seventeen Washington hospitals had fractures (33.8%) or open wounds (49.6%) (Table 2). Six percent of the trauma patients presented with intracranial injury and 4.8% presented with burns. The majority of the patients were discharged to home (75.2%) or transferred to another short term general hospital (20.6%). Only 3.1% were admitted to the ED hospital. Few ED trauma patients arrived by ambulance (15.0%).

Patients who are admitted via ambulance have been monitored prior to arrival and those who are transferred out are monitored after departure. The group at greatest risk of inadequate monitoring may be patients without monitoring before and or after their ED stay (i.e., those who arrive from and return home).

National data are not available for this measure.

Table 2 shows the average number of vital signs per hour and the standard deviation for all patients, those who were in the ED longer than 2 hours and those who were in the ED longer than 4 hours. This information is also presented by diagnostic category, by ambulance use category, and by discharge status.

Table 2
Average Number of Vitals Signs Reported per Hour in ED (10/05-3/06)[4]

Sample	Average Number of Vital Signs Per Hour Mean (SD)
All (n=591)	1.57 (1.26)
Patient Time in ED	
Patients in ED longer than 2 hours (n=138)	1.24 (1.50)
Patients in ED longer than 4 hours (n=23)	0.82 (1.18)
Condition Category	
Brain injured (n=35)	2.35 (2.58)
Burns (n=29)	1.72 (1.55)
Crushing injury (n=10)	2.21 (2.07)
Foreign body (n=20)	1.69 (1.20)
Fracture (n=200)	1.32 (0.95)
Internal injury (n=4)	2.16 (0.99)
Open wounds (n=293)	1.59 (1.10)
Arrived by Ambulance	
Yes (n=87)	1.46 (1.01)
No (n=494)	1.44 (2.14)
Discharge Status	
Admitted to this hospital (n=18)	1.07 (0.81)
Discharged to home (n=442)	1.50 (1.11)
Discharged to ICF (n=4)	2.48 (1.73)
Left against medical advice (n=2)	2.23 (0.32)
Transferred to short term general hospital (n=121)	1.85 (1.70)

EMERGENCY DEPARTMENT TRANSFER COMMUNICATION MEASURE

Communication between providers promotes continuity of care and may lead to improved patient outcomes. A Massachusetts-based expert panel including ASTM International (formerly known as the American Society for Testing and Materials), the Massachusetts Medical Society (MMS), the Health Information Management and Systems Society (HIMSS), and the American Academy of Family Physicians (AAFP) identified the need to organize and make transportable a set of basic patient information consisting of the most relevant and timely facts about a patient's condition. These organizations jointly developed the Continuity of Care Record (CCR).

The CCR is intended to foster and improve continuity of patient care, to reduce medical errors, and to assure at least a minimum standard of health information transportability when a patient is referred or transferred to, or is otherwise seen by, another provider. It includes patient and provider information, insurance information, patient health status (e.g., allergies, medications, vital signs, diagnoses, and recent procedures), recent care provided, as well as recommendations for future care (i.e. care plan) and the reason for referral or transfer. This minimum data set will enhance the continuity of care by providing a method for communicating the most relevant information about a patient and providing both context and support for the future implementation of the electronic health record (EHR).

The transfer communication measure used in this field test included data elements from the CCR and the Federal Emergency Medical Treatment and Active Labor Act (EMTALA). The measure included 28 elements in seven categories: pre-transfer communication, patient identification, vital signs, medication–related information, physician-generated information, nurse-generated information, and procedures and tests. It assessed the number of information elements sent with patients who were transferred from the ED to another hospital. Table 3 lists the data elements in each category.

National data on this measure are not available.

Data from the field test on this measure were reported for 616 charts. The percent of charts that had documentation for each of the elements was reported, along with the average number of elements in each sub-category (Table 3).

Table 3
Emergency Department Transfer Communication Data (10/05-3/06)
(n = 616 charts)

Category	Data Element	Mean and % Charts
Administrative information (Range 0-2)	1) Nurse communication with receiving hospital staff	Mean = 1.81 84.1%
	2) Physician communication with receiving professional	96.9%

Category	Data Element	Mean and % Charts
Patient information (Range 0-6)	1) Name 2) Address 3) Age 4) Gender 5) Contact information for significant others 6) Insurance information	Mean = 4.74 87.1% 73.9% 86.5% 86.5% 69.3% 69.8%
Vital signs (Range 0-7)	1) Pulse 2) Respiration 3) Blood pressure 4) Temperature 5) Oxygen level 6) Glasgow score 7) Apgar score	Mean = 5.92 83.4% 82.8% 79.9% 78.0% 77.5% 89.0% 99.2%
Medication communication (Range 0-3)	1) Medication history 2) Medications Given (MAR) 3) Allergies	Mean = 2.45 80.4% 81.4% 83.0%
Physician documentation (Range 0-2)	1) Physician's history and physical 2) Physician's orders and reason for transfer	Mean = 1.68 78.0% 89.6%
Nursing documentation (Range 0-6)	1) Nurse documentation: interventions/ response to care 2) Impairments 3) Immobility 4) Respiratory support given 5) Oral restrictions 6) Catheters	Mean = 4.96 80.1% 84.2% 88.5% 83.2% 81.4% 81.3%
Tests and procedures (Range 0-2)	1) Tests and procedures done 2) Tests and procedures sent	Mean = 1.64 82.3% 81.5%

Potential scores on this measure ranged from zero to 28. Not all elements are applicable for every patient; hospitals are credited for all properly documented elements including not applicable where relevant. Actual scores ranged from two to 28, with a mean score of 23.2 and a median score of 27 (Figure 2). Seventy-nine percent of charts scored 25 or higher.

Figure 2
Summary of Emergency Transfer Communication (10/05-3/06)[5]
(n = 616)
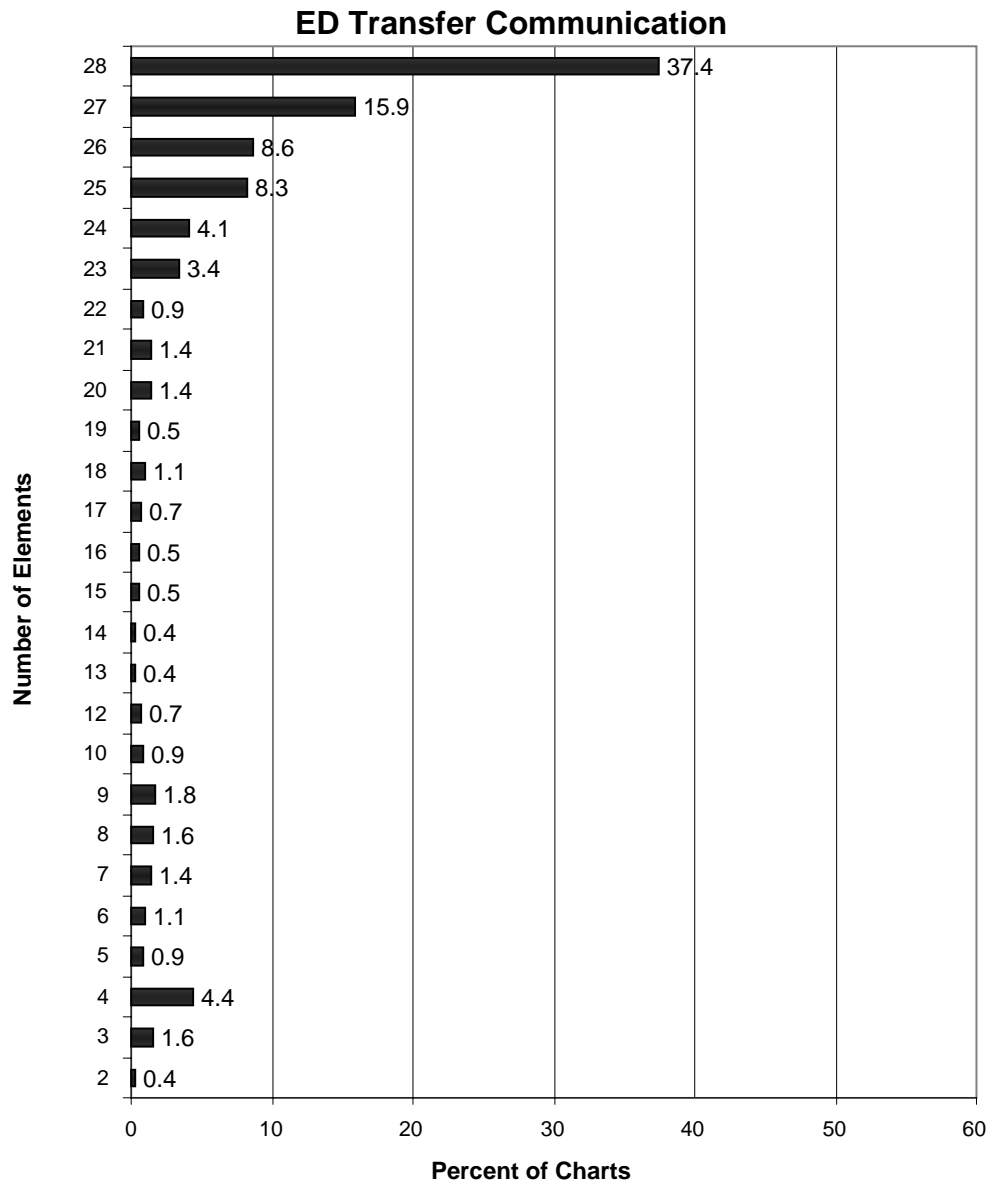
All Reporting Hospitals (Possible Scale Range 0-28)
     Mean: 23.2
     Median: 27
     SD: 7.6
     Range: 2-28

CONCLUSIONS

Seventeen small rural hospitals in Washington State successfully completed six months of data collection for quality measures in three emergency department areas: chest pain/AMI, trauma and transfer communication. A hospital-specific report of the quality measures was provided to each hospital and surveys collected information on hospital assessment of the usefulness of the reports and the quality measures.

Feedback on the measures suggest that the adaptation of the inpatient AMI measure to assess emergency department management of patients presenting with chest pain/AMI is a useful reporting and improvement tool for small rural hospitals. The elements of the transfer communication measure are easily abstracted, and provide many opportunities for documentation and communication improvement. The trauma measures still need refinement. The discussion regarding the correct timeline for assessment of serious trauma patients has not yet reached a consensus.

These results suggest that quality measurement at rural hospitals is feasible and useful for reporting and improvement when hospital staff are appropriately trained and provided ongoing technical support. Next steps in this process include the identification of additional topic areas (e.g. outpatient services) for small rural hospitals which would benefit from the development of measurement and continued refinement of the transfer communication and trauma assessment. In addition, the Oklahoma QIO is heading an effort to add the ED timeliness of care measures for AMI patients to the CMS Abstraction & Reporting Tool (CART), so that rural hospitals will be able to use them to collect and report data on AMI Emergency Department patients to the QIO Clinical Warehouse in the future.

Appendix

Definitions of Rural Hospital ED Quality Measures

A. Emergency Department Chest Pain/AMI Assessment

Measurement Description	Numerator	Denominator
Time to ECG	Time of arrival at ED until time of first 12 lead ECG. Includes pre-hospital ECG at 0 minutes. ACC and AHA standard of 10 minutes is used for the standard.	All Chest pain(CP)/AMI ED patients
Proportion of CP/AMI patients in the ED without aspirin contraindications who received aspirin within 24 hours before or after hospital arrival	CP/AMI patients in the ED who received aspirin within 24 hours before or after hospital arrival	CP/AMI patients without aspirin contraindications. Included Populations: Discharges with an ICD-9 Code for AMI of 410. Excluded Populations: 1)Patients less than 18 years of age; 2) patients received in transfer from another hospital including another emergency department; 3) patients discharged on day of arrival, who expired on day of arrival or who left against medical advice on day of arrival.
Proportion of ED AMI patients with ST elevation on ECG whose time from hospital arrival to thrombolysis is 30 minutes or less.	Number of ED patients with a time from hospital arrival to thrombolysis of 30 minutes or less.	AMI patients without thrombolysis contraindications. Included Populations: Discharges with an ICD-9 Code for AMI of 410. Excluded Populations: 1) Patients less than 18 years of age; 2) Patients received in transfer from another hospital including another emergency department; 3) patients discharged on day of arrival, who expired on day of arrival or who left against medical advice on day of arrival.

B. Emergency Department Trauma Vital Signs

Measurement Description	Numerator	Denominator
Proportion of trauma patients with systolic blood pressure, pulse rate, or respiratory rate documented on arrival to the emergency department and at least hourly (or until ER patient is released, admitted or transferred).	Trauma patients with systolic blood pressure, pulse rate, or respiratory rate documented on arrival to the emergency department and at least hourly for three hours (or until ER patient is released, admitted or transferred).	All trauma patients. (e.g. Patients undergoing emergency hospital care for at least one of the diagnoses listed on ICD-9-CM codes 800-999, general trauma codes AND who were admitted, transferred or expired.)

C. Emergency Department Transfer Time and Communication

ED transfer communication	Number of information elements sent with transfer patients in 7 categories (pre-transfer communication, patient identification, vital signs, medication –related information, physician generated information, nurse generated information, and procedures and tests).	All ED patients that are transferred to another acute care hospital.

NOTES

1. University of Minnesota Rural Health Research Center, Stratis Health, and Health Insight. Refining and Field Testing a Relevant Set of Quality Measures for Rural Hospitals: Phase One Final Report. 2005.

2. Resources for chest pain/AMI assessment care improvement are available at the CMS MedQIC website
http://www.medqic.org/content/nationalpriorities/topics/projectSupportCats.jsp?topicID=421&subTopicID=1143493

   Articles related to chest pain quality of care are:

   Mehta, R., Montoye, C., Gallogly, M., Baker, P., Blount, A., Faul, J., Roychoudhury, C., Borzak, S., Fox, S., Franklin, M., Freundl, M., Kline-Rogers, E., LaLonde, T., Orza, M., Parrish, R., Satwicz, M., Smith, M., Sobotka, P., Winston, S., Riba, A., Eagle, K., and GAP Steering Committee of the American College of Cardiology. "Improving quality of care for acute myocardial infarction: The Guidelines Applied in Practice (GAP) Initiative." *Journal of the American Medical Association* 287: 1269-1276, 2002.

   Eagle, K., Gallogly, M., Mehta, R., Baker, P., Blount, A. Freundl, M. Orza, M., Parrish, R., Riba, A., and Montoye, C. "Taking the national guideline for care of acute myocardial infarction to the bedside: Developing the Guidelines Applied in Practice (GAP) Initiative in Southeast Michigan." *Joint Commission Journal on Quality Improvement* 28: 5-19, 2002.

3. www.jcaho.org*;* http://www.ahrq.gov/qual/nhqr05/index.html#Heart

4. Resources for trauma care improvement are available at the website
http://www.nhtsa.gov/people/injury/ems/leaderguide/

5. Resources for transfer care improvement are available at the website
http://www.astm.org/cgi-bin/SoftCart.exe/COMMIT/COMMITTEE/E31.htm?L+mystore+eaxl7272+1062625333.