

eMeasure Feasibility Assessment

Measure Title: Hospital 30-Day Risk-Standardized Acute Myocardial Infarction (AMI) Mortality eMeasure

Note: We conducted our feasibility assessment prior to the release of the National Quality Forum's (NQF's) 2013 Measure Evaluation Criteria, which include additional guidance on feasibility assessment. However, our feasibility assessment closely aligns with NQF's guidance.

We assessed eMeasure feasibility of our model and eMeasure throughout the entire development process:

1. Data element feasibility assessment during model development

We developed criteria to evaluate data element feasibility for cohort identification (inclusion/exclusion criteria) and risk-adjustment variables for the eMeasure in consultation with clinical and EHR experts during measure development. Specifically, these criteria required that variables included in the eMeasure must be:

1. Consistently obtained in the target population based on current clinical practice.
2. Captured with a standard definition and recorded in a standard format.
3. Entered in structured fields that are feasibly retrieved from current EHR systems.

Only data elements that met these criteria, as determined by consensus among consulting experts, were included in the final eMeasure.

Once the final model was eSpecified, we worked with another CMS contractor to conduct two surveys and perform eMeasure logic testing to further assess eMeasure feasibility, as described below.

2. Hospital information technology (IT)/quality expert survey

Overview

This survey asked hospital IT and quality experts to describe the level of ease with which they understood the human-readable form of our eMeasure, and how the data elements included in the eMeasure were stored in their hospital's electronic health record (EHR) (e.g., structured field vs. free text). The experts also had the opportunity to provide comments on the eMeasure's usability and the specific aspects of the eMeasure that they found confusing or difficult.

We received survey responses from experts representing seven hospitals and five EHR systems. These experts are the individuals who would be responsible for writing the specific queries that would extract our eMeasure from the hospitals' EHRs.

Results

Five of the seven IT/quality experts indicated that they could understand the AMI mortality eMeasure well enough to write or run reports or extract the data necessary to calculate the eMeasure. Of the remaining two experts, one indicated difficulty understanding the measure and one did not complete

this section of the survey.

The experts also indicated that most data elements included in the AMI mortality eMeasure were stored as structured data (Table 1), allowing data elements to be extracted easily.

Table 1. Summary of survey responses indicating how AMI mortality eMeasure data elements are stored in the EHR

Data element	Stored as structured data n (%)	Stored as free text, scanned data, or other n (%)	No response n (%)
Patients transferred in from another acute care hospital	5 (71%)	2 (29%)	0 (0%)
Discharge status of “left against medical advice”	7 (100%)	0 (0%)	0 (0%)
Principal discharge diagnosis	7 (100%)	0 (0%)	0 (0%)
Heart rate (bpm)	7 (100%)	0 (0%)	0 (0%)
Systolic blood pressure (mm Hg)	7 (100%)	0 (0%)	0 (0%)
Initial troponin levels (ng/ml) laboratory test results	6 (86%)	1 (14%)	0 (0%)
Hospital’s specific upper reference limit for troponin (ng/ml)	3 (43%)	3 (43%)	1 (14%)
Creatinine level (mg/dl) laboratory test results	5 (71%)	1 (14%)	1 (14%)

However, the experts noted two exceptions that may pose challenges to implementation of the eMeasure. First, they noted a potential difficulty in extracting a hospital’s upper limit of normal for troponin, a variable used in the risk adjustment to calculate the patient-to-hospital troponin ratio. To address this problem, our eMeasure asks hospitals to provide the upper limit of normal manually. Second, they foresaw difficulties in linking emergency department data to inpatient data, which is necessary to identify the first-collected value of the risk-adjustment variables.

The results of the hospital IT/quality expert survey indicated overall that the experts understood the eMeasure well and that the majority of the data elements could be extracted from the EHR easily.

3. EHR vendor survey

Overview

The purpose of the EHR vendor survey was to further assess the feasibility of the eMeasure. Individuals from nine EHR vendors representing 85% of the current EHR market completed the survey. This survey was not specific to the AMI mortality eMeasure, but was rather a generic survey whose results could be applied to all eMeasures. The survey asked the vendors to assess whether 122 data types and their attributes, as defined by the Quality Data Model (QDM), could feasibly be retrieved as structured data from their existing hospital EHRs. Vendors also indicated which data types in each QDM category were currently stored in their EHRs as structured data, which data types they could develop as structured data within 18 months, and the potential burden associated with the development of these data types within

the EHR.

The CMS contractor that conducted this survey analyzed the results of the EHR vendor survey and, based on these results, assigned each QDM data type a feasibility score that ranged from 1 to 4. The contractor also compiled a report specific to the data types included in the AMI mortality eMeasure.

The survey scoring system is shown in Table 2. A response assigned a score of 1 indicated that the data type was not feasible for use in eMeasures, whereas a score of 4 indicated that the data type was highly feasible for use in eMeasures.

Table 2. Feasibility survey options and feasibility scores (developed by CMS contractor that performed this testing)

Response	Score
No, we do not provide it now, and could not or would not develop it within 18 months	1
No, we do not provide it now but could develop it within 18 months with moderate to major burden	2
No, we do not provide it now, but could develop it within 18 months with relatively minor burden	3
Yes, we provide it now or are already working on it	4

Results

Vendors calculated a feasibility score for each data type, and the contractor that performed this testing averaged feasibility scores from each vendor for each data type. The feasibility scores of the QDM data types used in the AMI mortality eMeasure are shown in Table 3.

Table 3. Feasibility scores of data elements included in the AMI mortality eMeasure (calculated by CMS contractor that performed this testing)

Data Item	Mean Score	Highly Feasible?
Physical exam findings	3.56	No
Date/time of physical exam	3.56	No
Diagnostic study result	3.75	No
Primary encounter diagnosis?	3.88	Yes
Date/time of start of condition	3.89	Yes
Transfer from (used when receiving a patient, as in “where did the patient transfer in from?”)	3.89	Yes
Date/time of transfer	3.89	Yes
Condition	4.00	Yes
Condition status (e.g., active, inactive, resolved)	4.00	Yes
Date/time of resolution of condition	4.00	Yes
Diagnostic study type – Lab (e.g., CBC, chemistry panel)	4.00	Yes
Date/time - ordered	4.00	Yes
Date/time - performed	4.00	Yes
Encounter type (e.g., inpatient, ambulatory)	4.00	Yes
Discharge status (e.g., alive and well, expired, left against medical advice)	4.00	Yes
Date/time of encounter	4.00	Yes
Birth date	4.00	Yes
Patient expired	4.00	Yes
Date/time patient expired	4.00	Yes

As shown in Table 3, the average scores for the data types in the AMI mortality eMeasure ranged from 3.56 to 4.0, with the majority of data types scoring a 4.0. Sixteen of the 19 data types in the AMI mortality eMeasure were identified as highly feasible. The vendors indicated that these 16 data types were either already included in their EHR, or could be developed as a structured field within 18 months with relatively little burden. Based on the vendor responses to the survey, we determined the AMI mortality eMeasure to be overall feasible.

4. Measure logic feasibility testing

Overview

We partnered with another CMS contractor to conduct measure logic feasibility testing on the fully eSpecified eMeasure. The purpose of this testing was to determine the following:

1. Do the data criteria in the eMeasure conform to the relevant QDM specifications?
2. Do the measure value sets meet requirements specified by the relevant standards and specifications imposed by HL7 and the CMS Measures Blueprint?

Two types of measure logic feasibility testing the contractor performed are Extensible Markup Language (XML) Schema Definition (XSD) testing and QDM Schematron testing. XSD testing validated the eMeasure syntax by comparing the data elements against the Health Quality Measures Format (HQMF)

XML Schema encoded definitions. QDM Schematron testing compared the measure XML against QDM conformance constraints using Schematron. Finally, the contractor conducted limited validity testing of the eMeasure value sets. Overall, this testing assessed whether the eMeasure's expression in XML is written correctly and is technically adequate, and whether the data elements and value sets used in the eMeasure are valid.

Results

Table 4. AMI mortality eMeasure logic feasibility testing results (determined by CMS contractor that performed this testing)

Test	Result	
XML Schema Definition (XSD) Testing	Passed	
QDM Schematron Testing	Passed	
	General Testing Issue	Status
	Need additional guidance in the measure header concerning risk adjustment	Resolved
	Missing value sets	Resolved
	Expired grouping value set is not constructed properly	Resolved
	Patient Characteristic Birthdate value set should not use SNOMED CT	Resolved
	Inpatient Encounter contains invalid HL7 value set	Resolved
Value Set Validity Testing	Passed	

As shown in Table 4, the AMI mortality eMeasure passed the XML Schema testing, Schematron testing, and the value set validity testing. Minor errors identified during Schematron testing were addressed iteratively and testing was rerun using the updated eSpecification. The final eMeasure passed all aspects of the measure logic feasibility testing with no additional issues.

Conclusions

The AMI mortality eMeasure was developed using only those data elements considered feasible for extraction from an EHR. Further feasibility assessment of the AMI mortality eMeasure showed that the eMeasure data elements and logic were overall usable and feasible. Hospital IT experts and vendors expressed few concerns about running the eMeasure in hospital EHRs.

A few data elements prove challenging to extract for this measure, but are likely to be resolved in the near future (e.g., laboratory values from the emergency department), or can be handled by collecting supplemental data from other sources (e.g., transfer status or upper limit of normal for a lab value). This measure requires an outside data source for the outcome assessment. For the near-term implementation of eMeasures, hybrid models combining EHR data with information from other data sources may be required until these challenges are resolved.