Integrating the Healthcare Enterprise

# IHE Quality, Research and Public Health White Paper

# 2008-2009

# Quality Measurement Data Element Structured for EHR Extraction

Version 1.0

# Contents





## Introduction

Measuring clinical performance is recognized as a key aspect in the process of improving the quality of patient care. Healthcare organizations are requested to collect and report quality measure data in an effort to monitor and assess the quality of care provided to their patients.

Currently performance data are generally derived from manual abstractions from paper charts, a challenging process with respect to accuracy, consistency, cost, time and use of resources. There are an increasing number of quality measurements required by accreditors, government, payers and clinical specialty societies. Continuation of the existing manual abstraction process is untenable for healthcare providers.

A machine-based collection of quality measures could improve efficiency and consistency of data collection and analysis, as well as reduce human efforts. This is more viable with the increase in adoption of Electronic Health Record Systems (EHRS). For successful processing, measure specifications need to take into account how data are collected and defined in the EHRS. Uniformity of data from a structure and a content point of view among EHRS will enhance capture of information and consistency of measurement.

The intent of this white paper is to identify a standard mechanism to enable extraction of quality measures from EHRS. It is also expected that the information sought through quality measurement will generate appropriate concurrent actions within the clinical care process. Such action will provide expected impact on care delivery directly as well as retrospectively measuring the adherence to recommendations. Hence, the same value set content will be used for both clinical decision support as well as retrospective quality measurement. In fact, clinical decision support can be considered as a concurrent process of quality measurement. Since guidelines represent the evidence that is used for clinical decision support and quality measurement, the guidelines could also use the same value sets.

It is not intended that EHRs should have the same structure (i.e. data model) across all vendors. Required is an intermediary structure to be created such that vendor system captured data can be subsequently interpreted. The intent can be met by standardization of the data definitions of quality measures and vendor certification that they met that criteria. Vendors would be responsible for their semantic outputs as defined by the quality organizations but the structure across vendors would vary based on what data are captured from a given interface during an encounter. For simplicity, this document will refer to quality measures and performance measures as synonyms and use the term “quality measure”.

## 1.1 Open Issues and Questions

1. The context for certain data elements is identified in both Cross-Enterprise Document Sharing Medical Summary (XDS-MS) as referenced in the Patient Care Coordination Domain (PCC) Technical Framework Volume 1 and

Continuity of Care Document (CCD). An individual clinical site must produce both XDS-MS and CCD in order to capture all measure elements required for the three hospital measures studied in this white paper, AMI3, HF3, OP3 (Appendix D, E, F). Having to produce the two types of documents may add work effort and cost for a clinical setting; hence a correspondence between XDS-MS and CCD must be established.

2. Certain requirements are to be met in order to use Value Sets within the context of quality measures. Adherence to Health Level 7 (HL7) Value Set Principles is recommended. HL7 V3 Core Principles are currently in draft form.
3. A centralized Registry for quality measure related Value Sets is required. A Value Set Repository stores value sets in a transparent, secure, reliable and persistent manner and responds to value set retrieval requests. A Value Set Registry maintains metadata about registered value sets. Certain measures are updated periodically, and there is a need to identify different versions of individual Value Sets for analysis of performance during identified time frames. A Value Set Registry will enable the reuse of existing Value Sets for other purposes such as additional quality measures, clinical guidelines, clinical decision support algorithms, and others. A registry will enable all value sets created to be stored and catalogued, enabling reuse by other organizations, regardless of the registering agency, avoiding duplication of efforts and value sets.
4. To manage licensing and intellectual property concerns within a Value Set Registry, any entity that controls such a registry, or centralized database, must articulate with whom they might share the data and in what context. The centralized database must articulate the circumstances and context for coordinating. IHE would not dictate the method for managing licensure issues, but should indicate the need for such policy and procedure. Security management and mitigation issues for value sets and potentially for registries are identified in the ITI Sharing Value Sets Profile.
5. A registry for value sets is not currently an option based on existing profiles. It is not clear what organization should be the owner of such a value set registry. In the US example provided in this white paper, an organization such as the National Quality Forum (NQF) or the Agency for Healthcare Research and Quality (AHRQ) might represent an appropriate US domain sponsor for a registry. An international registry and sponsor may be more advantageous, although the appropriate organization for that effort is not clear at this time. Potential sponsors could be HL7, Integrating the Healthcare Enterprise (IHE), and the International Medical Informatics Association (IMIA). A business model is require for maintaining a Value Set Registry and such a model will influence ownership decisions.

Refer to the HL7 Core Principles document (draft) for principles of Value Sets (Appendix B).



6. Each value set will have a unique Object Identifier (OID) (object ID) assigned to it as well as a version. It is assumed that quality measure developers and/or clinical guideline developers will register OIDS for each of the Value Sets identified, as well as a version. The creation of an OID and of its version are out of scope of this white paper.

7. Careful consideration by measure developers of information available within EHRS may dramatically improve the consistency and reliability of the data results. The manual record abstraction burden will also be decreased by enabling presentation of applicable data directly to abstractors for verification. In the future we hope that guideline developers will specify data elements such that they can be used by measures and clinical decision support tools. Significant complexity is identified in representing measure elements as defined in measure specifications. The complexity reflects the realities of clinical evidence and care. Only three representative measures are described in detail in this document, but the complexity is a significant issue for many measures. It is expected that the use of standard value sets aligned with EHRS data model will, over time, significantly reduce and change the role of a data abstractor.

8. Some terminologies allow identification of hierarchical elements such that Value Sets can be intensional. Others do not identify hierarchies. For example the medication terminology used in the examples in this document (RxNorm), lists individual medications but it does not identify drug classes. Therefore, to be able to identify all elements, an extensional set (list of all set members) is required. A hierarchical definition is required for an intensional value set and such a hierarchy does not exist today within RxNorm. A flat list of data elements (extensional value set) may therefore be required in many cases.

9. Mapping to local terms is not in scope for this White Paper regarding value sets specifically but an implementation issue for incorporation of quality measures within EHRS. It is expected that mapping of local terms to a reference terminology will be accomplished either locally at the EHRS, within a larger health system, or regionally at the level of a RHIO or an HIE.

10. There are large overlaps between the data needs of clinical decision support, research, public health and quality measurement. This issue is broader than that represented by value sets alone, but it does impact the content and use of value sets. These domains require an agreed, shared, intermediate data model such as the HL7 RIM. Other healthcare data models are not excluded but investigation is not within the scope of this white paper.

11. Identification of patients in active clinical trials is an issue. One potential method for consideration is to assign the patient a role indicating in an active clinical trial a role. The HL7 role identification scheme with enables assignment of relationships that could identify a role as active in a clinical trial. The ability to specify such a role in the patient metadata is not currently available. Note: The identification of a patient role fits the use case for research to identify patients on clinical trials actively, and for registries to identify patients currently enrolled in



case management programs (via consent or mandate) with impact on Publish and Subscribe criteria as well as active query criteria. It is assumed that roles are scoped by organizations and that roles can be assigned to an individual, perhaps through a master patient index

## 1.2 Closed Issues

None

## 1.3 Future Considerations

### 1.3.1 Value Set Registry Profile – Technical Infrastructure

### 1.3.2 Value Set Content Profiles

#### 1.3.2.1 Quality Measurement Profile

#### 1.3.2.2 Clinical Guideline/Registry Specific Profile

#### 1.3.2.3 Public Health Specific Content Profile

#### 1.3.2.4 Clinical Research Specific Content Profile

#### 1.3.2.5 Role Definition for Patients on Clinical Trials

### 1.3.3 XDS-MS and CCD Content Alignment



## 2 Stakeholders

- Health Care Professional (HCP)
- Abstractors
- Healthcare facilities
- EHRS Vendors
- Regional and national healthcare networks (HIE, RHIO)
- Payers
- Public Health Organizations
- Accreditors – E.g., The Joint Commission, the National Committee for Quality Assurance, etc.
- Oversight and Coordinating Organizations (E.g., NQF, CCHIT, ONC, HITSP, eHealth Initiative, Commonwealth Fund, Infoway, UK Department of Health)
- Ancillary Software Systems (E.g., The Joint Commission Performance Measurement Systems)

Any one of these stakeholders may hold one or more of the following business actor roles:

- Measure Developers and Endorsers - Organizations that provide an electronic resource of codified structured quality measures and measure metadata.
- Measure Adopters and Implementers – Organizations that develop adopt or endorse clinical quality measures. These organizations may also conduct the measurement processing.
- Measurement Consumers – Individuals or organizations that retrieve the published quality measures to inform business and payment decisions and choice of providers. Measurement consumers are not changing the measurement process but are consuming third parties.
- Processing Entities - Organizations that receive results of quality measurement (structural, process and outcome measures) and create reports for comparison among various providers in a region or nationally



# 3 Use Case

## 3.1 Quality Measurement

The National Quality Measures Clearinghouse (NQMC) in the US defines a quality measure as "a mechanism that enables the user to quantify the quality of a selected aspect of care by comparing it to a criterion." Specifically, a clinical quality measure is a mechanism for assessing the degree to which a provider competently and safely delivers clinical services that are appropriate for the patient in the optimal time period.[1] Such measures can address access, outcome, patient experience, process, and structure. Quality measurement generally does not begin de novo. It starts with clinical evidence, obtained from research that generates recommendations for patient care which are represented in clinical guidelines or protocols. Clinical guidelines are "systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances."[2] As noted in Figure 1 (Evidence-based guideline and measurement process), clinical guidelines begin with evidence obtained through clinical research. Guidelines contain decision points at which individual interventions are expected dependent on patient factors and status. These decision points lend themselves to measurement, especially process measurement. The same data elements and logic are used concurrently to identify patients for specific recommended interventions through clinical decision support as well as for retrospective quality measurement. The outcome of a quality report generates new information as input to research into potential changes for the measures or for the clinical guidelines. Quality measure data can also be used to assign accountability to clinical providers and used in variable payment and bonus schema.

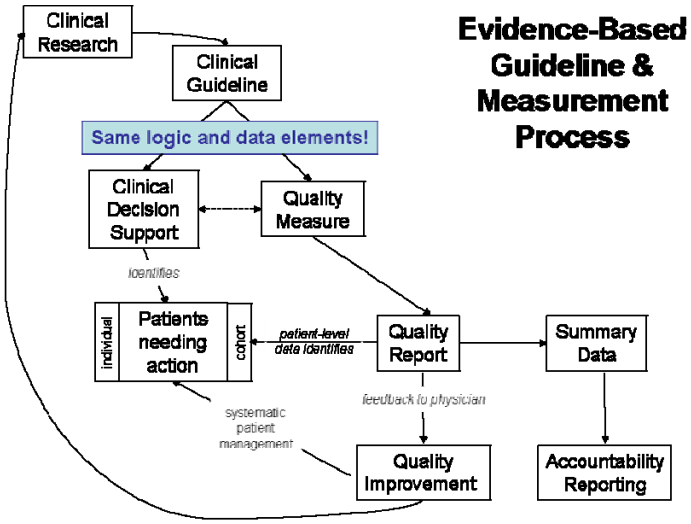



**Figure 1. Evidence-Based Guideline & Measurement**

### 3.1.1 Current situation:

[1] Available at: http://www.qualitymeasures.ahrq.gov/resources/measure_use.aspx

[2] Institute of Medicine, 1990. Available at: http://www.cancer.gov/templates/db_alpha.aspx?CdrID=44790.

Currently, healthcare facilities and healthcare practitioners are expected to review quality measurement specifications for the identification of patients subject to the measure. Such specifications include the presence of expected interventions, and determination as to whether patients can be excluded from reporting based on pre-defined criteria. The process of reviewing specifications for requested information takes considerable time and effort. Vendors of clinical information systems spend significant time analyzing specifications written with the expectation of manual chart abstraction and translating the requirements to data elements identifiable within electronic records. Implementers of clinical information systems also review the specifications in detail for coordination with local care practice and localization of workflow to collect and manage the data.

Reporting requires additional review of collected codified data and free text data, combining manual abstraction with some electronic data capture. For example, in the US, for each measure, code lists are mapped locally with each update to a measure or data request which occurs every six months with National Hospital Quality Measures developed by The Joint Commission and CMS (Centers for Medicare and Medicaid Services). Reporting mandates exist in a number of countries, such that the interoperability requirement is international. The Organisation for Economic Cooperation and Development (OECD) also has a Health Care Quality Indicators Project with the aim to collect internationally comparable data reflecting the health outcomes and health improvements attributable to medical care delivered in OECD countries.

The cost of medical record abstraction to provide required data for quality measures is significant.[3] It is estimated that a typical hospital spends up to $330,000 annually in resource time and efforts related to organizational continuous quality improvement activities.[4] For the provider complying with quality reporting, there are considerable costs in the preparation of information for measuring and reporting. These resources would be better spent improving the quality itself.

Ambulatory practices have less capability to manage such measurement and analysis and most add additional data entry fields to comply with required data element capture. Most ambulatory care practices participating in reporting also subscribe to services that perform the data mapping and analysis for them. Many ambulatory practices are not currently reporting due to the burden. Physician Consortium for Performance

[3] Dr. Feliciano Yu, internal estimate for The Children's Hospital of Alabama., April 7, 2008. Example of abstraction costs: In order to comply with reporting requirements for a recently promoted Joint Commission Children's Asthma Care Measure, costs for a pediatric hospital included an estimated a total of 119 FTE hours per year (about $4,287) in manual preparation and data abstraction time to responding and answering up to four questions answerable by a "Yes" or a "No" value for two Asthma Measures (i.e., *name of medication administered or documentation of contraindications*).

[4] Dranove D, Reynolds KS, Gillies RR, Shortell SS, Rademaker AW, Huang CF. The cost of efforts to improve quality. *Med Care.* Oct 1999;37(10):1084-1087.



Improvement (PCPI)[5] ambulatory measures have EHR specification code lists and logic algorithms.

[5] http://www.physicianconsortium.org

### 3.1.2 Desired situation:

A standard measure or data request format and schema will encourage measure developers and data requesters to define with increasing precision the data required to identify the applicable cohort of patients, the interventions required and the exceptions allowed, each represented by respective value sets. As shown in Figure 2, the measure or data request will be available in human readable format for review and in electronic form such that local clinical information systems can consume the required data elements to perform queries using locally preferred methodologies. Identification of applicable patients can thus be performed concurrently with care to enable improved care delivery and/or early identification of adverse events based on established triggers for appropriate intervention. Measures and patient-level data requests will be standardized and computable. Retrospective reporting will require fewer clinician hours for abstraction allowing more time for review and oversight. Modifications to measures can also be implemented by vendors and EHRS users in a quicker and standardized manner with minimal effort. The measurement process is clearer (more transparent) which is a critical success factor for clinician acceptance.

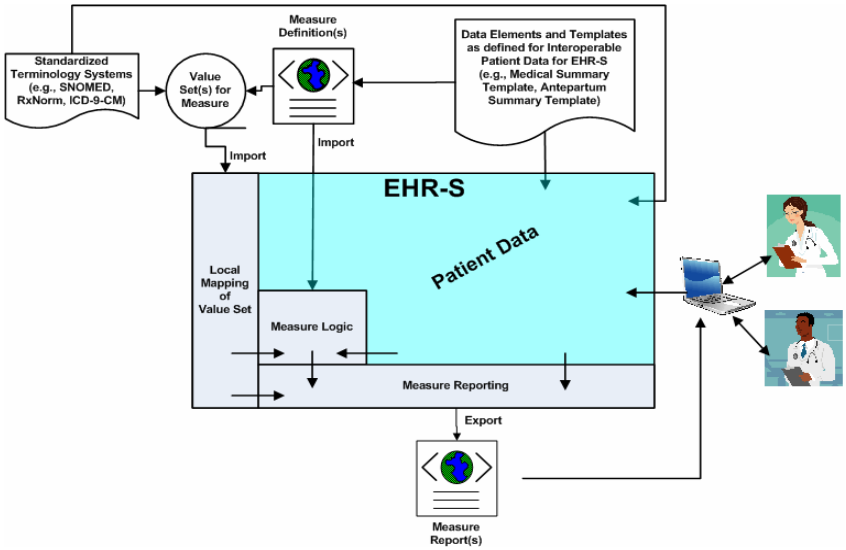



Figure 2. Desired Situation

The purpose of this white paper is to develop technical requirements to help capture appropriate information. Such effort will enable a change of paradigm from retrospective reporting to concurrent patient management and outcome and process evaluation using the same data components and logic. An additional benefit is to enable a single effort and avoid the need to rebuild measure management at each implementation.

## 3.2 Related Use Cases

To manage concurrent and retrospective processes requires the identification of a specific population or cohort of patients for specific interventions applicable to respective clinical guidelines or protocols with inherent clinical decision support. This white paper identifying quality measure value set requirements will have broad-reaching application to public health and clinical research use cases that have similar requirements. Other



examples include health registries with care management activities (e.g., immunization registries, oncology registries). Some specialty societies also manage registries to coordinate and identify clinical performance with respect to evidence-based clinical guidelines such as the American Heart Association (AHA), the American College of Cardiology (ACC), the American College of Rheumatology (ACR), and the Surgical Thoracic Society (STS). For context, additional Use Cases are provided in Appendix A for Public Health and Research.

# 4 The Quality Measure Specification

The assumption is that if all quality quality measures were written in a standard representation it would enable vendors to incorporate them into clinical systems. However, no clear current model is available for this purpose. There is current effort to standardize content based on endorsement criteria (in the US Domain) from the National Quality Forum (NQF). The NQF endorses measures to ascertain a basic level of rigor in analyzing the evidence and relevance to clinical care processes and outcomes.

Many measures are available in electronic document, non-executable format for distribution, for example, pdf. The expression of measures by each quality measurement development organization is different. This is very important and largely the reason why organizations are forced to manage the evaluation and reporting process manually. Manual is the best method at present despite the time required since there are no consistent data definitions for the quality measures. This fact also applies to the specialty societies that request collection of data elements that may not be required by other quality groups. New efforts are seeking standardization of format, structure and data definition to encourage the distribution and use of measures electronically. The Collaborative for Performance Measure Integration with EHRS, a group sponsored by the American Medical Association (AMA), the National Committee for Quality Assurance (NCQA), and recently the Electronic Health Record Vendor Association (EHRVA), has created a proposed model for such use for ambulatory settings. The model is an XML schema which is in development. If measures are expressed in this method – rather than as paper or free-text digital documents, we can eliminate the redundant manual processes now required to incorporate the content of quality measures into electronic health records.

Some of the work of the Collaborative model has been reviewed in the context of the quality measures selected for this white paper. Version 1.0 of the Collaborative model has been developed in the context of ambulatory quality measures. Additional information regarding the work of the Collaborative includes a survey of available components for quality measurement within EHRS located at: http://www.ama-assn.org/ama1/pub/upload/mm/472/fcgdraftreport.pdf, and recommendations for future activities located at: http://www.ama-assn.org/ama1/pub/upload/mm/472/wkgrparecommendation.pdf.

This white paper explores some differences with respect to hospital measures. Resolution of open issues identified in this white paper may be represented in forthcoming revisions of the Collaborative's effort.

# 5 Measures

Four quality measures are represented here as examples for value set determination within the context of EHRS. The first example identified represents a measure with less specificity and consequently is challenging with respect to value set identification. It is included in this white paper to demonstrate the need for collaboration among measure developers and the healthcare information technology community. The additional three measures were chosen as they are expected reporting measures hospitals in the United States and represent good examples of how value sets can be used in quality measure definitions.

## 5.1 ASGE and ACG Joint Task Force Measure: COL8

Colonoscopy 8 (COL 8) is a measure randomly selected from a specialty society joint effort (ASGE – American Society of Gastrointestinal Endoscopy, and the ACG – American College of Gastroenterology) was reviewed with respect to identification of value sets. The specific measure was developed from evidence showing that the time taken during a colonoscopy from reaching the cecum to withdrawal of the endoscope was directly proportionally to the quality of the examination. Therefore, the measure endeavors to measure the average time for withdrawal for all colonoscopies performed by an individual physician expecting the average time to be greater than or equal to six minutes. Some of the issues identified after review of the measure represent clarity and specificity of the measure itself which requires review by the specialty society. Others represent issues with defining the specification for IT consumption. Refer to Appendix C for more information about this measure.

### 5.1.1 COL 8 – IT Challenges

- Consistent, non-ambiguous definitions for quality measures is required to enable testing of the measure.
- COL8. Requires analysis of a continuous variable (mean, median). Continuous variable measures are aggregate data measures in which the value of each measurement can fall anywhere along a continuous scale (e.g., average time [in minutes] from reaching the cecum to withdrawal of the colonoscope.) Such measures require identification of a population which is similar to a denominator, but there is no numerator, rather a data element for each member of the defined population.
- Context must be identified to disambiguate the source of the data element within the EHR: For example, a medication in a medication list may represent active inpatient therapy in an inpatient summary, and a post-discharge medication list in a discharge summary.
- There is currently no healthcare information technology standard for reporting gastroenterology procedures. The measure developer is encouraged to work with



healthcare information technology experts to develop a standard reporting artifact for such procedures as to enable standardization.

### 5.1.2 COL8 – Measurement Definition Challenges

- Element to identify "withdrawal" time for colonoscopy is not clear. There is narrative that the "mean withdrawal time" is required for reporting. The time (in narrative) is from the time at which the cecum is reached to the time of withdrawal (expected > 6 minutes). How such times are expected to be documented is not clearly specified in the measure. If the data elements required to compute a measure rate are not clearly defined, it is NOT a good quality measure. An EHR vendor would not be expected to capture these data in a meaningful way, if the quality measure itself is subject to variable interpretations.
- The measure is only valid for "normal" results for patients with intact colon.
- What is a "normal" colon (a measure variable)– most likely a colon that requires no polypectomies and no biopsy –In the future measure developers should provide precise definitions for data elements so that EHRS vendors and implementers do not have to make assumptions about the meaning of the data elements.
- What is "intact colon" – no prior resections, etc. – In the future measure developers should provide precise definitions for data elements so that EHRS vendors and implementers do not have to make assumptions about the meaning of the data elements.
- The measure may require a request for new SNOMED codes.
- The measure may require a request from appropriate GI expert societies for new structure and precise definitions of any data elements to be used in the computation of measure rates.

### 5.1.3 COL8 – Recommendations

Measurement definition challenges identified in the analysis preclude definition of specific value sets for COL8. Further detail is required in the specification to establish such value sets.

- Measure developers should proceed with further definition of data element requirements (e.g., "normal colon," "intact colon" definitions) based on available coding schema, e.g. all patients except those with findings of colonic polyp (SNOMED-CT concept ID 68496003), stricture of colon (SNOMED CT concept ID 8543007), etc.
- Gastroenterology expert societies should identify a standard procedure report for Gastroenterology procedures generically or specific to individual procedures, and align such requirements with existing standard documentation formats. Examples can be found in DICOM, HL7 Structured Documents (CDA). Structured reporting can assist with documentation of required data elements specific to this measure, (e.g., the time the cecum is reached and the time and definition of



withdrawal of the scope), as well as specific observations and findings inherent to the procedure.

## 5.2 The Joint Commission and CMS Measurement Criteria

The Joint Commission and the Centers for Medicare and Medicaid Services (CMS) in the US manage measures collaboratively and separately as measure developers. Three representative measures were selected for review of data elements with respect to value sets. Data elements are referenced below as a combined set for all three measures.

### 5.2.1 AMI-3

AMI-3 (ACEI or ARB for LVSD) is an inpatient acute care hospital quality measure that evaluates acute myocardial infarction (AMI) patients with left ventricular systolic dysfunction (LVSD) and without both angiotensin converting enzyme inhibitor (ACEI) and angiotensin receptor blocker (ARB) contraindications who are prescribed an ACEI or ARB at hospital discharge. Refer to Appendix D for more information, including the initial patient population and measure algorithms for the AMI-3 measure.

### 5.2.2 HF-3

HF-3 (ACEI or ARB for LVSD) is an inpatient acute care hospital quality measure that evaluates heart failure patients with left ventricular systolic dysfunction (LVSD) and without both angiotensin converting enzyme inhibitor (ACEI) and angiotensin receptor blocker (ARB) contraindications who are prescribed an ACEI or ARB at hospital discharge. This measure is identical to AMI-3 except for the initial (denominator) population. Refer to Appendix E for more information, including the initial patient population and measure algorithms for the HF-3 measure.

### 5.2.3 OP-3

OP-3 (Median Time to Transfer to Another Facility for Acute Coronary Intervention) is an outpatient emergency department quality measure that evaluates the median time from emergency department arrival to time of transfer to another facility for acute coronary intervention. Refer to Appendix F for more information, including the initial patient population and measure algorithms for the OP-3 measure.

### 5.2.4 General Measure Criteria Challenges

Most of the data elements identified in the referenced quality measures refer to one or more terms or coded values, within a specific terminology (ICD-9-CM ). As will be noted in the following Value Set discussion, additional terminologies (SNOMED-CT, LOINC, RxNorm) are beneficial with respect to accessing information that is part of the direct patient care process and not specifically related to billing codes. The abstraction guidelines are generally instructions to abstractors to find clinical information in a paper



medical record. The EHRS ideally identifies such information using standardized medical terminology. Measures that refer to the same standardized terminology will add consistency of meaning with respect to clinical care delivery and data collection for measures, clinical decision support, and interoperability. Where suggestions are provided, the intent is to avoid the requirement for manual abstraction of data, not to change the meaning of the measure. It is expected that measure developers and guideline developers, as the clinical domain experts, will specify the clinically relevant terminology codes to represent the intended meaning of each data element.



# 6 Value Sets:

The ITI Shared Value Sets (SVS) Profile (http://wiki.ihe.net/index.php?title=Sharing_Value_Sets ) provides the infrastructure required to specify a value set, or a uniquely identifiable set of valid concept representations. Most of the data elements identified in the referenced quality measures refer to one or more terms or coded values, within a specific terminology. Where terminologies were not specified within a measure, suggestions were provided to enhance understanding of EHRS capabilities, specifically SNOMED CT, LOINC, RxNorm. As will be noted in the following discussion, those that do not reference such terminologies are problematic with respect to standardization, consistency of meaning with respect to clinical care delivery and medical record abstraction, and interoperability. The allowable values that represent an individual data element within a quality or quality measure comprise the value set for the respective data element. As such value sets require modification over time, individual versions of measures will need to refer to individual versions of value sets to maintain consistency.

Identification of value sets is not sufficient for the electronic processing of measurements or guideline specifications. The context of use for each data element type (value set) is highly significant to conform with the meaning intended. For example, a value set of medications representing Angiotensin Converting Enzyme Inhibitors (ACEI) contains 62 medications, representing individual medications, combination oral formulations, brand names, generic names and some dosage specifications. Each of these can be identified in a medication terminology, RxNorm. However, the expected intervention for the AMI3 and HF3 measures is that such medication is prescribed for the patient at discharge from the hospital if the patient meets criteria for having had a myocardial infarction or a diagnosis of heart failure. The appropriate RxNorm code must be identified in the record, therefore, in the context of a discharge medication reconciliation record or discharge order. Identification of the appropriate RxNorm code in any other context will not have the same meaning and would not be acceptable with respect to the measure.

Hence, two components are required for identification and use of each quality measure data element not directly available from the CCD: (a) value sets and (b) the context for identification of elements from each representative value set. This White Paper will identify the value sets and the context for a representative sample of data elements for each of the selected measures. The same requirements will apply to concurrent clinical decision support elements in support of clinical guideline and protocol representation within EHRS.

## 6.1 Value Set Definition

HL7 Defines Value Set as (full definition in Appendix B):



- A Value Set represents a uniquely identifiable set of valid concept representations, where any concept representation can be tested to determine whether or not it is a member of the value set. A concept representation may be a single concept code, or a combination of codes to be post-coordinated.
- Value sets exist to constrain the content for a coded element in an HL7 static model or data type property. Value sets cannot have null content, and must contain at least one concept representation where any given concept is generally (but not required to be) represented by only a single code within the Value Set. Codes from different code systems are allowed because they can be disambiguated by identifying the code system they come from.

## 6.2 Mapping

Mapping to local terms is not in scope for value sets specifically but an implementation issue for incorporation of quality measures within EHRS. It is expected that mapping of local terms to a reference terminology will be accomplished either locally at the EHRS, within a larger health system, or regionally at the level of a RHIO or HIE.



# 7 Combined Data Elements AMI3, HF3, OP3

## 7.1 Data Element Name – ACEI or ARB[6] Prescribed at Discharge

### 7.1.1 Value Set: ACEI Medications

For the purpose of this example, the national selection for interoperable nomeclature for medication by the Healthcare Information Technology Standards Panel (HITSP) is the RxNorm semantic clinical drug element. For international work, IHE specifies the use of national extensions that may select other medication terminologies (e.g., in the UK SNOMED CT).

In the following table all medications appropriate for this measure are listed as required elements for the value set. Only a representative set is mapped to RxNorm codes as a example of providing codes in the value set. RxNorm Semantic Clinical Drug (SCD) was the code used for the value set as it is the RxNorm code recommended for interoperability by HITSP.

Note that, in performing the mappings from measure terms to RxNorm in the tables below, some medications map to multiple elements within the terminology. For example, Benazepril/amlodipine maps to six clinical drugs, one dose form, and six branded by components. Only the RxNorm Semantic Clinical Drug (SCD) was used as this is the component identified for interoperability in the US domain by HITSP. Note, each value set will require modification over time as new items are added and existing items retired. Therefore, value set versions are required. In the example table below, the version is represented as the Measure Version Number.

| | |
|---|---|
| Measure | AMI-3, HF-3 |
| Measure Version Number | 2.5 |
| Measure Table Number | 1.2 |
| Table Name | ACEIs |
| Last Measure Version Update | 1.05 |
| Code System | RxNorm (OID: 2.16.840.1.113883.6.88) |
| Test OID (For Illustrative Purposes ONLY – not for real implementations) | 1.2.6.1.4.1.21367.2008.3.1.2008.1 |

| Medication (as listed in measure description) | RxNorm Semantic Clinical Drug (SCD) | Associated RxNorm Code |
|---|---|---|
| Accupril | quinapril 5 MG Oral Tablet | 312750 |
| | quinapril 10 MG Oral Tablet | 312748 |
| | quinapril 20 MG Oral Tablet | 312749 |

[6] ACEI = Angiotensin Converting Enzyme Inhibitor medication, ARB = Angiotensin Receptor Blocker

| | |
|---|---|
| Measure | AMI-3, HF-3 |
| Measure Version Number | 2.5 |
| Measure Table Number | 1.2 |
| Table Name | ACEIs |
| Last Measure Version Update | 1.05 |
| Code System | RxNorm (OID: 2.16.840.1.113883.6.88) |
| Test OID (For Illustrative Purposes ONLY – not for real implementations) | 1.2.6.1.4.1.21367.2008.3.1.2008.1 |

| Medication (as listed in measure description) | RxNorm Semantic Clinical Drug (SCD) | Associated RxNorm Code |
|---|---|---|
| | quinapril 40 MG Oral Tablet | 314203 |
| Accuretic | Hydrochlorothiazide 12.5 MG / quinapril 10 MG Oral Tablet | 310796 |
| | Hydrochlorothiazide 12.5 MG / quinapril 20 MG Oral Tablet | 310797 |
| | Hydrochlorothiazide 25 MG / quinapril 20 MG Oral Tablet | 310809 |
| Aceon | Perindopril 2 MG Oral Tablet | 312311 |
| | Perindopril 4 MG Oral Tablet | 312312 |
| | Perindopril 8 MG Oral Tablet | 312313 |
| Altace | Ramipril 1.25 MG Extended Release Capsule | 346568 |
| | Ramipril 1.25 MG Oral Tablet | 401965 |
| | Ramipril 10 MG Extended Release Capsule | 348000 |
| | Ramipril 10 MG Oral Capsule | 261962 |
| | Ramipril 10 MG Oral Tablet | 401968 |
| | Ramipril 2.5 MG Oral Capsule | 198188 |
| | Ramipril 2.5 MG Oral Tablet | 251856 |
| | Ramipril 5 MG Oral Capsule | 198189 |
| | Ramipril 5 MG Oral Tablet | 251857 |
| Benazepril | Amlodipine 10 MG / benazepril 20 MG Oral Capsule | 349442 |
| | Amlodipine 10 MG / benazepril 40 MG Oral Capsule | 629569 |
| | Amlodipine 2.5 MG / benazepril 10 MG Oral Capsule | 308137 |
| | Amlodipine 5 MG / benazepril 10 MG Oral Capsule | 308138 |
| | Amlodipine 5 MG / benazepril 20 MG Oral Capsule | 308139 |
| | Amlodipine 5 MG / benazepril 40 MG Oral Capsule | 629570 |
| | benazepril 10 MG / Hydrochlorothiazide 12.5 MG Oral Tablet | 308608 |
| | benazepril 10 MG Oral Tablet | 308607 |
| | benazepril 20 MG / Hydrochlorothiazide 12.5 MG Oral Tablet | 308610 |
| | benazepril 20 MG / Hydrochlorothiazide 25 MG Oral Tablet | 308611 |



| | |
|---|---|
| Measure | AMI-3, HF-3 |
| Measure Version Number | 2.5 |
| Measure Table Number | 1.2 |
| Table Name | ACEIs |
| Last Measure Version Update | 1.05 |
| Code System | RxNorm (OID: 2.16.840.1.113883.6.88) |
| Test OID (For Illustrative Purposes ONLY – not for real implementations) | 1.2.6.1.4.1.21367.2008.3.1.2008.1 |

| Medication (as listed in measure description) | RxNorm Semantic Clinical Drug (SCD) | Associated RxNorm Code |
|---|---|---|
| | benazepril 20 MG Oral Tablet | 308609 |
| | benazepril 40 MG Oral Tablet | 308612 |
| | benazepril 5 MG / Hydrochlorothiazide 6.25 MG Oral Tablet | 313866 |
| | benazepril 5 MG Oral Tablet | 308613 |
| Benazepril Hydrochloride | benazepril 10 MG Oral Tablet | 308607 |
| | benazepril 20 MG Oral Tablet | 308609 |
| | benazepril 40 MG Oral Tablet | 308612 |
| | benazepril 5 MG Oral Tablet | 308613 |
| Benazepril/amlodipine | Amlodipine 10 MG / benazepril 20 MG Oral Capsule | 349442 |
| | Amlodipine 10 MG / benazepril 40 MG Oral Capsule | 629569 |
| | Amlodipine 2.5 MG / benazepril 10 MG Oral Capsule | 308137 |
| | Amlodipine 5 MG / benazepril 10 MG Oral Capsule | 308138 |
| | Amlodipine 5 MG / benazepril 20 MG Oral Capsule | 308139 |
| | Amlodipine 5 MG / benazepril 40 MG Oral Capsule | 629570 |
| Benazepril/hydrochlorothiazide | **Only a sample of RxNorm codes are provided for this table** | |
| Capoten | | |
| Capozide | | |
| Capozide 25/15 | | |
| Capozide 25/25 | | |
| Capozide 50/15 | | |
| Capozide 50/25 | | |
| Captopril | | |
| Captopril HCT | | |
| Captopril/hydrochlorothiazide | | |
| Enalapril | | |
| Enalapril Maleate/diltiazem | | |
| Enalapril Maleate/hydrochlorothiazide | | |
| Enalapril/diltiazem | | |
| Enalapril/felodipine | | |



| | |
|---|---|
| Measure | AMI-3, HF-3 |
| Measure Version Number | 2.5 |
| Measure Table Number | 1.2 |
| Table Name | ACEIs |
| Last Measure Version Update | 1.05 |
| Code System | RxNorm (OID: 2.16.840.1.113883.6.88) |
| Test OID (For Illustrative Purposes ONLY – not for real implementations) | 1.2.6.1.4.1.21367.2008.3.1.2008.1 |

| Medication (as listed in measure description) | RxNorm Semantic Clinical Drug (SCD) | Associated RxNorm Code |
|---|---|---|
| Enalapril/hydrochlorothiazide | | |
| Enalaprilat | | |
| Fosinopril | | |
| Fosinopril Sodium/hydrochlorothiazide | | |
| Lexxel | | |
| Lisinopril | | |
| Lisinopril/hydrochlorothiazide | | |
| Lotensin | | |
| Lotensin HCT | | |
| Lotrel | | |
| Mavik | | |
| Moexipril | | |
| Moexipril Hydrochloride | | |
| Moexipril Hydrochloride/hydrochlorothiazide | | |
| Moexipril/hydrochlorothiazide | | |
| Monopril | | |
| Monopril HCT | | |
| Monopril HCT 10/12.5 | | |
| Perindopril | | |
| Perindopril Erbumine | | |
| Prinivil | | |
| Prinzide | | |
| Quinapril | | |
| Quinapril HC1 | | |
| Quinapril HC1/HCT | | |
| Quinapril Hydrochloride/hydrochlorothiazide | | |
| Quinapril/hydrochlorothiazide | | |
| Quinaretic | | |



| | |
|---|---|
| Measure | AMI-3, HF-3 |
| Measure Version Number | 2.5 |
| Measure Table Number | 1.2 |
| Table Name | ACEIs |
| Last Measure Version Update | 1.05 |
| Code System | RxNorm (OID: 2.16.840.1.113883.6.88) |
| Test OID (For Illustrative Purposes ONLY – not for real implementations) | 1.2.6.1.4.1.21367.2008.3.1.2008.1 |

| Medication (as listed in measure description) | RxNorm Semantic Clinical Drug (SCD) | Associated RxNorm Code |
|---|---|---|
| Ramipril | | |
| Tarka | | |
| Teczem | | |
| Trandolapril | | |
| Trandolapril/verapamil | | |
| Trandolapril/verapamil hydrochloride | | |
| Uniretic | | |
| Univasc | | |
| Vaseretic | | |
| Vasotec | | |
| Zestoretic | | |
| Zestril | | |

### 7.1.2 ACEI Value Set XML Representation – Appendix 18

### 7.1.3 Value Set – ARB Medications

For the purpose of this example, the national selection for interoperable nomeclature for medication by the Healthcare Information Technology Standards Panel (HITSP) is the RxNorm semantic clinical drug element. For international work, IHE specifies the use of national extensions that may select other medication terminologies (e.g., in the UK SNOMED CT).

Note, in the following table all medications appropriate for this measure are listed as required elements for the value set. Only a representative set of ACEIs are mapped to RxNorm codes as a example of providing codes in the value set (see 8.1.1).

| | |
|---|---|
| Measure | **AMI-3, HF-3** |
| Measure Version Number | **2.5** |
| Measure Table Number | **1.7** |
| Table Name | **ARBs** |



| | |
|---|---|
| Last Measure Version Update | **2.5** |
| Code System | **RxNorm (**2.16.840.1.113883.6.88) |
| Test OID (For Illustrative Purposes ONLY – not for real implementations) | 1.2.6.1.4.1.21367.2008.3.1.2008.2 |

| Medication | RxNorm Mappings – Representative Set entered for ACEIs Only |
|---|---|
| Atacand | **RxNorm information has not been identified for these medications** |
| Atacand HCT | |
| Avalide | |
| Avapro | |
| Azor | |
| Benicar | |
| Benicar HCT | |
| Candesartan | |
| Candesartan/hydrochlorothiazide | |
| Cozaar | |
| Diovan | |
| Diovan HCT | |
| Eprosartan | |
| Eprosartan/hydrochlorothiazide | |
| Exforge | |
| Hyzaar | |
| Irbesartan | |
| Irbesartan/hydrochlorothiazide | |
| Losartan | |
| Losartan/hydrochlorothiazide | |
| Micardis | |
| Micardis HCT | |
| Olmesartan | |
| Olmesartan/amlodipine | |
| Olmesartan Medoxomil | |
| Olmesartan Medoxomil/amlodipine | |
| Olmesartan/hydrochlorothiazide | |
| Tasosartan | |
| Telmisartan | |
| Telmisartan/hydrochlorothiazide | |
| Teveten | |
| Teveten HCT | |
| Valsartan | |
| Valsartan/amlodipine | |
| Valsartan/hydrochlorothiazide | |



| | |
|---|---|
| Measure | **AMI-3, HF-3** |
| Measure Version Number | **2.5** |
| Measure Table Number | **1.7** |
| Table Name | **ARBs** |
| Last Measure Version Update | **2.5** |
| Code System | **RxNorm (**2.16.840.1.113883.6.88) |
| Test OID (For Illustrative Purposes ONLY – not for real implementations) | 1.2.6.1.4.1.21367.2008.3.1.2008.2 |
| Verdia | |

### 7.1.4 Context:

The concept of a medication can occur in multiple locations within the EHRS to represent active medications, past medications, planned medications, medications to which the patient has an allergy or adverse reaction, etc. To identify the medication in the correct context for this measure requires that the patient is expected to continue it after discharge.

#### 7.1.4.1 XDS-MS

XDS-MS is the document to represent the context for this element. The element is part of the medication reconciliation section of the XDS-MS. The CCD Discharge Summary references medications "active" at discharge but without the ability to determine if the medication is active (hence, not discontinued during the last day of hospitalization) or continued post-discharge. Hence, the XDS-MS medication reconciliation section is a more appropriate context for this information.



#### 7.1.4.2 XDS-MS Section ACEI Ordered at Discharge:

| |
|---|
| clinicaldocument / component / structuredbody / component / section [code=LOINC 10183-2 (hospital discharge medications)] / entry / substanceadministration / consumable / manufacturedproduct / labeleddrug / code=[Valueset=ACEIlist] |

#### 7.1.4.3 XDS-MS Section – ARB Ordered at Discharge

| |
|---|
| clinicaldocument / component / structuredbody / component / section [code=LOINC 10160-0 (history of medication use)] / entry / substanceadministration [statuscode=SNOMED 55561003 (active)] / consumable / manufacturedproduct / material / code=[Valueset=ARBlist] |

### 7.1.5 Recommendations

- RxNorm Semantic Clinical Drug (SCD) was the code used for the value set as it is the RxNorm code recommended for interoperability by HITSP and the mapping of terms identified by the measure to RxNorm is partially accomplished with most medications. There are considerations for measure developers in using RxNorm within value sets. Some issues identified:
- Measures identify elements that are synonyms (e.g., Captopril HCT and Captopril/hydrochlorothiazide in this example) whereas only one (Captopril/hydrochlorothiazide) is listed specifically in the RxNorm search. In creating value sets, measure developers will require an understanding of the coding terminology system to select appropriate codes. The result is a benefit in that a single source (the coding terminology) can be used to determine applicable value set elements. An additional benefit is that measure developers can be more granular with respect to individual medications included or excluded from the value set. For example, an extensional value set (flat list of elements) can represent an entire class of medications (e.g., ACEIs) except for one that may have regulatory approval only for indications not represented in the condition under evaluation.
- The medication terminology used (RxNorm) does not identify drug classes. Therefore, to be able to identify all elements, an extensional set (list of all set members) is required. A hierarchical definition is required for an intensional value set and such a hierarchy does not exist today within RxNorm. It is recommended that RxNorm develop such a hierarchy or map to existing hierarchies such as NDF-RT.
- With respect to context for the identification of elements within an electronic record, XDS-MS and CCD Discharge Summary each has a medication list. For



EHRs routinely creating XDS-MS the solution is clear. For EHRs routinely creating CCD discharge summaries, the solution requires reconciliation of the differences between XDS-MS and CCD to be sure medications continued after discharge are appropriately identified. EHRs may not create both XDS-MS and CCD Discharge Summaries.

- Measure specifications that refer to the medication value set within the context of XDS-MS Discharge Summary will no longer need to specify multiple sources for data abstraction with indication of preference and conflict checking.

## 7.2 Admission Date – (AMI-3, HF-3)

Date of physician order to admit to an acute inpatient setting

### 7.2.1 Value Set

Value set not required, the data element is defined within the CCD (as noted below)

### 7.2.2 Context

#### 7.2.2.1 CCD

| |
|---|
| clinicaldocument / documentationof / serviceevent / effectivetime / low (limited to date) |

### 7.2.3 Recommendations:

Admission date can be simplified by identification within the header of a CCD.

## 7.3 Birth Date – (AMI-3, HF-3, OP-3) – Date of birth

### 7.3.1 Value Set

Value set not required, the data element is defined within the CCD (as noted below)

### 7.3.2 Context

#### 7.3.2.1 CCD Patient Demographics

| |
|---|
| clinicaldocument / recordtarget / patientrole / patient / birthtime [date only] |

### 7.3.3 Recommendations

Birth date can be simplified by identification within the demographics of a CCD.



## 7.4 Clinical Trial – (AMI3, HF3)

Determine if a clinical trial related to the measure topic (in this case Myocardial Infarction <AMI3> or Heart failure <HF3>) was active during the hospitalization

### 7.4.1 Value Set

A value set cannot be determined. There is no clear, consistent terminology to represent the existence, activity, or clinical nature of a clinical trial. Some measures require codes to indicate specific conditions (as with this one) non-medication, surgical procedure or device related clinical trial types. Such specificity is not available in existing terminologies identified.

### 7.4.2 Context

#### 7.4.2.1 Coding

V70.7 is an ICD9-CM Diagnosis code that can be used to indicate the patient is on a clinical trial. The code does not specify what type of clinical trial. It can be used to represent any trial whether or not related to medication. This code is only used by The Joint Commission core measures for Pregnancy Related Conditions.

#### 7.4.2.2 Clinical trials

Clinical trials are not defined in any of the CCD templates. A CCD medication list might have an undefined medication as the trial agent (or potentially placebo agent) in a double blind controlled trial. HL7 (Orders and Observation Workgroup) has a reference message to enroll a patient in a clinical trial but not to indicate the patient is actively part of an existing clinical trial. HL7 also has an unspecified study message. Neither of these has been in use.

##### 7.4.2.2.1 Context

Clinical Trials Context – The context required is to identify that a patient is actively a participant in a clinical trial as well as the type of clinical trial. The purpose of identifying this information is to enable exclusion or exception of the patient from the measurement. Such information is not easily identified within current EHRS, and there is no agreed upon standard.

##### 7.4.2.2.2 Role definition:

- Case Subject
- Research Subject

##### 7.4.2.2.3 Recommendations

In this case the requirement is to identify patients via an EHR who are already enrolled in a clinical trial. This use case is not intended to identify patients who may be a candidate



for a specific clinical trial based on a given profile. Identification of a patient enrolled in an active clinical trial and the context of the trial is a complex issue. Consultation with medical informatics standard organizations for appropriate standards, modeling and definition of requirements is necessary.

The measure requires as an exclusion that a patient is actively participating in a clinical trial related to the condition applicable to the measure. Therefore, active participation is not sufficient; rather the the type of clinical trial (i.e., based on a specific Problem or Diagnosis type) must be identifiable to represent a valid exclusion or exception. One potential method for consideration is to assign the patient a role indicating in an active clinical trial a role. The HL7 role identification scheme with enables assignment of relationships that could identify a role as active in a clinical trial. This capability is not currently available in CCD. Note: The identification of a patient role fits the use case for research to identify patients on clinical trials actively, and for registries to identify patients currently enrolled in case management programs (via consent or mandate) with impact on Publish and Subscribe criteria as well as active query criteria. It is assumed that roles are scoped by organizations and that roles can be assigned to an individual, perhaps through a master patient index.

Identification of an active clinical trial and the context of the trial is a complex issue for the healthcare information technology community. Consultation with medical informatics standard organizations for appropriate standards, modeling and definition of requirements is necessary. The value of identifing that a patient is a subject in a clinical trial for the purpose of an exclusion or exception should be re-evaluated by the measure developer community.

## 7.5 Comfort Measures Only – AMI-3, HF-3

Determine the date during admission patient care was changed to comfort measures only. The phrase “comfort measures only” does not have a consistent definition which makes the determination of such a patient status difficult. Some definitions are based on legal statute applicable to specific regions or locations (http://hawaii.gov/health/family-child-health/ems/pdf/dnrinfopacket.pdf). Medical journals also have definitions.[7,8] Consistency is lacking for definition as well as for location within a medical record in which such patient designation is captured. Some organizations require an order to initiate “comfort measures only” while others use physician documentation in notes to so indicate. Data elements with ambiguous or inconsistent definitions cannot be consistently determined.

[7] Kathleen Moneymaker. Journal of Palliative Medicine. June 1, 2005, 8(3): 688-688. doi:10.1089/jpm.2005.8.688.

[8] J. Andrew Billings. Journal of Palliative Medicine. March 1, 1998, 1(1): 73-81. doi:10.1089/jpm.1998.1.73.



### 7.5.1 Value Set

A value set cannot be determined. There is no clear, consistent terminology, nor is there a consistent medical record context for the representation of a patient status of “comfort measures only.” The expectation is also that the time of designation of “comfort measures only” is captured for analysis. The first allowable value is comfort measure only day 0 or 1. Second allowable value is day 2 or after. The justification is that early hospital interventions are expected if the “comfort measure only” designation is not made until day 2 or later. Some use ICD9-CM code V66.7, “Encounter for palliative care,” to identify "comfort care only." Although the code indicates “encounter for,” this code can only be reported as a secondary diagnosis, and it can be assigned whenever there is documentation that the patient is receiving palliative care. Assignment of the code is dependent on physician documentation.[9] ICD9 code V667 also fails to meet the requirement of timeframe.

### 7.5.2 Context

Electronically this information could be present in Advance Directives which are represented in CCD. Types of Advance Directives, however, do not specify "comfort measure only." No specific context is readily identified based on current usage. It may be most appropriate to expect an order by a physician, advanced nurse practitioner or physician assistant for “comfort measure only” to enable context for timing and to be certain of the source of the order.

### 7.5.3 Recommendations:

- Development of a standard definition for “comfort measure only” among quality measure developers and clinical guideline developers.
- Identification of a standard, well defined code for "comfort measure only"
- Limitation to “comfort measure only” orders as acceptable elements for this exclusion / exception to enable determination of the timing of assignment.
- Identification of a well defined place in the CCD or XDS-MS for "comfort measure only" designation.
- Reconsider the value of using this data element as an exclusion considering the effort required.

## 7.6 Contraindications (AMI3, HF3)

### 7.6.1 Contraindication – Allergy / Sensitivity

Determine if a patient had an allergy / sensitivity to ACEI and ARB. Note the guideline and measure developer must specify the logic unambiguously such that system

[9] Personal communication, Sue Bowman, American Health Information Management Association (AHIMA), May, 2008.



implementations can identify allergy or intolerance to both medications (ACEI and ARB) to indicate an exclusion (exception to the rule).

#### 7.6.1.1 Value Set – Allergy or Intolerance

A value set may be defined in two methods (refer to Appendix B for an explanation of value sets including intensional and extensional definitions). A full set of acceptable terms to represent allergy or intolerance must be reviewed by the measure developer.

##### 7.6.1.1.1 Intensional value set for Allergy or Intolerance

Example: Use the head concept (superordinate or parent) concept for ACEI allergy which is represented by SNOMED CT concept ID 2935000009. In this case, the measure developer's specification includes the definition of the head concept and instructions that system tools resolve the set of subordinate codes at run time within the EHRS.

##### 7.6.1.1.2 Extensional value set for Allergy or Intolerance

Example: Use an extensional value set (flat list) of all matching codes derived from a head concept code and its subordinates (e.g., ACEI allergy SNOMED CT 2935000009 and also all of its subordinates or children).

#### 7.6.1.2 Context

Allergy or Intolerance to both ACEI and ARB. Location in the record is XDS-MS in Allergies.



#### 7.6.1.2.1 ACEI XDS-MS Section:

| |
|---|
| clinicaldocument / component / structuredbody / component / section [code=LOINC 48765-2 (allergies, adverse reactions, alerts)] / entry / act / entryrelationship / observation / code=valueset SNOMED 293500009 (ACEI adverse reaction) and its children |

#### 7.6.1.2.2 ARB XDS-MS Section:

| |
|---|
| clinicaldocument / component / structuredbody / component / section [code=LOINC 48765-2 (allergies, adverse reactions, alerts)] / entry / act / entryrelationship / observation / code=valueset SNOMED 407590002 (ARB adverse reaction) and its children |

### 7.6.2 Contraindication – Medical Reason

Determine if the physician / advanced practice nurse / physician assistant / pharmacist documented a reason for not prescribing these medications.

There is a specific set of terms in the measure specification to represent moderate to severe aortic stenosis, angioedema, hyperkalemia, hypotension, renal artery stenosis, worsening renal function / renal disease / renal dysfunction. In addition to the examples shown here, the measure allows other acceptable reasons that can be indicated by the physician / advanced practice nurse / physician assistant. If another reason is given, it has to be documented for both classes of medications (ACEIs and ARBs).

#### 7.6.2.1 Value Set – Acceptable Reason – Renal Dysfunction

The example of worsening renal function / renal disease / renal dysfunction could be evidenced in various ways but ideally should represent specific information that can be found directly within an EHRS. Examples:

- An abnormal creatinine clearance to represent renal dysfunction or change in creatinine clearance for worsening renal function (calculated or measured) of $\leq n$ mL/min can be managed with a specific actual laboratory result or derived value from a laboratory result (serum creatinine), weight, age and sex. None of the elements in this example require value sets however, the context with which the element is expected should be identified (e.g., section of a CCD or XDS-MS).
- Other elements, e.g., renal artery stenosis, can be identified by a value set which includes relevant codes as well as identifying context for finding the information.



#### 7.6.2.1.1 Value Set – Acceptable Reason – Aortic Stenosis:

Moderate to severe aortic stenosis is a contraindication for the ACEI / ARB administration measures (AMI3, HF3). The example for identification of Aortic Stenosis is provided below. Using SNOMED CT codes for the example, there are available codes for:

**Problems:**

427515002 – Critical stenosis of the aortic valve

60573004 – Aortic valve stenosis

**Qualifiers:**

24484000 – Severe

371924009 – Moderate to severe

6736007 – Moderate

Definition within the measure specification can be provided as:

- A value set for "Aortic Valve Stenosis" (SNOMED CT code 60573004) and a second value set for the concept of "Moderate to Severe" (SNOMED CT codes 24484000, 371924009, and 6736007).
- The measure specification logic would require the existence of one element from each of these two value sets within recommended context (post-coordinated).
- A specific value of "Critical stenosis of the aortic valve" (SNOMED CT code 427515002).
- The measure specification logic would require the existence of the specific value with recommended context (pre-coordinated).

Since different EHRS implementations might allow for either or only one of the examples, the measure specification should include both options.

#### 7.6.2.2 Context – Aortic Stenosis XDS-MS Section:

| |
|---|
| clinicaldocument / component / structuredbody / component / section [code=LOINC 11450-4 (problem list)] / entry / act / entryrelationship / observation / code=valueset SNOMED CT 60573004 (aortic valve stenosis) with qualifier code=valueset (moderate through severe) |

### 7.6.3 Contraindication – "Physician/APN/PA Other Reason"

#### 7.6.3.1 Value Set

"Physician/APN/PA Other Reason" does not specifically indicate a definable electronic set of data elements. Such "Other" requires that a question is asked of the



clinician and response documented. Business rules are needed to determine how to attribute the logic (e.g., XPATH, Schematron)

### 7.6.4 Recommendations (Contraindications)

To some extent contraindications can be identified by careful description of value sets. The Allergy / sensitivity examples and the Moderate – to – Severe Aortic Stenosis examples are provided to suggest measure developers consider enhancements to the specificity of measure granularity. There are available data within EHRS. There is, however, some limitation with respect to definitions of "physician reason" or "medical reason." Such comments require human intervention during the care process if measures are managed concurrently, or after the fact if managed retrospectively. In either case, re-work and inconsistency of results will occur without clear, discrete definitions of acceptable reasons. Some examples are provided in the text. There is also reference in the measure that documentation of a history of moderate to severe aortic stenosis is also acceptable as long as there is no evidence of repair or commissurotomy. This latter detail raises the issue of when in the time continuum an event or problem attribution occurred. Strict adherence to addressing active issues for measurement and guideline analysis will enable more facile and efficient incorporation of clinical decision support and retrospective analysis within the care process.

## 7.7 Discharge Date – (AMI-3, HF-3) – Date of discharge

### 7.7.1 Value Set

Not required, the data element is defined within the CCD (as noted below)

### 7.7.2 Context – CCD

| |
|---|
| clinicaldocument / componentof / encompassingencounter / effectivetime / high (Limited to Date) |

### 7.7.3 Recommendations

Discharge date can be simplified by identification within the header of a CCD.

## 7.8 Discharge Date and Time – (OP-3) – Date and time of discharge

### 7.8.1 Value Set

Not required, the data element is defined within the CCD (as noted below)

### 7.8.2 Context – CCD

| |
|---|
| clinicaldocument / componentof / encompassingencounter / effectivetime / high |



### 7.8.3 Recommendations

Discharge date and time can be simplified by identification within the header of a CCD.

## 7.9 Discharge Status (AMI3, HF3)

### 7.9.1 Value Set –

The value set is comprised of the appropriate discharge status disposition codes for the measure.

### 7.9.2 Context – CCD:

| |
|---|
| clinicaldocument / componentof / encompassingencounter / dischargedispositioncode |

### 7.9.3 Recommendations

Discharge status can be simplified by identification within the encompassing encounter component of a CCD.

## 7.10 Evaluation / Management (EM) codes (OP3)

### 7.10.1 Value Set

**The value set is comprised of relevant evaluation management codes**

| | |
|---|---|
| Measure | OP-3 |
| Measure Version Number | 1.0a |
| Measure Table Number | 1.0 |
| Table Name | E/M Codes for Emergency Department Encounters |
| Last Measure Version Update | 1.0a |
| Code System | CPT4 2.(OID 16.840.1.113883.6.12 ) |
| Test OID (For Illustrative Purposes ONLY – not for real implementations) | 1.2.6.1.4.1.21367.2008.3.1.2008.3 |

| Code | E/M Code Description |
|---|---|
| 99281 | Emergency department visit, new or established patient |
| 99282 | Emergency department visit, new or established patient |
| 99283 | Emergency department visit, new or established patient |
| 99284 | Emergency department visit, new or established patient |
| 99285 | Emergency department visit, new or established patient |
| 99291 | Critical care, evaluation and management |



**Emergency Department E/M Code Value Set XML**

The same example in XML with representation of oids in the value set:

### 7.10.2 Context

Evaluation / management codes are provided within the context of billing. An alternative is to seek a medical summary indicating a visit to the Emergency Department within CCD or XDS-MS. The encompassing encounter section of a CCD is shown:

| clinicaldocument / componentof / encompassingencounter / |
|---|

### 7.10.3 Recommendations

The identification that an encounter has occurred in the context of an Emergency Department visit within the encompassing encounter section of the CCD. Such would provide a valuable clinical encounter beneficial for measurement from the encounter summary and avoid the need for the use of billing codes.

## 7.11 ED Arrival Time (OP3)

### 7.11.1 Value Set

Not required, the data element is defined within the CCD (as noted below)

### 7.11.2 Context – CCD

| clinicaldocument / componentof / encompassingencounter / effectivetime / high |
|---|

### 7.11.3 Recommendations

ED arrival time can be determined from the encompassing encounter section of the CCD.

## 7.12 Fibrinolytic Agents (OP3)

### 7.12.1 Value Set

For the purpose of this example, the national selection for interoperable nomeclature for medication by the Healthcare Information Technology Standards Panel (HITSP) is the RxNorm semantic clinical drug element. For international work, IHE specifies the use of national extensions that may select other medication terminologies (e.g., in the UK SNOMED CT).

Note, in the following table all medications appropriate for this measure are listed as required elements for the value set. In this white paper, only a representative set of ACEIs is mapped to RxNorm codes as a example of providing codes in the value set (see 8.1.1).

| | |
|---|---|
| Measure | OP-3 |
| Measure Version Number | 1.0a |
| Measure Table Number | 1.3 |
| Table Name | Fibrinolytic Agents |
| Last Measure Version Update | 1.0a |
| Code System | RxNorm (OID: 2.16.840.1.113883.6.88) |
| Test OID | |

| Medication | RxNorm Mappings – Representative set entered for ACEIs (8.1.1) only. |
|---|---|
| Abbokinase | **RxNorm information has not been identified for these medications** |
| Activase | |
| Alteplase | |
| Anistreplase | |
| Anisoylated Plasminogen-Streptokinase Activator Complex | |
| APSAC | |
| Eminase | |
| Kabikinase | |
| Retavase | |
| Reteplase | |
| RPA (RPA) | |
| Streptase | |
| Streptokinase | |
| Tenecteplase | |
| Tissue plasminogen activator | |
| TNKase | |
| TPA (TPA) | |
| UK | |
| Urokinase | |

### 7.12.2 Context – XDS-MS

| |
|---|
| clinicaldocument / component / structuredbody / component / section [code=LOINC 10183-2 (hospital discharge medications)] / entry / substanceadministration / consumable / manufacturedproduct / labeleddrug / code=[Valueset=Fibrinolyticslist] |

### 7.12.3 Recommendations

Information can be identified with XDS-MS.



## 7.13 Principal Diagnosis (AMI3, HF3)

The measure requests determination as to whether the diagnosis is "principal" or "other." The measure, based on a clinical guideline, is expecting that all patients with an acute myocardial infarction (AMI3) or heart failure (HF3) receives appropriate interventions. The principal diagnosis is often assigned post-discharge and thus would not represent a valuable trigger for decision support or concurrent measurement management. Also, the principal diagnosis does not necessarily indicate all patients with the condition specified. For example, a patient involved in a multiple trauma due to a myocardial infarction (MI) could have a principal diagnosis of multiple trauma. In this example, the treatment for the MI should be the same as for patients presenting with that condition. Another example is the patient developing and MI during a hospitalization for another reason (e.g., a hip fracture). EHRS allow a change in paradigm to treat and measure effective treatment based on patient condition rather than diagnoses. Billing codes are generally chosen today because they are available. Hence, "principal" diagnosis is often sought rather than "other" diagnoses. From a clinical perspective a patient's active problems are the significant issues rather than "principal diagnosis."

### 7.13.1 Value Set – AMI Diagnosis Codes

Represented in a value set. Note ICD-9-CM diagnosis codes are listed in the following value set table as that is the terminology set currently in use in the US where this measure is implemented. The value set can also include all applicable ICD-10 diagnosis codes for greater interoperability.

| | |
|---|---|
| Measure | AMI-3 |
| Measure Version Number | 2.5 |
| Measure Table Number | 1.1 |
| Table Name | Acute Myocardial Infarction (AMI) |
| Last Measure Version Update | 2.3 |
| Type of Value Set | ICD-9-CM Dx (OID: 2.16.840.1.113883.6.103) |
| Test OID (For Illustrative Purposes ONLY – not for real implementations) | 1.2.6.1.4.1.21367.2008.3.1.2008.4 |

| ICD-9-CM Code | ICD-9-CM Description | Shortened Description |
|---|---|---|
| 410.00 | Anterolateral wall, acute myocardial infarction-episode of care unspecified | AMI ANTEROLATERAL,UNSPEC |
| 410.01 | Anterolateral wall, acute myocardial infarction-initial episode | AMI ANTEROLATERAL, INIT |
| 410.10 | Other anterior wall, acute myocardial infarction-episode of care unspecified | AMI ANTERIOR WALL,UNSPEC |
| 410.11 | Other anterior wall, acute myocardial infarction-initial episode | AMI ANTERIOR WALL, INIT |
| 410.20 | Inferolateral wall, acute myocardial infarction-episode of care unspecified | AMI INFEROLATERAL,UNSPEC |
| 410.21 | Inferolateral wall, acute myocardial infarction-initial episode | AMI INFEROLATERAL, INIT |
| 410.30 | Inferoposterior wall, acute myocardial infarction-episode of care | AMI INFEROPOST, UNSPEC |



| | |
|---|---|
| Measure | AMI-3 |
| Measure Version Number | 2.5 |
| Measure Table Number | 1.1 |
| Table Name | Acute Myocardial Infarction (AMI) |
| Last Measure Version Update | 2.3 |
| Type of Value Set | ICD-9-CM Dx (OID: 2.16.840.1.113883.6.103) |
| Test OID (For Illustrative Purposes ONLY – not for real implementations) | 1.2.6.1.4.1.21367.2008.3.1.2008.4 |

| | | |
|---|---|---|
| | unspecified | |
| 410.31 | Inferoposterior wall, acute myocardial infarction-initial episode | AMI INFEROPOST, INITIAL |
| 410.40 | Other inferior wall, acute myocardial infarction-episode of care unspecified | AMI INFERIOR WALL,UNSPEC |
| 410.41 | Other inferior wall, acute myocardial infarction-initial episode | AMI INFERIOR WALL, INIT |
| 410.50 | Other lateral wall, acute myocardial infarction-episode of care unspecified | AMI LATERAL NEC, UNSPEC |
| 410.51 | Other lateral wall, acute myocardial infarction-initial episode | AMI LATERAL NEC, INITIAL |
| 410.60 | True posterior wall, acute myocardial infarction-episode of care unspecified | TRUE POST INFARCT,UNSPEC |
| 410.61 | True posterior wall, acute myocardial infarction-initial episode | TRUE POST INFARCT, INIT |
| 410.70 | Subendocardial, acute myocardial infarction-episode of care unspecified | SUBENDO INFARCT, UNSPEC |
| 410.71 | Subendocardial, acute myocardial infarction-initial episode | SUBENDO INFARCT, INITIAL |
| 410.80 | Other specified sites, acute myocardial infarction-episode of care unspecified | AMI NEC, UNSPECIFIED |
| 410.81 | Other specified sites, acute myocardial infarction-initial episode | AMI NEC, INITIAL |
| 410.90 | Unspecified site, acute myocardial infarction-episode of care unspecified | AMI NOS, UNSPECIFIED |
| 410.91 | Unspecified site, acute myocardial infarction-initial episode | AMI NOS, INITIAL |

**AMI Diagnosis Code Value Set XML**

### 7.13.2 Value Set – Heart Failure Diagnosis Codes

For Inclusion in the population / denominator. Note ICD-9-CM diagnosis codes are listed in the following value set table as that is the terminology set currently in use in the US where this measure is implemented. The value set can also include all applicable ICD-10 diagnosis codes for greater interoperability.

| | |
|---|---|
| Measure | HF-3 |
| Measure Version Number | 2.5 |
| Measure Table Number | 2.1 |
| Table Name | Heart Failure (HF) |
| Last Measure Version Update | 2.1a |
| Code System | ICD-9-CM Dx (OID: 2.16.840.1.113883.6.103) |



Test OID (For Illustrative Purposes ONLY – not for real implementations) 1.2.6.1.4.1.21367.2008.3.1.2008.5

| ICD-9-CM Code | ICD-9-CM Description | Shortened Description |
|---|---|---|
| 402.01 | Hypertensive heart disease, malignant, with heart failure | MAL HYPERT HRT DIS W HF |
| 402.11 | Hypertensive heart disease, benign, with heart failure | BENIGN HYP HT DIS W HF |
| 402.91 | Hypertensive heart disease, unspecified, with heart failure | HYP HT DIS NOS W HT FAIL |
| 404.01 | Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified | MAL HYP HT/KD I-IV W HF |
| 404.03 | Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage V or end stage renal disease | MAL HYP HT/KD STG V W HF |
| 404.11 | Hypertensive heart and chronic kidney disease, benign, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified | BEN HYP HT/KD I-IV W HF |
| 404.13 | Hypertensive heart and chronic kidney disease, benign, with heart failure and chronic kidney disease stage V or end stage renal disease | BEN HYP HT/KD STG V W HF |
| 404.91 | Hypertensive heart and chronic kidney disease, unspecified, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified | HYP HT/KD NOS I-IV W HF |
| 404.93 | Hypertensive heart and chronic kidney disease, unspecified, with heart failure and chronic kidney disease stage V or end stage renal disease | HYP HT/KD NOS ST V W HF |
| 428.0 | Congestive heart failure, unspecified | CHF NOS |
| 428.1 | Left heart failure | LEFT HEART FAILURE |
| 428.20 | Unspecified systolic heart failure | SYSTOLIC HRT FAILURE NOS |
| 428.21 | Acute systolic heart failure | AC SYSTOLIC HRT FAILURE |
| 428.22 | Chronic systolic heart failure | CHR SYSTOLIC HRT FAILURE |
| 428.23 | Acute on chronic systolic heart failure | AC ON CHR SYST HRT FAIL |
| 428.30 | Unspecified diastolic heart failure | DIASTOLC HRT FAILURE NOS |
| 428.31 | Acute diastolic heart failure | AC DIASTOLIC HRT FAILURE |
| 428.32 | Chronic diastolic heart failure | CHR DIASTOLIC HRT FAIL |
| 428.33 | Acute on chronic diastolic heart failure | AC ON CHR DIAST HRT FAIL |
| 428.40 | Unspecified combined systolic and diastolic heart failure | SYST/DIAST HRT FAIL NOS |
| 428.41 | Acute combined systolic and diastolic heart failure | AC SYST/DIASTOL HRT FAIL |
| 428.42 | Chronic combined systolic and diastolic heart failure | CHR SYST/DIASTL HRT FAIL |
| 428.43 | Acute on chronic combined systolic and diastolic heart failure | AC/CHR SYST/DIA HRT FAIL |



| | |
|---|---|
| Measure | HF-3 |
| Measure Version Number | 2.5 |
| Measure Table Number | 2.1 |
| Table Name | Heart Failure (HF) |
| Last Measure Version Update | 2.1a |
| Code System | ICD-9-CM Dx (OID: 2.16.840.1.113883.6.103) |
| Test OID (For Illustrative Purposes ONLY – not for real implementations) | 1.2.6.1.4.1.21367.2008.3.1.2008.5 |

| ICD-9-CM Code | ICD-9-CM Description | Shortened Description |
|---|---|---|
| 428.9 | Heart failure, unspecified | HEART FAILURE NOS |

### 7.13.3 Context for "Principal Diagnosis"

In the medical summary (XDS-MS) there is a hospital admission diagnosis, the primary reason for the admission. There is also a hospital discharge diagnosis section which includes all diagnoses for the hospital course. Each admission or discharge diagnosis is encoded as a problem (concern) which includes a subsidiary observation and an optional subsidiary status. There is no identifier to signify whether the diagnosis or problem is a "principal" or "other." The problem (concern) subsidiary status observation code indicates whether the problem (concern) is one element of a value set (2.16.840.1.113883.1.11.20.13, values = active, inactive, chronic, intermittent, current, ruled out, rule out).

### 7.13.4 Diagnosis Codes for OP3 – Acute Myocardial Infarction

AMI3 and OP3 have identical sets of elements to identify a patient that has had an acute myocardial infarction. Therefore they each could use the same value set. At present they are in different Joint Commission specification manual and therefore each relists the codes. Given value sets, the specifications could reference the same value set. Note ICD-9-CM diagnosis codes are listed in the following value set table as that is the terminology set currently in use in the US where this measure is implemented. The value set can also include all applicable ICD-10 diagnosis codes for greater interoperability.

| | |
|---|---|
| Measure | OP-3 |
| Measure Version Number | 1.0a |
| Measure Table Number | 1.1 |
| Table Name | Acute Myocardial Infarction (AMI) Diagnosis Codes |
| Last Measure Version Update | 1.0a |
| Code System | ICD-9-CM Dx (OID: 2.16.840.1.113883.6.103) |
| Test OID (For Illustrative Purposes ONLY – not for real implementations) – Note this OID is the same as used for AMI-3 | 1.2.6.1.4.1.21367.2008.3.1.2008.4 |

| ICD-9-CM | ICD-9-CM Description | Shortened Description |
|---|---|---|



| Code | | |
|---|---|---|
| 410.00 | Anterolateral wall, acute myocardial infarction-episode of care unspecified | AMI ANTEROLATERAL,UNSPEC |
| 410.01 | Anterolateral wall, acute myocardial infarction-initial episode | AMI ANTEROLATERAL, INIT |
| 410.10 | Other anterior wall, acute myocardial infarction-episode of care unspecified | AMI ANTERIOR WALL,UNSPEC |
| 410.11 | Other anterior wall, acute myocardial infarction-initial episode | AMI ANTERIOR WALL, INIT |
| 410.20 | Inferolateral wall, acute myocardial infarction-episode of care unspecified | AMI INFEROLATERAL,UNSPEC |
| 410.21 | Inferolateral wall, acute myocardial infarction-initial episode | AMI INFEROLATERAL, INIT |
| 410.30 | Inferoposterior wall, acute myocardial infarction-episode of care unspecified | AMI INFEROPOST, UNSPEC |
| 410.31 | Inferoposterior wall, acute myocardial infarction-initial episode | AMI INFEROPOST, INITIAL |
| 410.40 | Other inferior wall, acute myocardial infarction-episode of care unspecified | AMI INFERIOR WALL,UNSPEC |
| 410.41 | Other inferior wall, acute myocardial infarction-initial episode | AMI INFERIOR WALL, INIT |
| 410.50 | Other lateral wall, acute myocardial infarction-episode of care unspecified | AMI LATERAL NEC, UNSPEC |
| 410.51 | Other lateral wall, acute myocardial infarction-initial episode | AMI LATERAL NEC, INITIAL |
| 410.60 | True posterior wall, acute myocardial infarction-episode of care unspecified | TRUE POST INFARCT,UNSPEC |
| 410.61 | True posterior wall, acute myocardial infarction-initial episode | TRUE POST INFARCT, INIT |
| 410.70 | Subendocardial, acute myocardial infarction-episode of care unspecified | SUBENDO INFARCT, UNSPEC |
| 410.71 | Subendocardial, acute myocardial infarction-initial episode | SUBENDO INFARCT, INITIAL |
| 410.80 | Other specified sites, acute myocardial infarction-episode of care unspecified | AMI NEC, UNSPECIFIED |
| 410.81 | Other specified sites, acute myocardial infarction-initial episode | AMI NEC, INITIAL |
| 410.90 | Unspecified site, acute myocardial infarction-episode of care unspecified | AMI NOS, UNSPECIFIED |
| 410.91 | Unspecified site, acute myocardial infarction-initial episode | AMI NOS, INITIAL |

### 7.13.5 Recommendations:

Many measure specifications are not sufficiently explicit about time-related constraints for data elements. Diagnoses/conditions should always be constrained by allowable time frames. As examples, diabetes should be represented with an open ended time frame (once diagnosed it is a permanent condition); conversely acute exacerbation of asthma is an episodic condition and may completely resolve. In a measure, an acute episode of asthma would be relevant if it (a) occurred within the measurement period, and (b) had a relevant intervention that occurred AFTER the onset of the exacerbation. It should be borne in mind that such episodes might occur more than once during the measurement period, and the measure specification should be clear about whether all episodes should be counted in the measure, only one, only



the first one, or the latest one, or (for frequent numerical observations such as blood pressure readings) the average over a specified period of time.

## 7.14 Heart Failure Procedure Codes (OP3)

These codes are used for Exclusion from the Population / Denominator [Reasons for contraindication to use of ACEI or ARB medications]

### 7.14.1 Heart Failure Procedure Value Set

The value set is a list of procedure codes for use as exclusions (exceptions) to remove patients from the denominator population.

| | |
|---|---|
| Measure | HF-3 |
| Measure Version Number | 2.5 |
| Measure Table Number | 2.2 |
| Table Name | Left Ventricular Assistive Device (LVAD) and Heart Transplant |
| Last Measure Version Update | 1.04 |
| Code System | ICD-9-CM Dx (OID: 2.16.840.1.113883.6.103) |
| Test OID (For Illustrative Purposes ONLY – not for real implementations) | 1.2.6.1.4.1.21367.2008.3.1.2008.7 |

| ICD-9-CM Code | ICD-9-CM Description | Shortened Description |
|---|---|---|
| 33.6 | Combined heart-lung transplantation | COMB HEART/LUNG TRANSPLA |
| 37.51 | Heart transplantation | HEART TRANSPLANTATION |
| 37.52 | Implantation of total replacement heart system | IMPLANT TOT REP HRT SYS |
| 37.53 | Replacement or repair of thoracic unit of total replacement heart system | REPL/REP THORAC UNIT HRT |
| 37.54 | Replacement or repair of other implantable component of total replacement heart system | REPL/REP OTH TOT HRT SYS |
| 37.62 | Insertion of non-implantable heart assist system | INS NON-IMPL HRT ASSIST |
| 37.63 | Repair of heart assist system | REPAIR HEART ASSIST SYS |
| 37.64 | Removal of heart assist system | REMOVE HEART ASSIST SYS |
| 37.65 | Implant of external heart assist system | IMP EXT HRT ASSIST SYST |
| 37.66 | Insertion of implantable heart assist system | IMPLANTABLE HRT ASSIST |
| 37.68 | Insertion of percutaneous external heart assist device | PERCUTAN HRT ASSIST SYST |

### 7.14.2 Context for Heart Failure Procedure Code

Heart Failure procedure information is identified in XDS MS in the following context:

clinicaldocument / component / structuredbody / component / section [code=LOINC 11450-4 (problem list)] / entry / act / entryrelationship /



observation / code=valueset [1.2.6.1.4.1.21367.2008.3.1.2008.7 (Heart Failure Procedure code)]

### 7.14.3 Recommendations

Information can be identified with XDS-MS.

## 7.15 Moderate to Severe Left Ventricular Systolic Dysfunction (LVSD) (HF3)

The measure requires for inclusion in the denominator population a left ventricular ejection fraction (LVEF) of less than 40% by an appropriate study (value set) or a narrative description of left ventricular systolic (LVS) function consistent with moderate or severe systolic dysfunction.

### 7.15.1 Value Set

The value set can be described using measure developer defined procedure codes (e.g., ICD-9-CM, SNOMED CT, CPT are options) to identify tests used to determine systolic function or dysfunction. The "narrative description" is problematic with respect to value sets. Identification of acceptable SNOMED CT codes that can represent moderate to severe systolic dysfunction within a problem list would enable correlation with EHRS.

#### 7.15.1.1 LVSD Acceptable Procedure Value Set

First is the list of procedures that are acceptable for use to determine left ventricular systolic function as listed within the Joint Commission measures AMI3, HF3.

| | |
|---|---|
| Measure | AMI-3, HF-3 |
| Measure Version Number | 2.5 |
| Measure Table Number | 1.8 |
| Table Name | LVSF Assessment Inclusions |
| Last Measure Version Update | 2.5 |
| Code System | ICD-9-CM Procedure Codes (OID: 2.16.840.1.113883.6.103) |
| Test OID (For Illustrative Purposes ONLY – not for real implementations) | 1.2.6.1.4.1.21367.2008.3.1.2008.8 |

| Procedure / Finding | ICD-9-CM Procedure Codes |
|---|---|
| Left Ventricular Systolic Function Assessment Inclusions | |
| Echocardiogram | |
| 2-D | 88.79 |
| 3-D | 88.79 |
| cardiac ultrasound | 00.24 |
| Doppler color flow mapping | 88.79 |



| | |
|---|---|
| Measure | AMI-3, HF-3 |
| Measure Version Number | 2.5 |
| Measure Table Number | 1.8 |
| Table Name | LVSF Assessment Inclusions |
| Last Measure Version Update | 2.5 |
| Code System | ICD-9-CM Procedure Codes (OID: 2.16.840.1.113883.6.103) |
| Test OID (For Illustrative Purposes ONLY – not for real implementations) | 1.2.6.1.4.1.21367.2008.3.1.2008.8 |

| Procedure / Finding | ICD-9-CM Procedure Codes |
|---|---|
| M-mode echo | 88.72 |
| transesophageal echocardiogram (TEE) | 88.72 |
| Cardiac Catheterization with Left Ventriculogram | |
| cardiac cath with mention of LVSF | 37.22; 88.50 |
| cardiac/coronary angiogram with LV gram | 88.53 |
| cardiac/coronary angiogram with mention of LVSF | 88.53 |
| cardiac/coronary arteriogram with LV gram | 88.53 |
| cardiac/coronary arteriogram with mention of LVSF | 88.53 |
| left heart cath with mention of LVSF | 37.22; 88.53 |
| left ventriculogram | 88.53 |
| Other Tests | |
| adenosine myocardial perfusion stress test with mention of LVSF | 89.44 |
| cardiac blood pool imaging | 92.05 |
| cardiac MRI with mention of LVSF | 88.92 |
| Cardiolite scan with mention of LVSF | 92.05 |
| CT scan of chest with mention of LVSF | 87.41 |
| gated blood pool imaging study | 92.05 |
| gated heart study | 92.05 |
| gated ventriculogram | 92.05 |
| left ventricular gated wall motion analysis | NA |
| Multiple gated acquisition scan (MUGA) | 92.05 |
| myocardial perfusion imaging with mention of LVSF | 92.05 |
| myocardial SPECT imaging with mention of LVSF | 92.05 |
| myocardial SPECT study with mention of LVSF | 92.05 |
| Positron emission tomography (PET) with mention of LVSF | 92.05 |
| radionuclide myocardial perfusion imaging with mention of LVSF | 92.05 |
| radionuclide ventriculography | 92.05 |
| Sestamibi scan with mention of LVSF | 92.05 |
| SPECT imaging with mention of LVSF | 92.05 |
| SPECT perfusion imaging with mention of LVSF | 92.05 |



| | |
|---|---|
| Measure | AMI-3, HF-3 |
| Measure Version Number | 2.5 |
| Measure Table Number | 1.8 |
| Table Name | LVSF Assessment Inclusions |
| Last Measure Version Update | 2.5 |
| Code System | ICD-9-CM Procedure Codes (OID: 2.16.840.1.113883.6.103) |
| Test OID (For Illustrative Purposes ONLY – not for real implementations) | 1.2.6.1.4.1.21367.2008.3.1.2008.8 |

| Procedure / Finding | ICD-9-CM Procedure Codes |
|---|---|
| stress perfusion imaging with mention of LVSF | 89.44 |
| stress SPECT imaging with mention of LVSF | 92.05 |
| stress SPECT perfusion imaging with mention of LVSF | 92.05 |
| technetium scan with mention of LVSF | 92.05 |
| Thallium stress test with mention of LVSF | 92.05 |
| wall motion study | NA |

### 7.15.1.2 LVSD Determination Value Set

Second is the list of conditions that are acceptable to document that a patient has left ventricular systolic dysfunction. There are two options:

- One option within the measure is the identification of an Ejection Fraction with a numerical value of <40%. That option could refer to a LOINC code for Ejection Fraction as a clinical finding or the SNOMED CT observable entity included in the table below for ejection fraction.
- An alternative allowed by the measure is to enable acceptance of physician documented moderate to severe left ventricular dysfunction (LVSD). A CPT-II code was established for such documentation: **3021F** Left ventricular ejection fraction < 40% or documentation of moderately or severely depressed left ventricular systolic function. The CPT-II code is generally used to report exclusions for measures in the ambulatory setting within the billing submission. The discussion here focuses on identification of physician documented information from existing problem list documentation. The measure provides terms that may be identified within a clinical record that represent physician assessment of moderate to severe LVSD. Although a human abstractor can determine the appropriate meaning based on the terms listed in the measure specification, electronic determination requires one of the following options which represent five distinct value sets. The first value set includes pre-coordinated concepts in SNOMED-CT to represent the entire concept of moderate to severe left ventricular dysfunction. The other four value sets represent concepts that require post-coordination of (a) an appropriate procedure to measure left ventricular systolic function, (b) left ventricular systolic function, AND (c) moderate or severe, AND NOT (d) other than moderate or severe.:



- Pre-coordinated definition of moderate to severe LVSD. The value set includes codes that specifically reference moderate or severe hypokinesis of the cardiac wall.

| | |
|---|---|
| Measure | AMI-3, HF-3 |
| Measure Version Number | 2.5 |
| Measure Table Number | 1.8 |
| Table Name | LVSD Inclusions |
| Last Measure Version Update | 2.5 |
| Code System | SNOMED CT Condition / Qualifier Codes (OID 2.16.840.1.113883.6.96) |
| Test OID (For Illustrative Purposes ONLY – not for real implementations) | PRE Coordinated – 1.2.6.1.4.1.21367.2008.3.1.2008.10 |

| Procedure / finding from the measure specification | SNOMED CT Concept Name | SNOMED CT Concept ID |
|---|---|---|
| Hypokinesis | Moderate hypokinesis of cardiac wall (Description, finding) | 371869002 |
| | Severe hypokinesis of cardiac wall (Description, finding) | 371870001 |

- Post-coordinated definition of moderate to severe LVSD including the following:
  - The specification indicates procedures acceptable to determine LVSD. These could represent a fifth value set to list acceptable procedures for determination of LVSD. Such a value set can be include coding schema such as ICD-9-CM procedure codes and/or SNOMED procedure codes. The example provided below includes ICD-9-CM procedure codes to represent acceptable procedures.

| | |
|---|---|
| Measure | AMI-3, HF-3 |
| Measure Version Number | 2.5 |
| Measure Table Number | 1.8 |
| Table Name | LVSD Acceptable Assessment Procedure |
| Last Measure Version Update | 2.5 |
| Code System | ICD-9-CM Procedure Codes (OID 2.16.840.1.113883.6.103) |
| Test OID (For Illustrative Purposes ONLY – not for real implementations) | 1.2.6.1.4.1.21367.2008.3.1.2008.8 |

| ICD-9-CM Procedure Description | ICD-9-CM Procedure Code |
|---|---|
| Other diagnostic ultrasound Ultrasonography of: multiple sites nongravid uterus total body | 88.79 |
| Intravascular imaging of coronary vessels, Intravascular untrasound (IVUS), coronary vessels | 00.24 |
| Diagnostic ultrasound of heart Transesophageal echocardiography | 88.72 |
| Intracardiac echocardiography [ICE], Echocardiography of heart chambers | 37.28 |



| | |
|---|---|
| Measure | AMI-3, HF-3 |
| Measure Version Number | 2.5 |
| Measure Table Number | 1.8 |
| Table Name | LVSD Acceptable Assessment Procedure |
| Last Measure Version Update | 2.5 |
| Code System | ICD-9-CM Procedure Codes (OID 2.16.840.1.113883.6.103) |
| Test OID (For Illustrative Purposes ONLY – not for real implementations) | 1.2.6.1.4.1.21367.2008.3.1.2008.8 |

| ICD-9-CM Procedure Description | ICD-9-CM Procedure Code |
|---|---|
| Synchronous Doppler flow mapping | 88.72 |
| Left heart cardiac catheterization | 37.22 |
| Angiocardiography, not otherwise specified | 88.50 |
| Cardiac/coronary angiogram with LV gram | 88.53 |
| Other cardiovascular stress test, Thallium stress test with or without transesophageal pacing | 89.44 |
| Cardiovascular and hematopoietic scan and radioisotope function study, Cardiac output scan or function study | 92.05 |
| Magnetic resonance imaging of chest and myocardium | 88.92 |
| Computerized axial tomography of thorax | 87.41 |

- Presence of the condition term LVSD and related dysfunction or a synonym –:

Note in the Table, NA references the term listed in the specification was not identifiable within SNOMED CT and therefore is Not Available.

| | |
|---|---|
| Measure | AMI-3, HF-3 |
| Measure Version Number | 2.5 |
| Measure Table Number | 1.8 |
| Table Name | Left Ventricular Systolic Function Inclusions |
| Last Measure Version Update | 2.5 |
| Code System | SNOMED CT Condition / Qualifier Codes (OID 2.16.840.1.113883.6.96) |
| Test OID (For Illustrative Purposes ONLY – not for real implementations) | 1.2.6.1.4.1.21367.2008.3.1.2008.9 |

| Procedure / finding from the measure specification | SNOMED CT Concept Name | SNOMED CT Concept ID |
|---|---|---|
| Left Ventricular Systolic Function | Depression of left ventricular systolic function | 371862006 |
| Akinesis | Cardiac akinesia | 195675009 |
| biventricular dysfunction | Biventricular failure (Description, disorder) | 92506005 |
| biventricular heart failure | Biventricular failure (Description, disorder) | 92506005 |



| | |
|---|---|
| Measure | AMI-3, HF-3 |
| Measure Version Number | 2.5 |
| Measure Table Number | 1.8 |
| Table Name | Left Ventricular Systolic Function Inclusions |
| Last Measure Version Update | 2.5 |
| Code System | SNOMED CT Condition / Qualifier Codes (OID 2.16.840.1.113883.6.96) |
| Test OID (For Illustrative Purposes ONLY – not for real implementations) | 1.2.6.1.4.1.21367.2008.3.1.2008.9 |

| Procedure / finding from the measure specification | SNOMED CT Concept Name | SNOMED CT Concept ID |
|---|---|---|
| | Biventricular congestive heart failure (Description, disorder) | 92506005 |
| Dyskinesis | NA | NA |
| ejection fraction (EF) | Cardiac ejection fraction (Description, observable entity) | 70822001 |
| | Left ventricular ejection fraction (Description, observable entity) | 250908004 |
| | Determination of ventricular ejection fraction with probe technique (Procedure) | 46258004 |
| | Myocardial imaging for infarct with ejection fraction, first pass technique (Procedure) | 41466009 |
| Endstage cardiomyopathy | Multiple terms – difficult to determine if any apply | Undetermined |
| | Hypokinesis of cardiac wall (Description, finding) | 37706002 |
| left ventricular diastolic dysfunction | Left ventricular diastolic dysfunction (Description, disorder) | 395704004 |
| left ventricular diastolic function | NA | NA |
| left ventricular dysfunction (LVD) | Left ventricular diastolic dysfunction (Description, disorder) | 395704004 |
| left ventricular ejection fraction (LVEF) | Left ventricular ejection fraction (Description, observable entity) | 250908004 |
| left ventricular failure | Acute left ventricular failure (Description, disorder) | 195114002 |
| | Congestive heart failure due to left ventricular systolic dysfunction (Description, disorder) | 426263006 |
| left ventricular function (LVF) | Left ventricular function (Description, observable entity) | 250907009 |
| | Left ventricular function – finding (Description, finding) | 366188009 |
| left ventricular systolic dysfunction (LVSD) | Impaired left ventricular function (Description, finding) | 275514001 |
| left ventricular systolic failure | Depression of left ventricular systolic | 371862006 |



| | |
|---|---|
| Measure | AMI-3, HF-3 |
| Measure Version Number | 2.5 |
| Measure Table Number | 1.8 |
| Table Name | Left Ventricular Systolic Function Inclusions |
| Last Measure Version Update | 2.5 |
| Code System | SNOMED CT Condition / Qualifier Codes (OID 2.16.840.1.113883.6.96) |
| Test OID (For Illustrative Purposes ONLY – not for real implementations) | 1.2.6.1.4.1.21367.2008.3.1.2008.9 |

| Procedure / finding from the measure specification | SNOMED CT Concept Name | SNOMED CT Concept ID |
|---|---|---|
| | function (Description, finding) | |
| | Left ventricular systolic dysfunction (Description, disorder) | 134401001 |
| systolic dysfunction | Systolic dysfunction (Description, finding) | 371037005 |
| systolic function | Depression of left ventricular systolic function (Description, finding) | 371862006 |
| | Peak systolic function (Description, observable entity) | 255236000 |
| ventricular function | Left ventricular function (Description, observable entity) | 250907009 |

- Presence of sufficient abnormalities to represent moderate to severe qualifiers of left ventricular systolic dysfunction.

| | |
|---|---|
| Measure | AMI-3, HF-3 |
| Measure Version Number | 2.5 |
| Measure Table Number | 1.8 |
| Table Name | Moderate to Severe Qualifiers |
| Last Measure Version Update | 2.5 |
| Code System | SNOMED CT Condition / Qualifier Codes (OID 2.16.840.1.113883.6.96) |
| Test OID (For Illustrative Purposes ONLY – not for real implementations) | 1.2.6.1.4.1.21367.2008.3.1.2008.11 |

| Procedure / finding from the measure specification | SNOMED CT Concept Name | SNOMED CT Concept ID |
|---|---|---|
| Severe | Severe | 24484000 |
| Moderate to severe | Moderate to severe | 371924009 |
| Moderate | Moderate | 6736007 |

- Absence of qualifiers suggesting the absence of moderate to severe.



Note in the Table, NA references the term listed in the specification was not identifiable within SNOMED CT and therefore is Not Available.

| | |
|---|---|
| Measure | AMI-3, HF-3 |
| Measure Version Number | 2.5 |
| Measure Table Number | 1.8 |
| Table Name | Not Moderate to Severe Qualifiers |
| Last Measure Version Update | 2.5 |
| Code System | SNOMED CT Condition / Qualifier Codes (OID 2.16.840.1.113883.6.96) |
| Test OID (For Illustrative Purposes ONLY – not for real implementations) | 1.2.6.1.4.1.21367.2008.3.1.2008.12 |

| Procedure / finding from the measure specification | SNOMED CT Concept Name | SNOMED CT Concept ID |
|---|---|---|
| [Pre-coordinated exclusion] | Mild hypokinesis of cardiac wall (Description, finding) | 371868005 QUAL-NotModSev |
| Cannot exclude | NA | NA |
| Cannot rule out | NA | NA |
| Could be | NA | NA |
| Could have been | NA | NA |
| May have | NA | NA |
| May have had | NA | NA |
| May indicate | NA | NA |
| Possible | Possible (Description, qualifier value) | 371930009 |
| Questionable | NA | NA |
| Risk of | Risk of (Description, qualifier value) | 33678008 |
| | High Risk of (Description, contextual qualifier, qualifier value) | 15508007 |
| | Mild Risk of (Description, contextual qualifier, qualifier value) | 75976002 |
| | Moderate Risk of (Description, contextual qualifier, qualifier value) | 25594002 |
| Ruled out (r'd/o, r/o'd) | Disease ruled out after examination (Description, finding) | 33678008 |
| Suggestive of | Suggestive of (Description, attribute) | 7196007 |
| Suspect | NA | NA |
| Suspicious | NA | NA |
| Negative Modifiers | | |
| Borderline | Borderline (Qualifier Value) | 75189007 |
| | Borderline normal (Qualifier Value) | 371932001 |
| Insignificant | No evidence of left ventricular diastolic dysfunction (Description, situation) | 413164001 |
| | Echocardiogram shows normal left ventricular function (Description, finding) | 414072005 |



| | |
|---|---|
| Measure | AMI-3, HF-3 |
| Measure Version Number | 2.5 |
| Measure Table Number | 1.8 |
| Table Name | Not Moderate to Severe Qualifiers |
| Last Measure Version Update | 2.5 |
| Code System | SNOMED CT Condition / Qualifier Codes (OID 2.16.840.1.113883.6.96) |
| Test OID (For Illustrative Purposes ONLY – not for real implementations) | 1.2.6.1.4.1.21367.2008.3.1.2008.12 |

| Procedure / finding from the measure specification | SNOMED CT Concept Name | SNOMED CT Concept ID |
|---|---|---|
| | Normal left ventricular systolic function and wall motion (Description, finding) | 371857005 |
| Scant | NA | NA |
| Slight | Slight (Qualifier Value) | 255510006 |
| Sub-clinical | Subclinical (Qualifier Value) | 74314007 |
| Subtle | NA | NA |
| Trace | Trace (Qualifier Value) | 260405006 |
| Trivial | Not necessarily related – Symptom trivial (Finding) | 162466003 |

- EHRS must then be searched for evidence of (a) the appropriate procedure, (b) left ventricular systolic function assessment that includes (c) a moderate-to-severe modifier **AND NOT** (d) a not moderate-to-severe qualifier.

**LVSD Determination Value Sets – XML Version**

Internal Hyperlink to Appendix 20

### 7.15.2 Context

Context is most effectively identified within a problem list (as active) or discharge diagnosis. Context for unacceptable information could also be represented as a problem list entry identified as inactive. Note that left ventricular systolic dysfunction may be identified during the active encounter (or admission) but it may be available in patient history. The context is still likely a problem list. Specification for appropriate context within EHRS by measure developers is suggested.

#### 7.15.2.1 XDS-MS section for problem list entry – pre coordinated

```
clinicaldocument / component / structuredbody / component / section  /
code=LOINC
11493-4 (HOSPITAL DISCHARGE STUDIES SUMMARY) / entry / act /
entryrelationship / observation /
code=1.2.6.1.4.1.21367.2008.3.1.2008.8
(Left Ventricular Function Procedure)  AND value
```



```
[code=1.2.6.1.4.1.21367.2008.3.1.2008.10 (ModSevLVSD)]
```

#### 7.15.2.2 XDS-MS section for problem list entry – post coordinated

```
clinicaldocument / component / structuredbody / component / section  /
code=LOINC 11493-4 (HOSPITAL DISCHARGE STUDIES SUMMARY) / entry / act /
entryrelationship / observation /
code=1.2.6.1.4.1.21367.2008.3.1.2008.8
(Left Ventricular Function Procedure)
AND value [code=1.2.6.1.4.1.21367.2008.3.1.2008.9 (CondLVSF)]
AND / interpretationCode [code=1.2.6.1.4.1.21367.2008.3.1.2008.11
(ModSev)]
AND NOT / interpretationCode [code=1.2.6.1.4.1.21367.2008.3.1.2008.12
(NotModSev)]
```

### 7.15.3 Recommendations

A more clearly defined set of data for physician determined moderate to severe LVSD would enable use of EHRS documented information to accomplish the intent of this element. Note that post coordination is implied by the listing of terms provided by the measure specification, but the activity is expected by a human abstractor. If measure developers can identify an appropriate terminology and appropriately expected elements from that terminology, significant chart abstraction requirements can be eliminated. SNOMED CT is used for the examples here presuming the use of a problem list. Codes developed to enable submission of exclusion or exception information along with billing and financial data are a short-term solution. Such codes can be used for mapping of existing data in the background, but the identification of physician intent and meaning from existing documentation and problem lists is a more beneficial long-term solution.

Clear identification of specific codes will eliminate considerable complexity of data collection and abstraction, or electronic query requirements as well. Careful attention to such issues by measure developers in concert with terminology subject matter experts is recommended.

## 7.16 Initial ECG Interpretation (OP3)

### 7.16.1 Initial ECG Interpretation Value Set

It is not clear how is this information is defined. An ECG performed after the patient's arrival at the hospital is less problematic than capturing data that are obtained prior to arrival at the hospital. Options are:

1. 1. Manually enter EMT obtained ECG into the electronic record as an ECG observation
2. 2. Electronic connection such that the EMT obtained ECG is directly available to the ED record and the result is available as an observation.

For appropriate identification of a value set a LOINC code is required. Available LOINC codes to identify an ECG as a test include:



- 34534-8 – EKG 12 Channel Panel
- 8601-7 – EKG Impression
- There are 424 LOINC codes related to individual EKG components and their duration. Unless specified by the measure developer it is difficult to determine the exact codes (if any) to represent the appropriate test.

SNOMED CT also identifies EKG results as findings

- Lateral infarction by EKG – finding – 87064008
- EKG findings of infarction – finding – 65181009
- Inferior infarction by EKG – finding – 7326005
- Posterior infarction by EKG – finding – 73999000
- Anteroseptal infarction by EKG – finding – 22111008
- Anterolateral infarction by EKG – finding – 43630006
- Subendocardial infarction by EKG – finding – 52295007

The measure developer will need to identify the content for a specific Value Set for ECG findings to meet the needs of this data element. Also needed is a method to identify which is the "initial" ECG within the timeframes specified (closest to time of arrival within the time span of 60 minutes prior to arrival or the first after arrival).

### 7.16.2 Context for Initial ECG Interpretation Value Set

Initial ECG interpretation information is identified in XDS-MS in the following context:

| |
|---|
| clinicaldocument / component / structuredbody / component / section 1.3.6.1.4.1.19376.1.5.3.1.3.29 [code=valueset [code=LOINC 34534-8, 8601-7 (Optional discharge procedures tests, reports section content)] / entry / act / entryrelationship / observation / code=valueset SNOMED (ECG evidence of MI) |

### 7.16.3 Recommendations

Identify a standard procedure report for electrocardiogram (ECG) procedures, and align such requirements with existing standard documentation formats. Examples can be found in DICOM and HL7 Structured Documents (CDA). Structured reporting can assist with documentation of required data elements specific to this measure.



# 8 Measure Report: Data Output and Measure Analysis

Once all data elements are identified and captured within the EHRS, a method is required for reporting and submitting results to internal and external consumers of the information. There are various methods for reporting the outcome and/or adherence to the measure. Value sets as specified in the measure and the subsequent EHR query will define the output in various ways to enable appropriate data items to be exported to whatever analysis tools are being used at whatever location. Using standardized value sets will enhance data quality and reliability for use in registries.

Extraction and calculation may be performed at various levels within an organization or by an individual physician. Examples include:

AMI-3 (ACEI or ARB for LVSD) is an inpatient acute care hospital quality measure that evaluates acute myocardial infarction (AMI) patients with left ventricular systolic dysfunction (LVSD) and with neither angiotensin converting enzyme inhibitor (ACEI) or angiotensin receptor blocker (ARB) contraindications who are prescribed an ACEI or ARB at hospital discharge.

Listing of [identified] [de-identified] patients with appropriate data items/value sets, for analysis by a third party, e.g. a registry, a QIO, etc.:

- Patient name / identifier
- Date of birth
- Date of discharge
- Allowable Diagnosis code for AMI + date
- Allowable Diagnosis code for LVSD + date
- Allowable Medication prescribed (ACEI or ARB) + date
- Allowable contraindications if medication not prescribed

Listing of identified patients with appropriate data items/value sets as above for use by responsible physician or organization

Use of data items/value sets within decision support tools, e.g., use of AMI diagnosis codes and LVSD indicators to trigger popup to remind physician to prescribe ACEI or ARB.

Use of outputs from the query to calculate achievement against measure specification.

A ballot is planned within HL7 Structured Documents for a Quality Reporting Document Architecture (QRDA) measure report which takes into account the issues listed above. More detail is available in a summary provided in Appendix G.



# 9 Summary

Ideally the health system requires a coordinating body for the management and endorsement of quality measures, and synchronization with clinical guideline development. In the US, measure endorsement is managed by the National Quality Forum (NQF). Such endorsement should encourage measure developers to use nomenclature (terminology) subject matter experts in the definition of value sets to represent elements within measures and also, healthcare IT subject matter experts to identify appropriate context to maintain consistency of meaning. The attention to quality measurement and accountability as referenced in the US by the proposed doubling of CMS measures utilized in the Annual Payment Update Program for 2009 shows that a clear infrastructure is required that coordinates and endorses measures and guidelines only if they use appropriate value sets and describe context in an interoperable fashion for EHRS consumption. As value sets have benefit to many quality measures, clinical guidelines and clinical decision support initiatives, a centrally managed registry is required to enable the most effective reuse.

There is significant benefit for measure developers and clinical guideline developers to create value sets using clinical terminologies identified as standards for use within EHRS. The outcome will more rapidly ensure consistency of the meaning of terms used with EHRS for clinical care delivery, while allowing locally preferred interface terms. This process will incrementally build semantic interoperability based on evidence based clinical care components. Such components will subsequently and simultaneously enable guideline implementation, clinical decision support and quality measurement, all based on the reference terminology codes represented in the respective value sets.

# Appendix A – Additional Use Cases

## 9.1 Public Health Surveillance

Public health surveillance efforts consist of many organizations working together to share data, often flowing in a well defined hierarchical manner from local origination upwards to regional, national, and international stakeholders.

One form of public health surveillance uses laboratory confirmed reports of notifiable conditions. These conditions range from endemic, such as Tuberculosis, to new threats such as the recent Measles resurgence.

### A.1.1 Current situation:

As electronic laboratory result reporting has become more widely adopted (HL7v2.x messaging), recipients have been thrilled by the improved turnaround times. However, it became immediately clear to agencies collecting data from multiple sources that there is little terminology consistency across these sources and therefore more effort is required



of surveillance and aggregation tools to do the necessary custom vocabulary mapping. More recently, government agencies and professional organizations have begun using their expertise to publish guides with standards recommendations towards improving vocabulary consistency. These paper guides are a great start to building syntactic consistency in electronic reporting and would be useful authoritative contributions towards building Shared Value Sets.

**Public Health Surveillance Scenario:**

A national public health surveillance technology package receives XDS-LAB documents from several regional laboratories confirming notifiable results initially obtained at local patient care centers. All regional laboratory reports received are processed through an advanced terminology service that tries to automate mapping of local vocabularies with the national surveillance package's configuration. It is one person's job to work an incoming queue where they manually approve or edit the terminology mappings before the data is available to the public health surveillance technology. This step is costly and results in at least a 24 hour delay of data availability at the national level. At the local and regional levels, laboratory staff who are not vocabulary domain experts, are continuously updating system configurations and making independent vocabulary judgments. Often terms with less specificity are chosen. A new national guide with standards recommendations is available but not widely adopted due to the manual effort required to review and implement.

### A.1.2 Desired situation:

We envision at least two desirable workflows that take advantage of Shared Value Sets.

1. An integration is completed between Shared Value Sets and the system's configuration such that as data is generated in the system it is immediately stored with the current prevailing vocabulary. Electronic data sharing occurs without any need for vocabulary pre-processing.
2. No system integration is done, but rather Shared Value Sets is engaged for vocabulary pre-processing when data sharing occurs between partners requiring the use of Shared Value Sets.

In both cases, the recipient of electronically shared data will have both improved turnaround time and terminology consistency leading to better public health surveillance.

**Public Health Surveillance Scenario:**

A national public health surveillance technology package receives XDS-LAB documents from several regional laboratories confirming notifiable results initially obtained at local patient care centers. At generation, the XDS-LAB document creator queries the *Value Set Registry* and retrieves the current *Shared Value Set* for that particular notifiable condition from the *Value Set Repository*. Vocabulary pre-processing is done and ensures that the XDS-LAB document is immediately available for public health surveillance.



When new threats are identified for notification, the national agency updates the *Value Set Registry* and *Value Set Repository* and is assured that all incoming reports will be processed with the same expediency.

At the local and regional levels, laboratory staff who are not vocabulary domain experts, are no longer having to make independent judgements and begin to update system configuration to the national recommendations.

## 9.2 Clinical Research

### A.1.3 Current situation:

Clinical research methodology resembles public health and public services research methodologies and quality measurement methodologies. All three domains have similar needs to select patients of interest and to capture data from the patient care domain to support the domain's activities. The differences between clinical research and the other domains are often due to varying terminologies and term definitions used for the sample subjects by these three domains. The words 'clinical' and 'protocol', for example, have significantly different uses in clinical research and in healthcare.

Clinical research is driven by a protocol, but a research protocol is quite different from a patient care protocol or a care plan. The research protocol includes a trial design which specifies exactly the required visits for patient's participation in a trial, and the exact data to be collected. A healthcare protocol, by contrast, must deal with a great deal more complexity, since the condition of a patient across time can change and the treatment must change accordingly. A research protocol is much more tightly constrained and immutable than any healthcare protocol could be.

Clinical research data (merely called 'clinical data' in the research community) are likewise more tightly defined and constrained than data for use in patient care. Since the goal of a randomized clinical trial is to draw a statistical inference about the treatment under study, variability in the data must be tightly controlled. In many cases, data that are perfectly suitable for making a patient care decision are inadequate for research purposes. In virtually ALL cases, clinical trials will require additional data that are not present in the record. So the data needs of research include some pre-existing data, and some requirements for the creation of new data. Clinical research needs may never be entirely met by extracting data from a patient care database.

Clinical research complies with a set of regulations that are separate and distinct from those in patient care. Regulatory authorities in Europe (EMEA and national authorities) and the US (FDA) impose a regulatory framework for the capture of clinical trial data. In the US, section 21 of the Code of Federal Regulations (CFR) places requirements on the investigator to clearly identify source data unique to clinical research and to establish an auditable chain of custody.

### A.1.4 Desired situation:

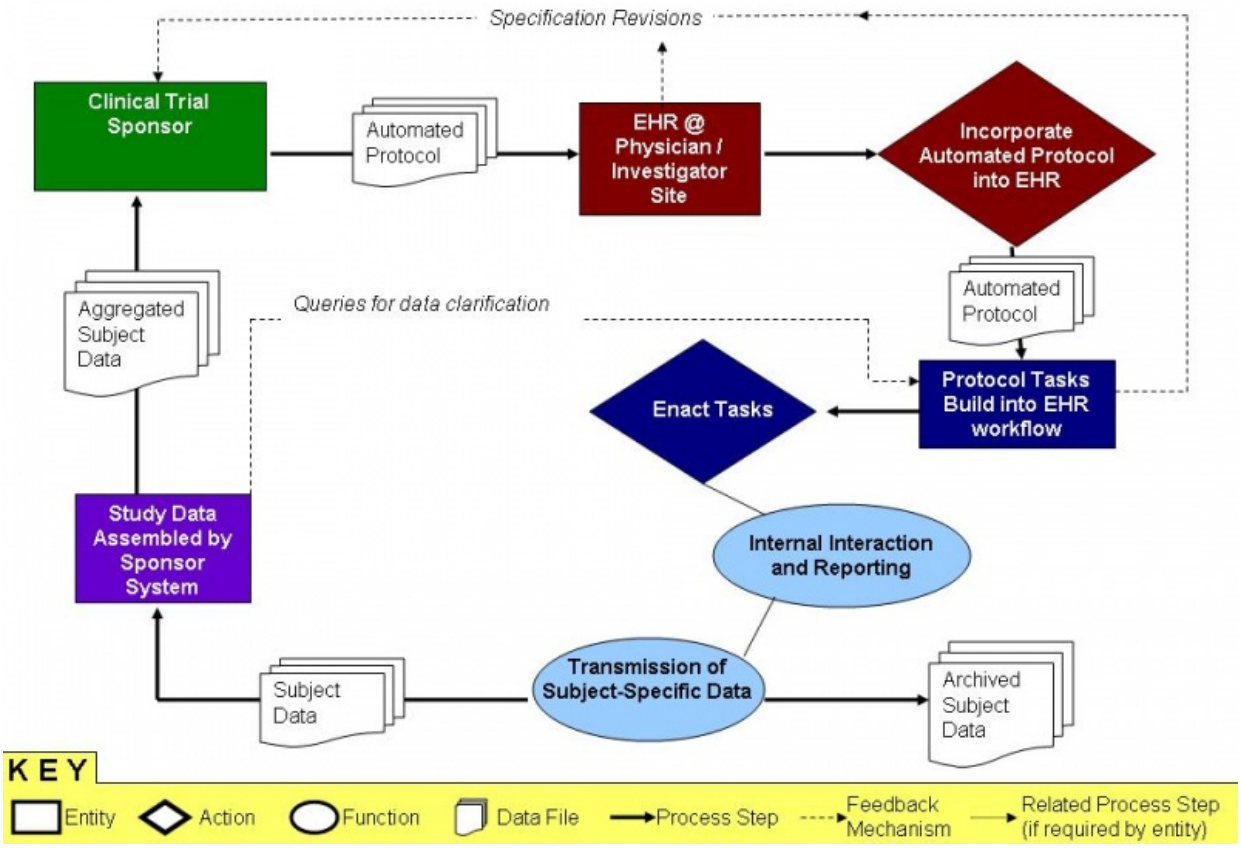


The clinical research community has four goals for ongoing profile development with IHE. Each of these goals entails integration of clinical research tasks with existing patient care functionality. Four IHE goals for the coming year are Content Profiles, Protocol Insertion, Image Acquisition, and Device Data Acquisition. These goals require interaction with IHE Patient Care Coordination, Radiology, and Patient Care Device domains.

**Content Profile for use in Retrieve Form for Data-capture (RFD)** The CDISC project Clinical Data Acquisition Standards Harmonization (CDASH) defines a set of standard collection instruments that can form the basis for an IHE content profile for use with RFD. Such trial design and data collection instruments can be transported using CDISC's Operational Data Model (ODM) in conjunction with RFD. The proper layering of RFD, CDASH, and ODM needs to be specified in an integration profile.

**Protocol Insertion** A protocol includes a trial design section that can be thought of as workflow instructions for the conduct of the trial. If these instructions could be expressed as rules and inserted into an EHR as executable instructions, yet another piece of the clinical trial work could be integrated with the patient care workflow. The embedded image (also included as a PowerPoint link) shows how protocol insertion might work.





# Appendix B: HL7 Value Set Principles

## Core Principles and Properties of HL7 Version 3 Models – Draft


HL7 V3 MODELS, R1
HL7 Version 3 Standard: Core Principles and Properties of Version 3 Models, Release 1
Normative Ballot 1 - May 2008

## 4.3 Value Sets

### 4.3.1 Introduction

A Value Set represents a uniquely identifiable set of valid concept representations, where any concept representation can be tested to determine whether or not it is a member of the value set. A concept representation may be a single concept code, or a combination of codes to be post-coordinated.

Value sets exist to constrain the content for a coded element in an HL7 static model or data type property. Value sets cannot have null content, and must contain at least one concept representation where any given concept is generally (but not required to be) represented by only a single code within the Value Set. Identical codes from different code systems are allowed because they can be disambiguated by identifying the code system they come from.

Ideally, a given concept should be represented only by a single code. However, in unusual circumstances, a given concept can have more than one code. (e.g. in some cases where different case is used to signify the same concept, as 'l' and 'L' in UCUM for 'litre').

Value set complexity may range from a simple flat list of concept codes drawn from a single code system, to an unbounded hierarchical set of possibly post-coordinated expressions drawn from multiple code systems.

Note that this implies that all value Set specifications must be able to be machine-resolved at a point in time to their contained coded concepts. Another implication is that an HL7 Terminology Service must be able to perform this resolution on any valueSet definition in HL7.

### 4.3.2 Value Set Specification

Value sets can be specified in two ways, either by enumeration (extension), or definition (intention).

#### 4.3.2.1 Extensional Value Set Representation (Enumeration)

From ISO (http://www.tc215wg3.nhs.uk/pages/pdf/vote0204.pdf), an extensional definition is a description of a concept by enumerating all of its subordinate concepts under one criterion of subdivision.

Value sets defined by extension are comprised of an explicitly enumerated set of codes. The simplest case is when the value set consists of only one code. The following table shows a flat list of codes that might be used as values for the coded attribute Gender.

**Table 1: Example Extensional Value Set**

| Code Value | Description |
|---|---|
| M | Male |
| F | Female |
| U | Unspecified |

More complex variations might relate to hierarchical coding systems such as the following fictitious example:

**Table 2: Example Extensional Value Set (fabricated)**

| Code Value | Level | Description |
|---|---|---|
| 1123123 | 1 | Education |
| 1343434 | 2 | Diabetic Education |
| 1445455 | 2 | Stroke Education |
| 2135534 | 1 | Counseling |
| 2344566 | 2 | Emotional |
| 3456663 | 2 | Daily Living |

#### 4.3.2.2 Intensional Value Set Definition (Definition)

From ISO (http://www.tc215wg3.nhs.uk/pages/pdf/vote0204.pdf), an intensional definition describes the intension of a concept by stating the superordinate concept and the delimiting characteristics.

Value sets defined by intension are value sets that are defined by a computable expression that can be resolved to an exact list of codes at a particular point in time.

The intentional definition must be specific enough that it is always possible at a point in time (within a specific version of the code system) to determine whether a given value (including post coordinated collections of codes) is a member of the value set. For



example, an intensional value set definition might be defined as, “All SNOMED CT concepts that are children of the SNOMED CT concept ‘Diabetes Mellitus.’”

Some common strategies used to define intensional values sets include:

- Reference a head concept and its subordinate concepts in a hierarchy.
- Reference only the concepts subordinate to a head code (and not the head code itself).
- Create arbitrarily complex unions, intersections, and exclusions of the two previously described types of value sets.
- Other mechanisms, including statements created using a rich expression language.

Intensional Value Sets can be defined by either fixing the Value Set definition to a specific version of the Code System (when the Code System supports versioning), or by decoupling the Value Set definition from the version of the code system. This seemingly subtle variation can have very significant impact on the final list of concepts which the Value Set ultimately resolves to. When the Value Set definition is tied to the version of the Code System, the value set content will remain fixed whenever it is instantiated. When the Value Set definition is independent of Code System version, the content of the Value Set can vary as the Value Set is resolved against different versions of the Code System. Note that the resolved content of an intensionally defined value set may change without the value set version changing if the version of the underlying code system(s) are not specified, and those code systems change the coded concepts that are included within the value set.

### 4.3.3 Nested Value Sets

When a Value Set Entry references another Value Set, the child value set is referred to as a *Nested Value Set.* There is no preset limit to the level of nesting allowed within value sets. Value sets cannot contain themselves, or any of their ancestors (i.e. they cannot be defined recursively). Any child value set that is references by this nesting may be either intensionally defined or extensionally defined. For any value set that includes child value sets, if any of the child value sets are intentionally defined, then the containing ('parent') value set is considered to be intentionally defined.

### 4.3.4 Sub-value Sets

A sub-value set is a sub-set of a ”parent” value set. It is a constraint on the content of a value set such that there are no coded concepts contained in the sub-valueSet that are not also contained with the "parent" valueSet. A sub-value set is generally created as part of the successive constraining process of model development.

### 4.3.5 Value Set / Code System Relationship

Whether specified extensionally, intensionally or both, a Value Set can contain concepts from one or more code systems. While drawing concepts from multiple code systems in many cases is desirable, care must be taken to ensure that a given meaning is only



represented by a code or codes from a single code system. For example, it would be inappropriate to create value set where a given orderable item like a hematocrit could be represented by a CPT code and also by a LOINC code. If a single concept (meaning) ends up being represented by more than one code in a Value Set in this manner, it allows for the possibility that the same information can be recorded in two different ways. This can lead to confusion and error in analyzing the recorded data.

On the other hand, a value set **is** allowed to contain more than one code for a given concept as long as both codes are drawn from the same code system. For example, in the UCUM coding system "l" and "L" are both codes for liter. While this is undesirable, it is permitted for a value set to have both codes as members of the set. When this occurs, the codes are referred to as *synonyms*.

### 4.3.6 Value Set Versioning

Value sets are versioned. The version of a value set changes when:

1. For enumerated value sets
   - Any allowed values are added or deleted
2. For intensionally defined value sets
   - If the logic of the defining expression changes

Changes that correct the spelling of terms, or additions of terms that do not add new codes to the value set, do not cause the version to change.

There are multiple strategies for tracking value set versions. Two of the most common are:

1. Increment the version number each time a change is made to the value set.
2. Track add/modification dates for each change to the value set.

By a vote of the Vocabulary TC on September 15, 2006 at the Boca Raton meetings, it was decided that HL7 will reference all value set versions based on effective date and not by available date or by a version number. This policy has the following implications:

1. For enumerated value sets maintained by HL7, the activation date and inactivation date for individual codes in the value set must be maintained as part of the value set database.
2. For intensionally defined value sets in the HL7 value set database, the activation date and superseded date must be recorded (tracked) each time the logic of the definition is changed.
3. For externally maintained terminologies that have named/numbered releases, a table must be maintained that shows the modification dates for the named/numbered release.



4. For externally maintained terminologies that maintain modification dates for each individual code change, no additional information is needed. Appendix C – COL 8

# Appendix C: COL8

**Quality Indicators for Colonoscopy: Mean withdrawal time**

Background: The American Society for Gastrointestinal Endoscopy (ASGE) and the American College of Gastroenterology (ACG) formed a task force (The ASGE/ACG Task Force on Quality in Endoscopy) to develop quality measures for four GI endoscopic procedures: colonoscopy, esophagogastroduodenoscopy (EGD), endoscopic retrograde cholangiopancreatography (ERCP), and endoscopic ultrasonography (EUS). The measures created were evidence-based, when possible. Recommendations were published in the American Journal of Gastroenterology in 2006. The following recommendation is chosen from among the quality indicators for colonoscopy[1]:

**8. Mean withdrawal time should be >= 6 minutes in colonoscopies with normal results performed in patients with intact colons.**

The following is an example of how the measure might be recast or restated to provide clear unambiguous definitions of all the component measures:

Restated measure: Average examination time for endoscope withdrawal is greater than or equal to 6 minutes for screening colonoscopies performed on patients >= 18 years of age with intact colons where no biopsies or polypectomies are performed.

1. Denominator: All colonoscopies performed for screening (regardless of risk) during the specified time period. Age limited to >= 18 years.
   - Screening colonoscopies are identified by inclusion of any screening indication (whether average risk or high risk) and the absence of other indications.
   - Age is identified as age at the time of the procedure and may be the stated age or calculated from date of procedure minus date of birth.
   - Note: Although the quality measure is written to include all colonoscopies, the intent is to improve the detection of polyps on screening examinations. This is a point which needs to be clarified with the measures developers. Non-screening colonoscopies were excluded in this case in order to simplify the implementation as well as to be certain that the intent of the measure
   - Note: The quality measure does not explicitly specify an age restriction although the intent is that it applies to adults only.
2. Denominator exclusions: Procedures removed from this denominator include those where the cecum was not reached (so that measurement of time from cecum is not possible), in which there is a history of colon resection (representing lack of intact colon), or those in which polypectomy or biopsy were performed during the procedure (representing lack of normal results).



- History of colon resection is identified in the context of Past Medical History by one or more codes representing procedures such as: Colostomy, Left Hemi-Colectomy, Right Hemi-Colectomy, Segmental Colectomy, or Total Colectomy.
- The cecum has been reached if a code for extent reached is present and the value is from a value set such as: 'cecum', 'terminal ileum', 'ileum'. Note that other methods of documentation that the cecum is reached include description of landmarks and photo documentation.
- Polypectomy or biopsy performed during the procedure should be detected through presence of procedure codes (such as CPT) for appropriate procedures.

3. Measured continuous variable: Average time of withdrawal from cecum to completion of procedure is then measured, aggregating over all procedures.

- Withdrawal time may be documented as an absolute value (i.e. 7 minutes) or as two clock times (time the cecum reached and time endoscope withdrawn). Granularity of the time may be minutes or minutes plus seconds or minute fractions in different information systems.

**Discussion:** There are several challenges encountered with describing this quality measure using the Collaborative XML framework.

- The Collaborative XML framework does not allow measures based on aggregation over continuous variables (e.g. mean, median). This measure could have been stated in an alternative fashion such that a numerator is specified and percentage conformance calculated (i.e., "Withdrawal time should be >= 6 minutes …) However, this measure's developers have clearly documented the need for reporting of mean times.
  - Request clarification from the Collaborative
- For some data elements, context must be specified in order to disambiguate similar elements. An example for some quality measures is a code for a disease which could be found in the past medical history (representing a disease which the patient has/had), the family history (representing a family history of the disease), or negated in the present history (representing lack of the disease). The CCD (a constrained view of the CDA for clinical care documentation) may be used for context in some circumstances, but there is no structured document for procedure reports.
  - Ask HL7 (or DICOM) for a constraint on a domain for procedure reports
- While the requirement to document the needed data elements is established both through this quality measure and by a separate expert/consensus group (CO-RADS [2]) in neither case are those data elements defined well enough for implementation. For example, clear definitions are lacking for "intact colon" and "normal results". In order to implement this measure, assumptions must be made and value sets created without validation.



- Motivate and enable specialty societies to define the elements and datasets required.
- Ask SNOMED CT or LOINC to create codes required for these definitions, if needed.

**Collaborative Model XML Section I. – Measure General Information**

- Measure ID - **COL8**
- Measure name - **Mean withdrawal time**
- Version – **1.0**
- Version date -
- Topic type - **COLONOSCOPY**
- Measure developer – **ASGE/ACG Task Force**
- Measure developer ID – **GI-COL**
- Measure statement – summary statement of measure – **Mean withdrawal time in colonoscopies with normal results performed in patients with intact colons.**
- Measurement unit -
- Measurement length -
- Calculation description
- Disclaimer
- Copyright

**Collaborative Model XML Section II. – Measure Information**

Information Type = “Patient Population”

Statement – All patients >= 18 years of age undergoing a colonoscopy.
MinAge = 18
AgeUnit = Years
Measure Calculation Date = Date of procedure
Number of logical expressions = 1
<Logical Expression>
Number of Logical Elements = 1
<Logical Element>
Code Group = GICOL.CG1
Code Type = C4
Occurrence Min = 1
<End/Logical Element>
<End Logical Expression>

Information type = “Denominator”

Statement = Count of all procedures in time period
MinAge = 18
AgeUnit = Years



Measure Calculation Date = Date of procedure
Number of logical expressions = 1
<Logical Expression>
Number of Logical Elements = 1
<Logical Element>
Code Group = GICOL.CG1
Code Type = C4
Occurrence Min = 1
<End/Logical Element>
<End Logical Expression>
Information type = “Denominator Exclusions”
Statement = Procedures are excluded if they do not have an intact colon (i.e. finding of anastomosis or history of colon resection), if the cecum was not reached on examination, or if there are abnormal findings on the examination.
Number of Logical Expressions = 3
<Logical Expression> // This Expression identifies cases not having an intact colon
Logical Expression Logical Operator = “OR”
Number of Logical Elements = 1
<Logical Element> // This Element uses ICD9 to identify prior GI procedures
Code Group = GICOL.CG2
Code Type = I9
Occurrence Min = 1
<End/Logical Element>
<End/Logical Expression>
<Logical Expression> // This Expression identifies cases where the colon was not // reached on the examination
Logical Expression Logical Operator = “OR”
Number of Logical Elements = 1
<Logical Element> //Requires new code
Code Group = GICOL.CG3
Code Type = SNM
Occurrence Min = 1
<End/Logical Element>
<End/Logical Expression>
<Logical Expression> // This Expression identifies cases where there were abnormal
// findings

Number of Logical Elements = 2
<Logical Element> //ICD9 diagnosis for findings
Logical Element Logical Operator = "OR"
Code Group = GICOL.CG4
Code Type = I9
Occurrence Min = 1
<End/Logical Element>
<Logical Element> //CPT codes for procedures performed during the examination
Code Group = GICOL.CG5
Code Type = C4
Occurrence Min = 1
<End/Logical Element>
<End/Logical Expression>

*Information type = "Numerator with Continuous Variable"*
*Statement =This information type must express an aggregate value measured across all cases in the denominator minus the denominator exclusions. In this case, it should represent calculation of the mean of the value for the variable "mean withdrawal time."*

References:

[1]Rex DK, JL Petrini, TH Baron, et al. *Quality Indicators for Colonoscopy.* Am J Gastroenterol, 2006; 101(4):873-85.

[2]Rex DK, Bond JH, Winawer S, et al. for the U.S. Multi-Society Task Force on Colorectal Cancer. Quality in the technical performance of colonoscopy and the continuous quality improvement process for colonoscopy: recommendations of the U.S. Multi-Society Task Force on Colorectal Cancer. The Am J of Gastroenterol 2002;97(6):1296–1308.

## Appendix D – AMI3

The *Specifications Manual for National Hospital Inpatient Quality Measures* [Version 2.5, Discharges 10-01-08 (4Q08) through 03-31-09 (1Q09)] is the collaborative work of the Centers for Medicare & Medicaid Services and The Joint Commission. The *Specifications Manual* is periodically updated by the Centers for Medicare & Medicaid Services and The Joint Commission. Users of the *Specifications Manual for National Hospital Inpatient Quality Measures* must update their software and associated documentation based on the published manual production timelines.

****NQF-ENDORSED VOLUNTARY CONSENSUS STANDARDS FOR HOSPITAL CARE****

## Measure Information Form

**Measure Set:** Acute Myocardial Infarction (AMI)

**Set Measure ID#:** AMI-3

**Quality measure Name:** ACEI or ARB for LVSD

**Description:** Acute myocardial infarction (AMI) patients with left ventricular systolic dysfunction (LVSD) and without both angiotensin converting enzyme inhibitor (ACEI) and angiotensin receptor blocker (ARB) contraindications who are prescribed an ACEI or ARB at hospital discharge. For purposes of this measure, LVSD is defined as chart documentation of a left ventricular ejection fraction (LVEF) less than 40% or a narrative description of left ventricular systolic (LVS) function consistent with moderate or severe systolic dysfunction.

**Rationale:** ACEI therapy reduces mortality and morbidity in patients with left ventricular systolic dysfunction (LVSD) after AMI (Flather, 2000; Pfeffer, 1992; Torp-Peterson, 1999; and Yusuf, 1992). Recent clinical trials have also established ARB therapy as an acceptable alternative to ACEI, especially in patients with heart failure and/or LVSD who are ACEI intolerant (Granger, 2003 and Pfeffer, 2003). National guidelines strongly recommend ACEI for patients hospitalized with AMI who have either clinical heart failure or LVSD (Antman, 2004). Guideline committees have also supported the inclusion of ARBs in quality measures for AMI (Antman, 2004). Despite these recommendations, ACEIs remain under-utilized in eligible older patients hospitalized with AMI (Jencks, 2000).

**Type of Measure:** Process

**Improvement Noted As:** An increase in the rate

**Numerator Statement:** AMI patients who are prescribed an ACEI or ARB at hospital discharge

**Included Populations:** Not Applicable



**Excluded Populations:** None

**Data Elements:**

- ACEI Prescribed at Discharge
- ARB Prescribed at Discharge

**Denominator Statement:** AMI patients with LVSD and without both ACEI and ARB contraindications

**Included Populations:** Discharges with:

- An *ICD-9-CM Principal Diagnosis Code* for AMI as defined in Appendix A, Table 1.1
- AND
- Chart documentation of a LVEF less than 40% or a narrative description of LVS function consistent with moderate or severe systolic dysfunction

**Excluded Populations:**

- Patients less than 18 years of age
- Patients who have a Length of Stay >120 days
- Patients with *Comfort Measures Only* documented
- Patients enrolled in clinical trials
- Patients discharged/transferred to another hospital for inpatient care
- Patients who left against medical advice or discontinued care
- Patients who expired
- Patients discharged/transferred to a federal health care facility
- Patients discharged/transferred to hospice
- Patients with BOTH a potential contraindication/reason for not prescribing an ACEI at discharge AND a potential contraindication/reason for not prescribing an ARB at discharge, as evidenced by one or more of the following:
  - ACEI allergy AND ARB allergy
  - Moderate or severe aortic stenosis
  - Physician/advanced practice nurse/physician assistant (physician/APN/PA) documentation of BOTH a reason for not prescribing an ACEI at discharge AND a reason for not prescribing an ARB at discharge Note: Documentation of a reason for not prescribing one class



(either ACEI or ARB) should be considered implicit documentation of a reason for not prescribing the other class for the following five conditions only:
  - Angioedema
  - Hyperkalemia
  - Hypotension
  - Renal artery stenosis
  - Worsening renal function/renal disease/dysfunction
- Reason documented by physician/APN/PA for not prescribing an ARB at discharge AND an ACEI allergy
- Reason documented by physician/APN/PA for not prescribing an ACEI at discharge AND an ARB allergy

**Data Elements:**

- Admission Date
- Birthdate
- Clinical Trial
- Comfort Measures Only
- Contraindication to Both ACEI and ARB at Discharge
- Discharge Date
- Discharge Status
- ICD-9-CM Principal Diagnosis Code
- LVSD

**Risk Adjustment:** No

**Data Collection Approach:** Retrospective data sources for required data elements include administrative data and medical records.

**Data Accuracy:** Variation may exist in the assignment of ICD-9-CM codes; therefore, coding practices may require evaluation to ensure consistency.

**Measure Analysis Suggestions:** None

**Sampling:** Yes, for additional information see the Population and Sampling Specifications section.

**Data Reported As:** Aggregate rate generated from count data reported as a proportion

**Selected References:**



- Anderson JL, Adams CD, Antman EM, Bridges CR, Califf RM, Casey DE Jr, Chavey WE II, Fesmire FM, Hochman JS, Levin TN, Lincoff AM, Peterson ED, Theroux P, Wenger NK, Wright RS. ACC/AHA 2007 guidelines for the management of patients with unstable angina/non–ST-elevation myocardial infarction: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Committee to Revise the 2002 Guidelines for the Management of Patients With Unstable Angina/Non–ST-Elevation Myocardial Infarction): developed in collaboration with the American College of Emergency Physicians, American College of Physicians, Society for Academic Emergency Medicine, Society for Cardiovascular Angiography and Interventions, and Society of Thoracic Surgeons. J Am Coll Cardiol 2007;50:e1–157.
- Antman EM, Anbe DT, Armstrong PW, Bates ER, Green LA, Hand M, Hochman JS, Krumholz HM, Kushner FG, Lamas GA, Mullany CJ, Ornato JP, Pearle DL, Sloan MA, Smith SC Jr. ACC/AHA guidelines for the management of patients with ST-elevation myocardial infarction: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee to Revise the 1999 Guidelines for the Management of Patients With Acute Myocardial Infarction). 2004.
- Flather MD, Yusuf S, Kober L et al. Long-term ACE-inhibitor therapy in patients with heart failure or left-ventricular dysfunction: a systematic overview of data from individual patients. ACE-Inhibitor Myocardial Infarction Collaborative Group. Lancet 2000; 355(9215):1575-1581.
- Granger CB, McMurray JJ, Yusuf S et al. Effects of candesartan in patients with chronic heart failure and reduced left-ventricular systolic function intolerant to angiotensin-converting-enzyme inhibitors: the CHARM-Alternative trial. *Lancet.* 2003;362:772-776.
- Jencks SJ, Cuerdon T, Burwen DR, Fleming B, Houck PM, Kussmaul AE, Nilasena DS, Ordin DL, Arday DR. Quality of medical care delivered to Medicare beneficiaries: a profile at state and national levels. *JAMA.* 2000;284:1670-1676.
- Krumholz HM, Anderson JL, Brooks NH, Fesmir FM, Lambrew CT, Landrum MB, Weaver WD, Whyte J. ACC/AHA Clinical Quality measures for Adults With ST-Elevation and Non–ST-Elevation Myocardial Infarction: a report of the ACC/AHA Task Force on Quality measures (ST-Elevation and Non–ST-Elevation Myocardial Infarction Quality measures Writing Committee). J Am Coll Cardiol 2006;47:236–65. Available at http://www.acc.org and http://www.americanheart.org.
- Pfeffer MA, Braunwald E, Moye LA, Basta L, Brown EJ, Jr., Cuddy TE, Davis BR, Geltman EM, Goldman S, Flaker GC, for the SAVE Investigators. Effect of captopril on mortality and morbidity in patients with left ventricular dysfunction after myocardial infarction. Results of the Survival and Ventricular Enlargement Trial. *N Engl J Med.* 1992;327:669-77.
- Pfeffer MA, McMurray JJ, Velazquez EJ et al. Valsartan, captopril, or both in myocardial infarction complicated by heart failure, left ventricular dysfunction, or both. *N Engl J Med.* 2003;349:1893-1906.

- Torp-Pedersen C, Kober L. Effect of ACE inhibitor trandolapril on life expectancy of patients with reduced left-ventricular function after acute myocardial infarction. TRACE Study Group. Trandolapril Cardiac Evaluation. Lancet 1999; 354(9172):9-12.
- Yusuf S, Pepine CJ, Garces C et al. Effect of enalapril on myocardial infarction and unstable angina in patients with low ejection fractions. Lancet 1992; 340(8829):1173-1178.

**Acute Myocardial Infarction (AMI) Initial Patient Population**

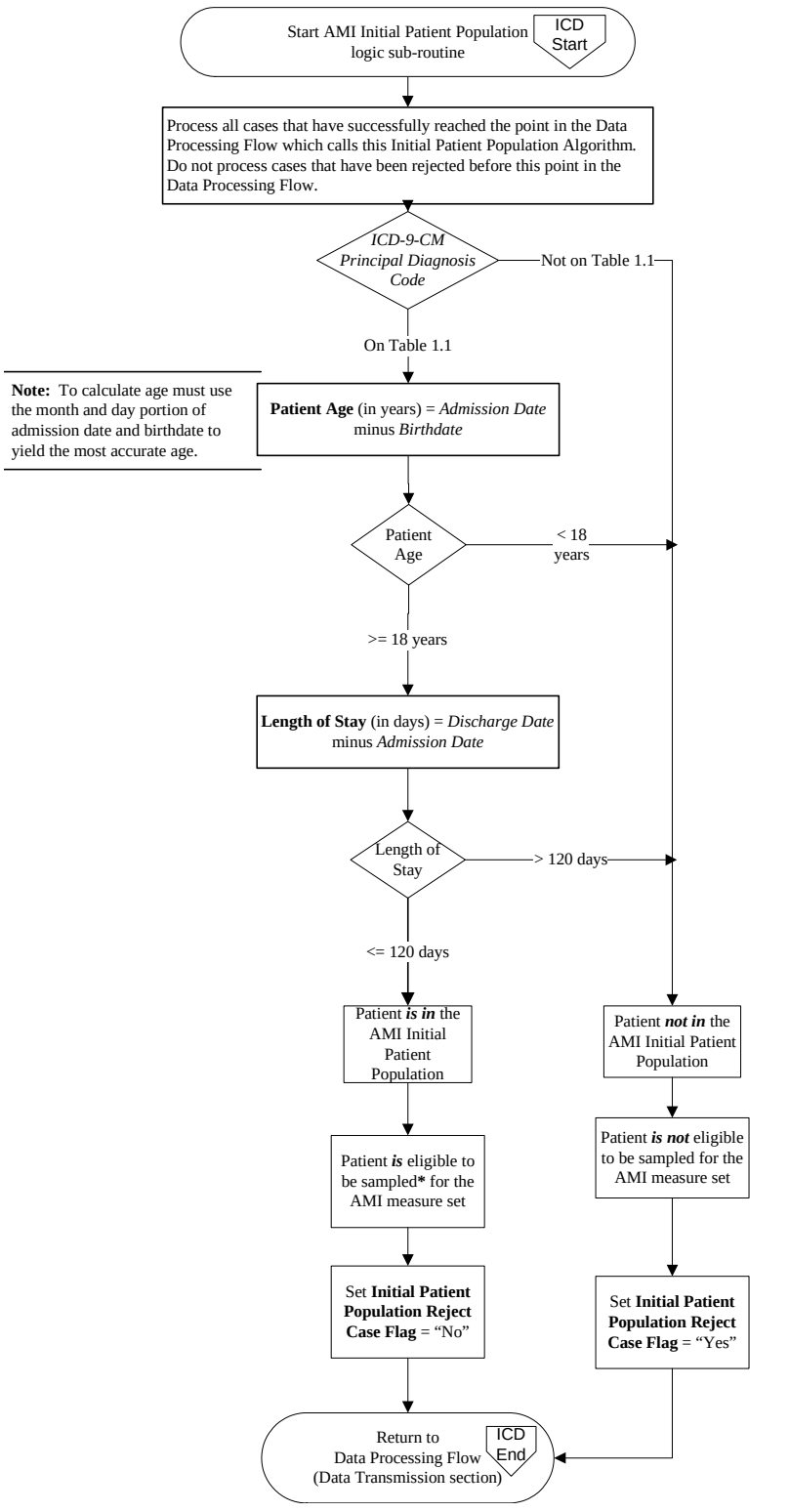
The population of the AMI measure set is identified using 4 data elements:

- ICD-9-CM Principal Diagnosis Code
- Admission Date
- Birthdate
- Discharge Date

Patients admitted to the hospital for inpatient acute care with an *ICD-9-CM Principal Diagnosis Code* for AMI as defined in Appendix A, Table 1.1, a Patient Age (*Admission Date – Birthdate*) >= 18 years and a Length of Stay (*Discharge Date - Admission Date*) <= 120 days are included in the AMI Initial Patient Population and are eligible to be sampled.

**AMI Initial Patient Population Algorithm**




**Variable Key:**
Patient Age
Initial Patient Population Reject Case Flag
Length of Stay

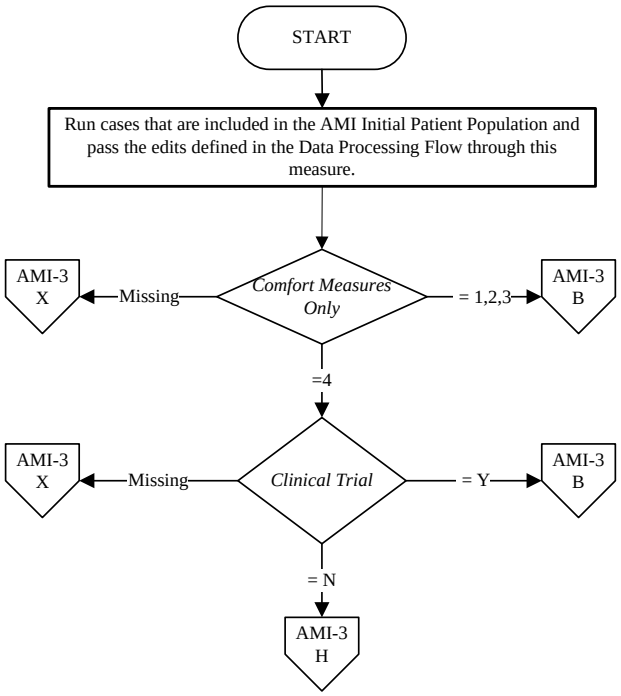


## AMI-3: ACEI or ARB for LVSD

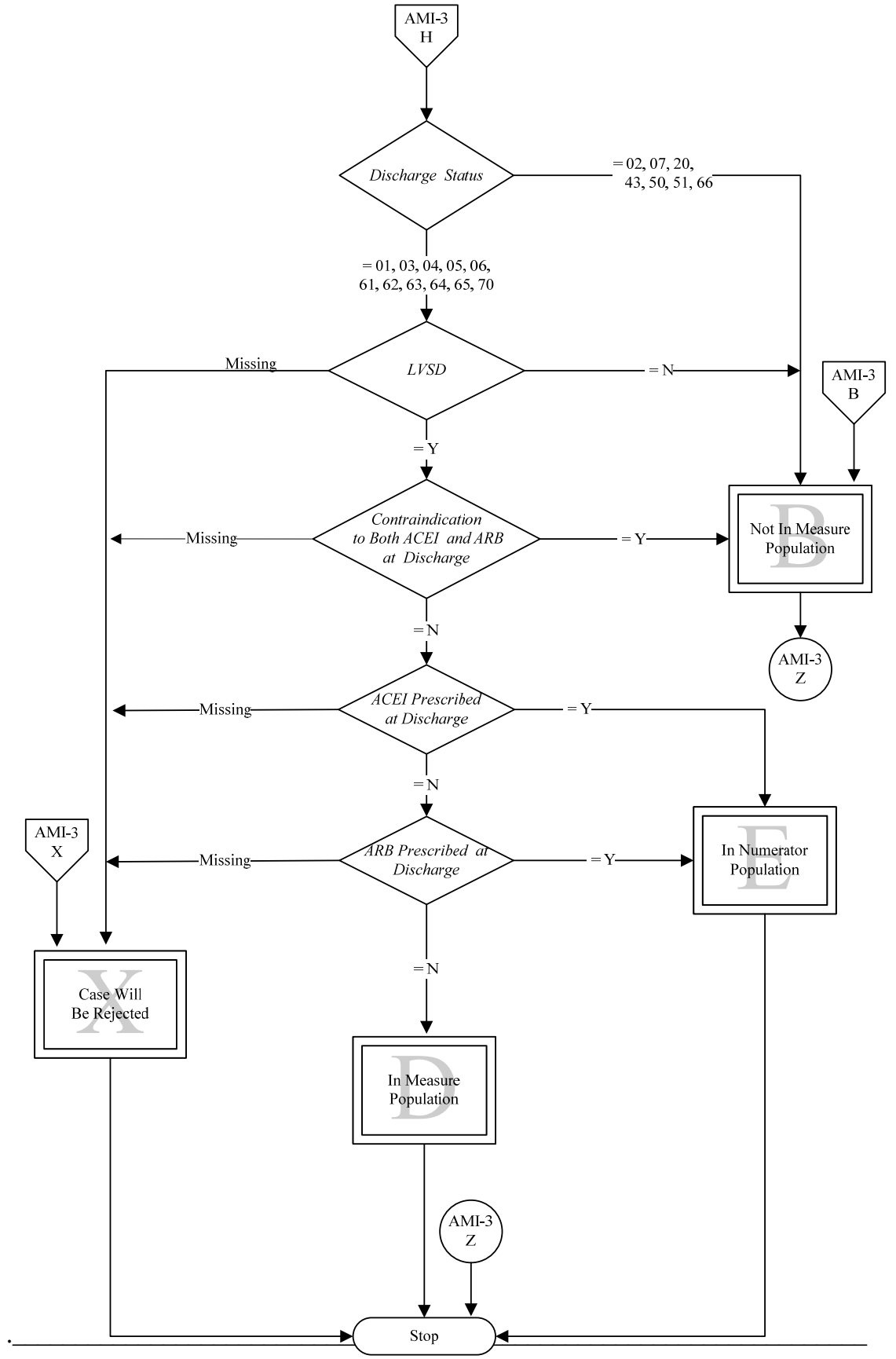
**Numerator:** AMI patients who are prescribed an ACEI or ARB at hospital discharge.

**Denominator:** AMI patients with LVSD and without both ACEI and ARB contraindications.









## Appendix E – HF3

The *Specifications Manual for National Hospital Inpatient Quality Measures* [Version 2.5, Discharges 10-01-08 (4Q08) through 03-31-09 (1Q09)] is the collaborative work of the Centers for Medicare & Medicaid Services and The Joint Commission. The *Specifications Manual* is periodically updated by the Centers for Medicare & Medicaid Services and The Joint Commission. Users of the *Specifications Manual for National Hospital Inpatient Quality Measures* must update their software and associated documentation based on the published manual production timelines.

****NQF-ENDORSED VOLUNTARY CONSENSUS STANDARDS FOR HOSPITAL CARE****

Measure Information Form

**Measure Set:** Heart Failure (HF)

**Set Measure ID#:** HF-3

**Quality measure Name:** ACEI or ARB for LVSD

**Description:** Heart failure patients with left ventricular systolic dysfunction (LVSD) and without both angiotensin converting enzyme inhibitor (ACEI) and angiotensin receptor blocker (ARB) contraindications who are prescribed an ACEI or ARB at hospital discharge. For purposes of this measure, LVSD is defined as chart documentation of a left ventricular ejection fraction (LVEF) less than 40% or a narrative description of left ventricular systolic (LVS) function consistent with moderate or severe systolic dysfunction.

**Rationale:** ACEI therapy reduces mortality and morbidity in patients with heart failure and left ventricular systolic dysfunction (The SOLVD Investigators, 1991 and CONSENSUS Trial Study Group, 1987) and are effective in a wide range of patients (Masoudi, 2004). Recent clinical trials have also established ARB therapy as an acceptable alternative to ACEI, especially in patients who are ACEI intolerant (Granger, 2003 and Pfeffer, 2003). National guidelines strongly recommend ACEIs for patients hospitalized with heart failure (Hunt, 2005 and HFSA, 2006). Guideline committees have also supported the inclusion of ARBs in quality measures for heart failure (Executive Council of the Heart Failure Society of America, 2004). Despite these recommendations, ACEIs and ARBs remain underutilized in eligible older patients hospitalized with heart failure (Jencks, 2000 and Masoudi, 2004).

**Type of Measure:** Process



**Improvement Noted As:** An increase in the rate

**Numerator Statement:** Heart failure patients who are prescribed an ACEI or ARB at hospital discharge

**Included Populations:** Not Applicable

**Excluded Populations:** None

**Data Elements:**

- *ACEI Prescribed at Discharge*
- *ARB Prescribed at Discharge*

**Denominator Statement:** Heart failure patients with LVSD and without both ACEI and ARB contraindications

**Included Populations:** Discharges with:

- An *ICD-9-CM Principal Diagnosis Code* for heart failure as defined in Appendix A, Table 2.1

AND

- Chart documentation of a LVEF less than 40% or a narrative description of LVS function consistent with moderate or severe systolic dysfunction

**Excluded Populations:**

- Patients who had a left ventricular assistive device (LVAD) or heart transplant procedure during hospital stay (ICD-9-CM procedure code for LVAD and heart transplant as defined in Appendix A, Table 2.2)
- Patients less than 18 years of age
- Patients who have a Length of Stay >120 days
- Patients enrolled in clinical trials
- Patients discharged/transferred to another hospital for inpatient care
- Patients who left against medical advice or discontinued care
- Patients who expired
- Patients discharged/transferred to a federal health care facility
- Patients discharged/transferred to hospice
- Patients with *Comfort Measures Only* documented



- Patients with BOTH a potential contraindication/reason for not prescribing an ACEI at discharge AND a potential contraindication/reason for not prescribing an ARB at discharge, as evidenced by one or more of the following:
  - o ACEI allergy AND ARB allergy
  - o Moderate or severe aortic stenosis
  - o Physician/advanced practice nurse/physician assistant (physician/APN/PA) documentation of BOTH a reason for not prescribing an ACEI at discharge AND a reason for not prescribing an ARB at discharge Note: Documentation of a reason for not prescribing one class (either ACEI or ARB) should be considered implicit documentation of a reason for not prescribing the other class for the following five conditions only:
    - – Angioedema
    - – Hyperkalemia
    - – Hypotension
    - – Renal artery stenosis
    - – Worsening renal function/renal disease/dysfunction
  - o Reason documented by physician/APN/PA for not prescribing an ARB at discharge AND an ACEI allergy
  - o Reason documented by physician/APN/PA for not prescribing an ACEI at discharge AND an ARB allergy

**Data Elements:**

- *Admission Date*
- *Birthdate*
- *Clinical Trial*
- *Comfort Measures Only*
- Contraindication to Both ACEI and ARB at Discharge
- *Discharge Date*
- *Discharge Status*
- *ICD-9-CM Other Procedure Codes*
- *ICD-9-CM Principal Diagnosis Code*
- *ICD-9-CM Principal Procedure Code*
- *LVSD*

**Risk Adjustment:** No

**Data Collection Approach:** Retrospective data sources for required data elements include administrative data and medical records.



**Data Accuracy:** Variation may exist in the assignment of ICD-9-CM codes; therefore, coding practices may require evaluation to ensure consistency.

**Measure Analysis Suggestions:** None

**Sampling:** Yes, for additional information see the Population and Sampling Specifications Section.

**Data Reported As:** Aggregate rate generated from count data reported as a proportion

**Selected References:**


- Bonow RO, Bennett S, Casey DE, Ganiats TG, Hlatky MA, Konstam MA, Lambrew CT, Normand ST, Piña IL, Radford MJ, Smith AL, Stevenson L. ACC/AHA Clinical Quality measures for Adults With Chronic Heart Failure: a report of the American College of Cardiology/American Heart Association Task Force on Quality measures (Writing Committee to Develop Heart Failure Clinical Quality measures). J Am Coll Cardiol 2005;46:1144–78. Available at http://www.acc.org and http://www.americanheart.org.
- Effects of enalapril on mortality in severe congestive heart failure. Results of the Cooperative North Scandinavian Enalapril Survival Study (CONSENSUS). The CONSENSUS Trial Study Group. *N Engl J Med.* 1987;316:1429-1435.
- Executive Council of the Heart Failure Society of America. Implications of recent clinical trials for heart failure quality measures. HFSA Position Statement. *J Card Fail*. 2004;10:4-5.
- Granger CB, McMurray JJ, Yusuf S et al. Effects of candesartan in patients with chronic heart failure and reduced left-ventricular systolic function intolerant to angiotensin-converting-enzyme inhibitors: the CHARM-Alternative trial. *Lancet.* 2003;362:772-776.
- Heart Failure Society of America. HFSA 2006 Comprehensive Heart Failure Practice Guideline. J Card Fail. 2006 Feb;12(1):e1-2.
- Hunt SA. ACC/AHA 2005 guideline update for the diagnosis and management of chronic heart failure in the adult: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Committee to Update the 2001 Guidelines for the Evaluation and Management of Heart Failure). J Am Coll Cardiol 2005; 46(6):e1-82.
- Jencks SJ, Cuerdon T, Burwen DR, Fleming B, Houck PM, Kussmaul AE, Nilasena DS, Ordin DL, Arday DR. Quality of medical care delivered to Medicare beneficiaries: a profile at state and national levels. *JAMA.* 2000;284:1670-1676.

- Masoudi FA, Rathore SS, Wang Y et al. National patterns of use and effectiveness of angiotensin-converting enzyme inhibitors in older patients with heart failure and left ventricular systolic dysfunction. *Circulation.* 2004;110:724-731.
- Pfeffer MA, McMurray JJ, Velazquez EJ et al. Valsartan, captopril, or both in myocardial infarction complicated by heart failure, left ventricular dysfunction, or both. *N Engl J Med.* 2003;349:1893-1906.
- The SOLVD Investigators. Effect of enalapril on survival in patients with reduced left ventricular ejection fractions and congestive heart failure. *N Engl J Med,* 325:293-302, 1991.

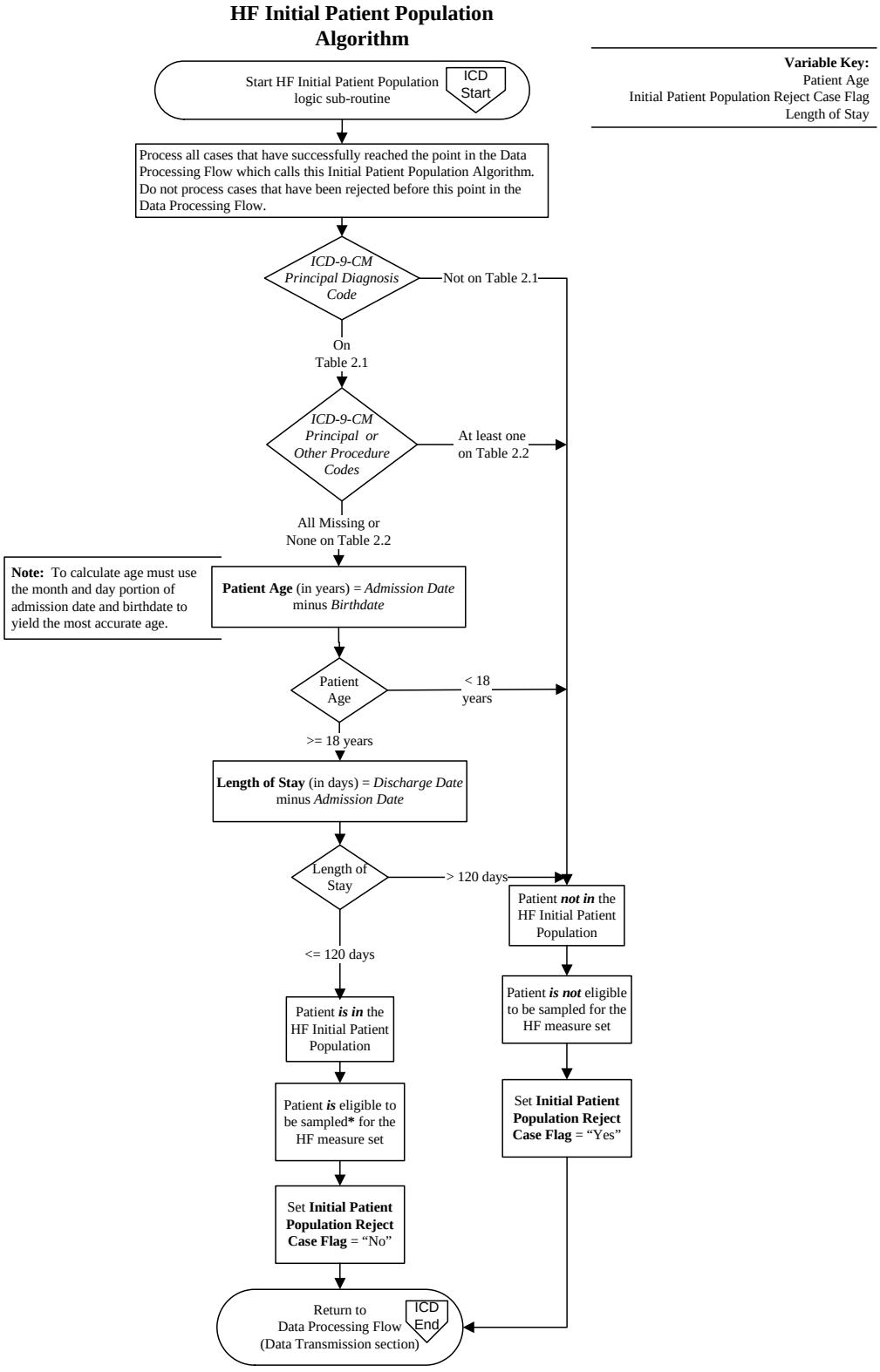

**Heart Failure (HF) Initial Patient Population**

The population of the HF measure set is identified using 6 data elements:

- *ICD-9-CM Principal Diagnosis Code*
- *ICD-9-CM Principal Procedure Code*
- *ICD-9-CM Other Procedure Codes*
- *Admission Date*
- *Birthdate*
- *Discharge Date*

Patients admitted to the hospital for inpatient acute care with an *ICD-9-CM Principal Diagnosis Code* for HF as defined in Appendix A, Table 2.1, no *ICD-9-CM Principal or Other Procedure Code* of Left Ventricular Assistive Device (LVAD) or Heart Transplant as defined in Appendix A, Table 2.2, a Patient Age (*Admission Date – Birthdate*) >= 18 years , and a Length of Stay (*Discharge Date - Admission Date*) <= 120 days are included in the HF Initial Patient Population and are eligible to be sampled.



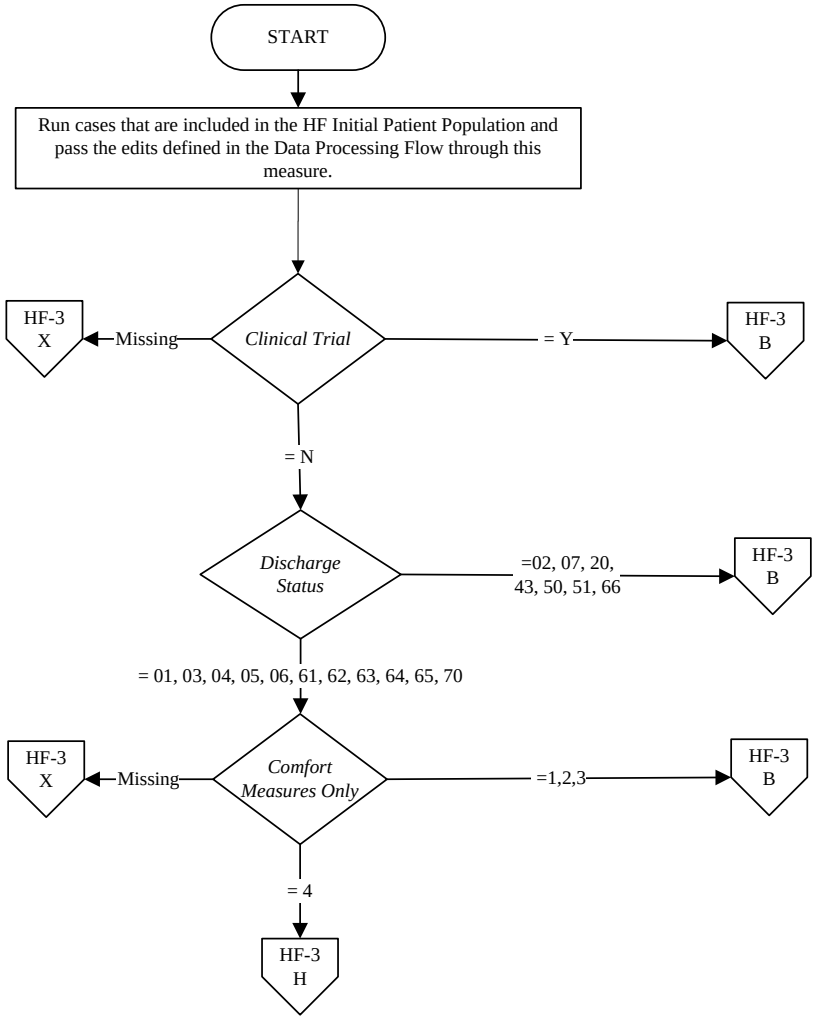


## HF-3: ACEI or ARB for LVSD

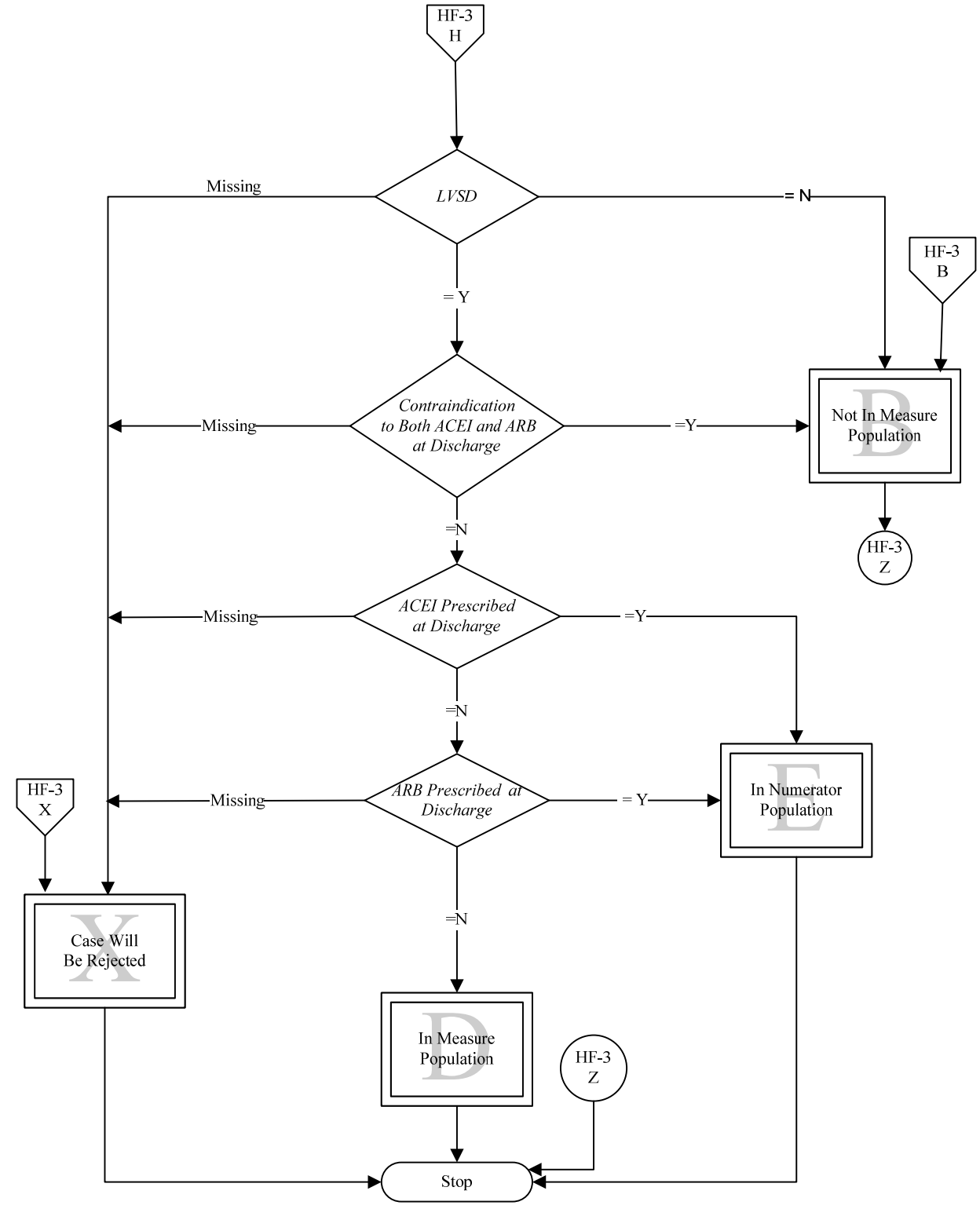
**Numerator:** Heart failure patients who are prescribed an ACEI or ARB at hospital discharge.

**Denominator:** Heart failure patients with LVSD and without both ACEI and ARB contraindications.








2100

## Appendix F: OP 3

The *Specifications Manual for Hospital Outpatient Department Quality Measures* [Version 1.0a, Encounter dates 04-01-08 (2Q08) through 09-30-08 (3Q08)] is periodically updated by the Centers for Medicare & Medicaid Services. Users of the *Specifications Manual for Hospital Outpatient Department Quality Measures* must update their software and associated documentation based on the published manual production timelines.

## Measure Information Form

**Measure Set:** Hospital Outpatient Acute Myocardial Infarction

**Measure ID #:** OP-3

**Outpatient Setting:** Emergency Department

**Quality measure Name:** Median Time to Transfer to Another Facility for Acute Coronary Intervention

**Description:** Median time from emergency department arrival to time of transfer to another facility for acute coronary intervention

**Rationale:** The early use of primary angioplasty in patients with acute myocardial infarction who present with ST-segment elevation or LBBB results in a significant reduction in mortality and morbidity. The earlier primary coronary intervention is provided, the more effective it is (Brodie, 1998 and DeLuca, 2004). National guidelines recommend the prompt initiation of percutaneous coronary intervention (PCI) in patients presenting with ST-segment elevation myocardial infarction (Antman, 2004). Despite these recommendations, few eligible older patients hospitalized with AMI receive primary angioplasty within a timely manner (Jencks, 2000). Patients transferred for primary PCI rarely meet recommended guidelines for door-to-balloon time (Nallamothu, 2005). Times to treatment in transfer patients undergoing primary PCI may influence the use of PCI as an intervention (Nallamothu, 2005). Current recommendations support a door-to balloon time of 90 minutes or less (Krumholz, 2006).

**Type of Measure:** Process

**Improvement Noted As:** A decrease in the median value

**Continuous Variable Statement:** Time (in minutes) from emergency department arrival to transfer to another facility for acute coronary intervention

**Included Populations:**

- An *E/M Code* for emergency department encounter as defined in Appendix A, OP Table 1.0, and
- Patients discharged/transferred to a short-term general hospital for inpatient care, to a Federal healthcare facility, or to a Critical Access Hospital, and
- An *ICD-9-CM Principal Diagnosis Code* for AMI as defined in Appendix A, OP Table 1.1, and
- ST-segment elevation or LBBB on the ECG performed closest to ED arrival, and
- Patients with *Transfer for Acute Coronary Intervention* as defined in the Data Dictionary

**Excluded Populations:**

- Patients less than 18 years of age
- Patients receiving *Fibrinolytic Administration* as defined in the Data Dictionary

**Data Elements:**

- *Birthdate*
- *Discharge Date and Time*
- *Discharge Status*
- *E/M Code*
- *ED Arrival Time*
- *Fibrinolytic Administration*
- *ICD-9-CM Principal Diagnosis Code*
- *Initial ECG Interpretation*
- *Outpatient Encounter Date*
- *Reason for Not Administering Fibrinolytic Therapy*
- *Transfer for Acute Coronary Intervention*

**Risk Adjustment:** No



**Data Collection Approach:** Retrospective data sources for required data elements include administrative data and medical records. Some facilities may prefer to gather data concurrently by identifying patients in the population of interest. This approach provides opportunity for improvement at the point of care/service. However, complete documentation includes the ICD-9-CM diagnosis, which requires retrospective data entry.

**Data Accuracy:** Variation may exist in the assignment of ICD-9-CM codes; therefore, coding practices may require evaluation to ensure consistency.

Measure Analysis Suggestions: **None**

**Sampling:** Yes, for additional information see the Population and Sampling Specifications section.

**Data Reported As:** Aggregate measure of central tendency

**Selected References:**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**Acute Myocardial Infarction (AMI) Hospital Outpatient Population**

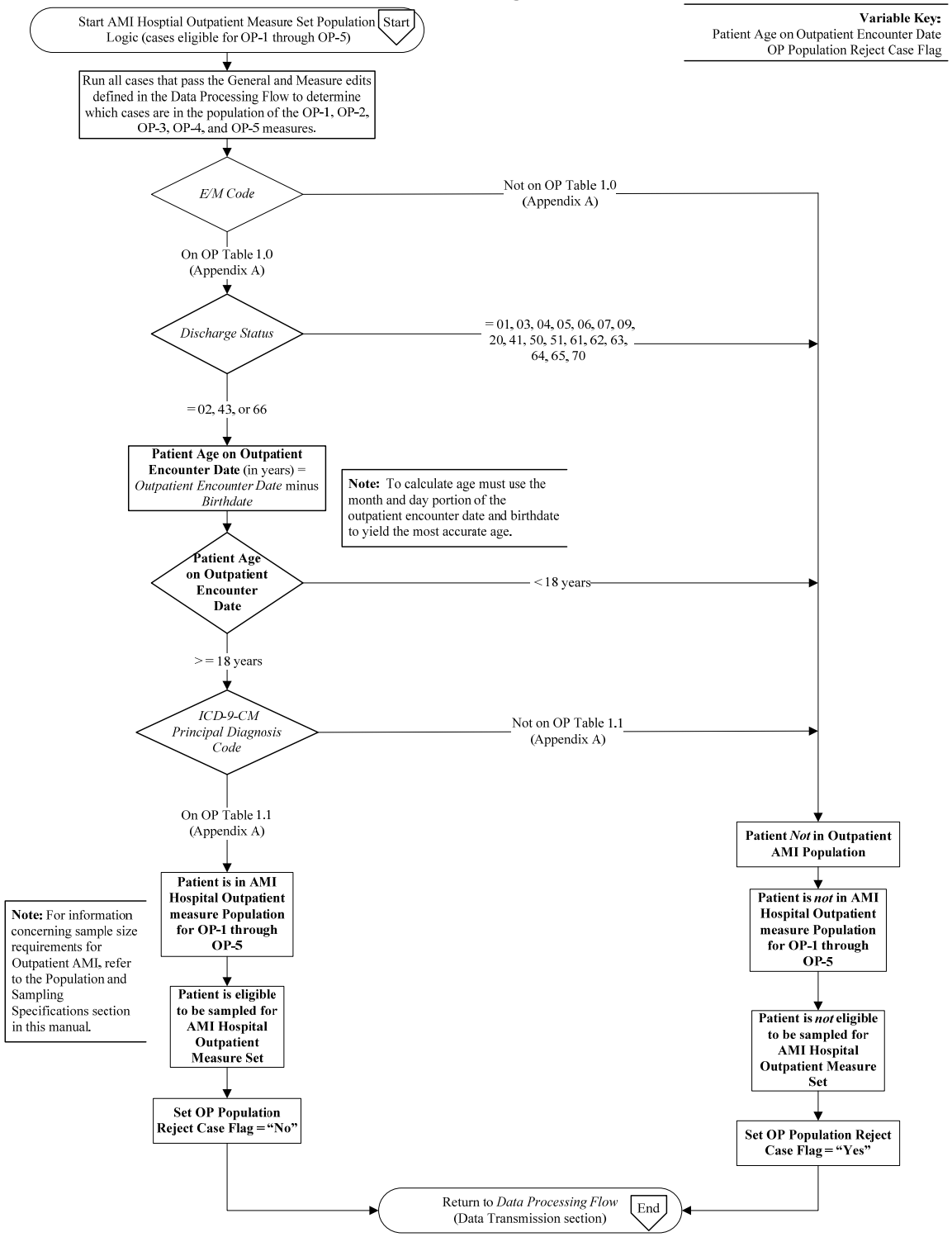
The population of the OP-1 through OP-5 AMI measures is identified using 5 data elements:

- *E/M Code*
- *Discharge Status*
- *Outpatient Encounter Date*
- *Birthdate*
- *ICD-9-CM Principal Diagnosis Code*

Patients seen in a Hospital Emergency Department (*E/M Code* on Appendix A OP Table 1.0) are included in the OP-1 through OP-5 AMI Hospital Outpatient Population and are eligible to be sampled if they have:

- Discharged / transferred to a short-term general hospital for inpatient care, to a Federal healthcare facility, or to a Critical Access Hospital (*Discharge Status*), and
- A Patient Age on *Outpatient Encounter Date* (*Outpatient Encounter Date – Birthdate*) >= 18 years, and
- *An ICD-9-CM Principal Diagnosis Code* for AMI defined in Appendix A, OP Table 1.1.

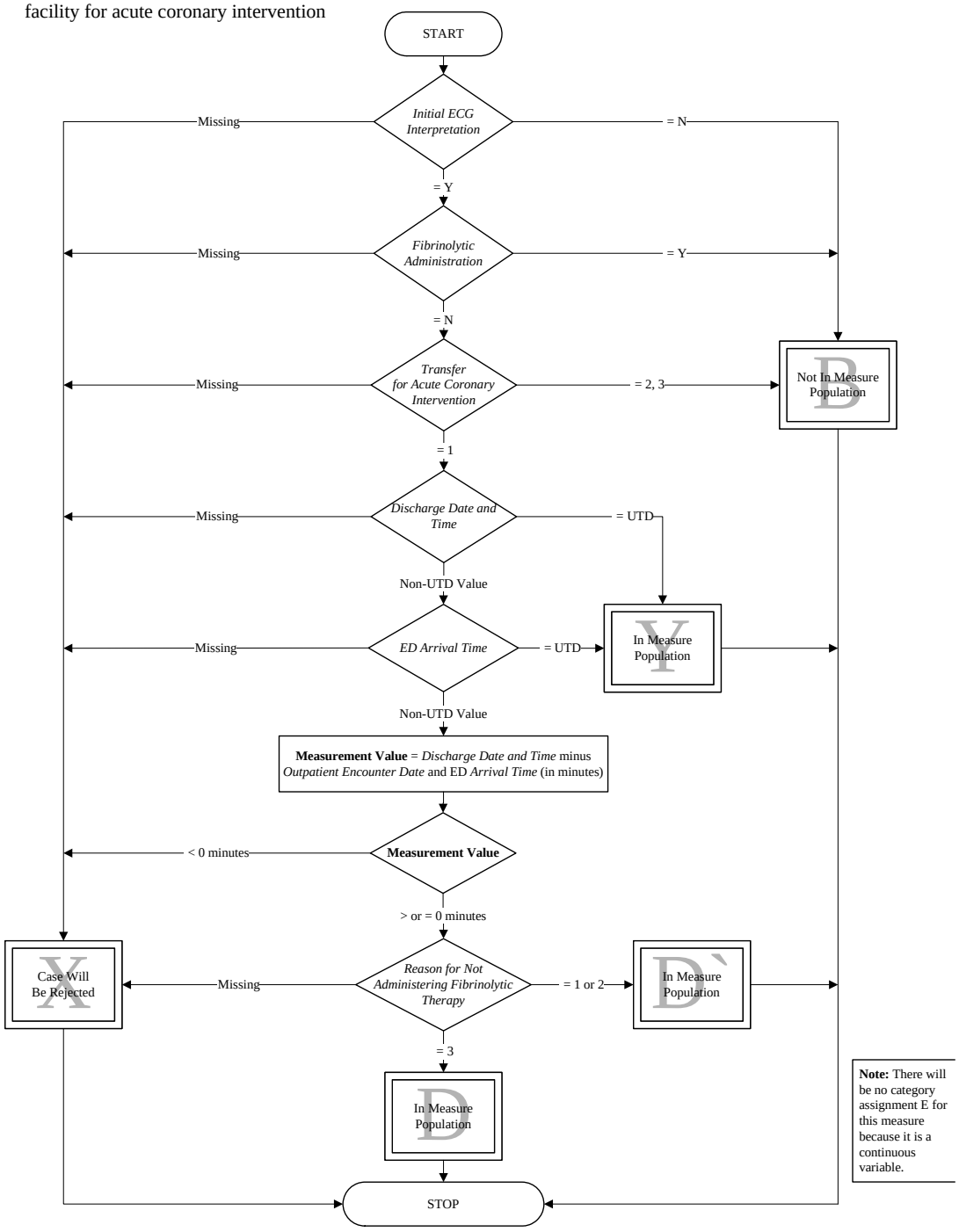
## AMI Hospital Outpatient Population Algorithm (OP-1 through OP-5)





**OP-3:** Median Time to Transfer to Another Facility for Acute Coronary Intervention
**Continuous Variable Statement:** Time (in minutes) from emergency department arrival to transfer to another facility for acute coronary intervention




2250

# Appendix G – QRDA

**HL7 Quality Reporting Document Architecture (QRDA) Project**[10]

The HL7 QRDA Project aims to develop standard specifications for communicating relevant information that will be used for improving the quality of healthcare. Healthcare institutions routinely collect and report quality measure data to improve the quality of care provided to patients. Current data collection and reporting activities rely on a variety of mechanisms that range from structured paper to electronic data entry formats – usually derived from claims-based data sets or manual data abstraction. The HL7 Pediatric Data Standards Special Interest Group (PeDSSIG) pioneered the QRDA initiative with funding for Phase I from the Alliance for Pediatric Quality.[11] The initiative is aimed at developing an EMR-compatible standard for distributing data related to patient-level quality measures across disparate healthcare IT systems. Participating organizations are dedicated to the belief that such a standard will make it easier to support the analysis and tracking of healthcare quality, decrease the reporting burden for providers and improve the quality of data used for measurement.

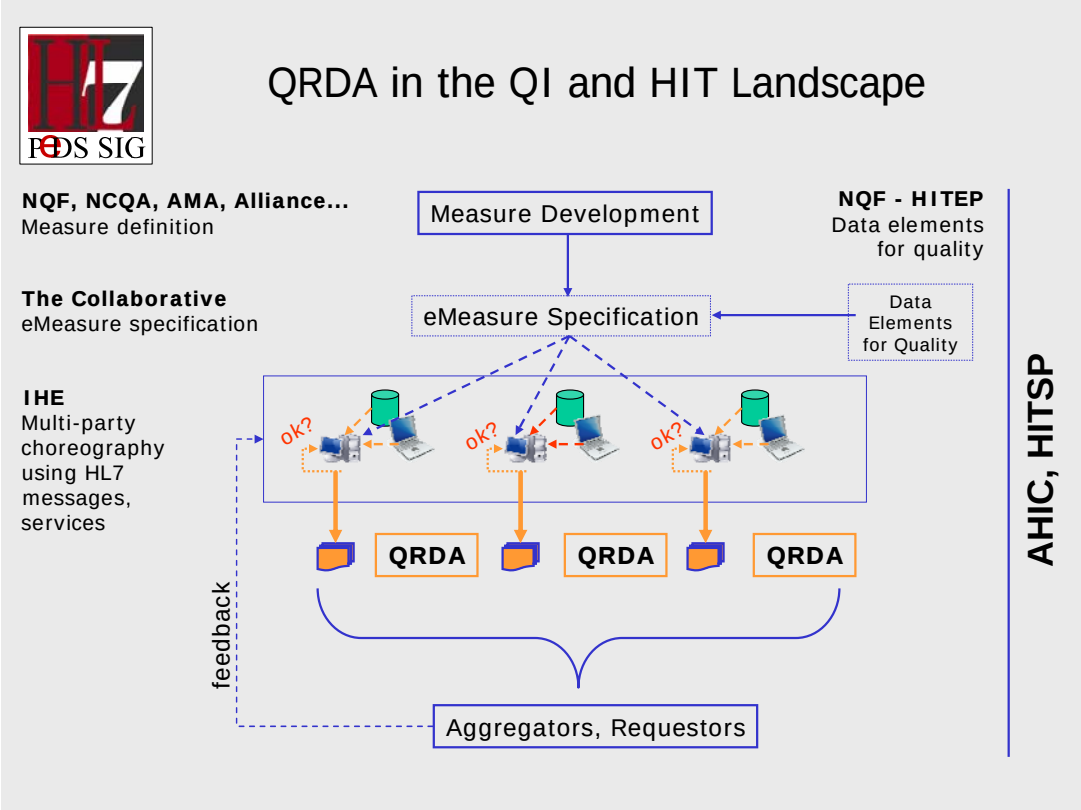
In the first phase of the QRDA initiative, participating organizations confirmed the feasibility of using the HL7 Clinical Document Architecture (CDA) as the foundation for the QRDA specification. It was concluded that CDA, a document markup standard that defines the structure and semantics of clinically-relevant documents for healthcare information exchange across EMRs, can provide the technical underpinnings for communicating pediatric and adult quality measures for both inpatient and ambulatory care settings. The project team developed sample QRDA instances from an adult use case developed for the CMS Doctor Office Quality–Information Technology (DOQ-IT) initiative (defined as an HL7 Version 2.4 messaging specification), and a sample pediatric quality measure from The Joint Commission Pediatric Asthma Measures.

The coalition is now focused on Phase II that leads to developing a QRDA Implementation Guide and other materials needed for the September 2008 HL7 ballot that could make QRDA a Draft Standard for Trial Use (DSTU). This effort is supported by the Child Health Corporation of America (CHCA) and MedAllies. The QRDA DSTU aims to, as its initial output; define three (3) levels or categories of quality reporting specifications. For instance, the QRDA DSTU will define an individual patient-level report with the full clinical data defined in the quality measure, also known as Category 1: Single-patient report. Categories II and III define summary and calculated reports, respectively. For more information on the categories of QRDA, please refer to, ftp://ftp.ihe.net/Quality/Technical_Comittee/2008/Quality%20Reporting.3cats.2.doc.

The QRDA initiative is compatible with parallel industry efforts and organizations that are addressing the quality landscape, including the American Health Information Community (AHIC), Healthcare Information Technology Standards Panel (HITSP) and Integrating the Healthcare Enterprise (IHE). (See Figure 4, below)

[10] http://informatics.mayo.edu/wiki/index.php/Quality_Reporting_Document_Architecture

[11] http://www.hl7.org/Library/Committees/pedsdata/QRDA%20Phase%20I%20Public%20Report.pdf



## Appendix H: Glossary

**ACEI** – Angiotensin Converting Enzyme Inhibitor – A drug that inhibits ACE (angiotensin converting enzyme) which is important to the formation of angiotensin II. Angiotensin II causes arteries in the body to constrict and thereby raises the blood pressure. ACE inhibitors lower the blood pressure by inhibiting the formation of angiotensin II. This relaxes the arteries. Relaxing the arteries not only lowers blood pressure, but also improves the pumping efficiency of a failing heart and improves cardiac output in patients with heart failure. (http://www.medterms.com/script/main/art.asp?articlekey=2108)

**AHIC –**The American Health Information Community (AHIC) is a US federal advisory body, chartered in 2005 to make recommendations to the Secretary of the U.S. Department of Health and Human Services on how to accelerate the development and adoption of health information technology. (http://www.hhs.gov/healthit/community/background/)

**AMA** – American Medical Association is a physician membership organization in the US.

**ARB** – Angiotensin Receptor Blocker – Angiotensin receptor blockers (ARBs) are medications that block the action of angiotensin II. Angiotensin II is a very potent chemical that causes the muscles surrounding the blood vessels to contract, which thereby narrows the blood vessels. This narrowing increases the pressure within the vessels and can cause high blood pressure (hypertension). As a result of Angiotensin II receptor blockade, the blood vessels dilate and the blood pressure is reduced. The lower blood pressure makes it easier for the heart to pump blood and can improve heart failure. In addition, the progression of kidney disease due to high blood pressure or diabetes is slowed. (http://www.medicinenet.com/angiotensin_ii_receptor_blockers/article.htm)

**ASTM** – ASTM International, originally known as the American Society for Testing and Materials (ASTM), (http://astm.org/ABOUT/aboutASTM.html)

**Attributes** – A characteristic of an object or entity. An entity is any concrete or abstract thing of interest, including associations among things. Concepts such as units, magnitude, and currency of denomination, titles and methodological comments can be used as attributes in the context of an agreed data exchange. In XML an attribute is a property that is associated with an XML element that is also a named characteristic for



the element. An attribute also provides additional data about an element, independent of the element content

**Characteristic** - abstraction of a property of an object or of a set of objects. Characteristics are used for describing concepts (*A.3.2.4 - Definitions ISO 1087-1:2000*)

**CCD** – Continuity of Care Document - The HL7 Continuity of Care Document (CCD) is the result of a collaborative effort between the Health Level Seven and ASTM organizations to "harmonize" the data format between ASTM's Continuity of Care Record (CCR) and HL7's Clinical Document Architecture (CDA) specifications. The CCD will enable greater interoperability or healthcare integration of clinical data and "allow physicians to send electronic medical information to other providers without loss of meaning."

**CCHIT –** Certification Commission for Healthcare Information Technology (US). Three leading HIT industry associations - the American Health Information Management Association (AHIMA), the Healthcare Information and Management Systems Society (HIMSS), and The National Alliance for Health Information Technology (The Alliance) joined forces in July 2004 to launch CCHIT as a voluntary, private-sector organization to certify health IT products. (http://www.hhs.gov/healthit/certification/cchit/)

**Clincial Document Architecture (CDA)** - An HL7 standard for the exchange for clinical documents. It specifies the structure and semantics of clinical documents. More information is available from http://www.hl7.org. From HL7 – an XML-based markup standard intended to specify the encoding, structure and semantics of clinical documents for exchange. CDA is based on the HL7 Reference Information Model (RIM) and the HL7 Version 3 Data Types.

**Classification** - A terminology in which concepts are arranged using generic relationships.

**Clinical Guideline –** A guideline is a statement representing evidence-based recommendations for the evaluation and treatment of a defined group of patients with specific characteristics.

**Code Sytem** - A set of unique codes that represent corresponding set of classes in the "real world". At various times referred as "ontology", "classification", "terminology" or code set. Within the HL7 context, a code system is a collection of codes with associated designations and meanings. Concept codes within a code set must not change meaning. Codes may be added or retired, definitions may be clarified, and new relationships may be established. Coded may not be reused. Code systems might vary in size and complexity from a simple code/value table such as Administrative Gender to a complex reference terminology containing thousands of terms and relationships. Examples are: LOINC, SNOMED CT, ICD-10, ISO 639 Language Codes.



**Collaborative for Quality measure Integration with EHRS –** The Collaborative for Quality measure Integration with EHR systems (Collaborative), co-sponsored by the AMA the NCQA, and the EHR Vendor Association (EHRVA) comprises a group of stakeholders—quality measure developers, EHR vendors, physician users, and technical experts—in the physician quality measurement and quality improvement arena who have a shared goal to facilitate the integration of quality measures in EHR systems. (http://www.ama-assn.org/go/collaborative).

**Concept -** A general idea derived or inferred from specific instances or occurrences. It is defined as something formed in the mind; a thought or notion. A concept defines a unitary mental representation of a real or abstract thing; an atomic unit of thought. A concept should be unique in a given terminology and may have synonyms in terms of representation. A concept may also be a primitive (single unit of thought) or a compositional term (a grouping of concepts together). (HL7 V3 Glossary, 2008).

**Concern -** The HL7 Patient Care Technical Committee is developing a formal model for condition tracking. In that model, a problem (which may be an Observation, a Procedure, or some other type of Act) is wrapped in an Act with a new Act.classCode "CONCERN". The focus in this guide is on the use of SNOMED CT, whereas the Patient Care condition tracking model is the definitive source for the overall structure of a problem list.

**Condition** - An observable finding or state that persists over time and tends to require intervention or management, and, therefore, distinguished from an Observation made at a point in time; may exist before an Observation of the Condition is made or after interventions to manage the Condition are undertaken. Examples: equipment repair status, device recall status, a health risk, a financial risk, public health risk, pregnancy, health maintenance, chronic illness

**Content Binding** – A content binding describes how the payload used in an IHE transaction is related to and/or constrained by the data elements contained within the content sent or received in those transactions.

**Context –** The part of a text or statement that surrounds a particular word or passage and determines its meaning. The circumstances in which an event occurs; a setting.

**Continuity of Care Document(CCD)** – An HL7 Clinical Document Architecture (CDA) implementation alternative to ASTM ADJE2369 for institutions or organizations committed to HL7 standards. This specification was developed as a collaborative effort between ASTM and HL7. More information is available from http://www.hl7.org.

**Continuity of Care Record (CCR)** – A core data set of the most relevant administrative, demographic, and clinical information facts about a patient's healthcare, covering one or more encounters. The CCR is Designation E2369-05 of the ASTM (American Society for Testing and Materials, International). More information is available from http://www.astm.org.

**CPT - Current Procedural Terminology –** CPT is a proprietary coding system, owned by the American Medical Association and used for billing and reimbursement for procedures performed. (http://www.ama-assn.org/ama/pub/category/3113.html)

**CCAM -** (Classification Commune des Actes Medicaux) or the Common Classification of Medical Procedures.) is the French equivalent of CPT.

**Data Element –** a single unit of data which corresponds to a field in a data base record. It is a real instantiation of a concept. An example would be a textbook entry on a web form. A clinical example as referenced in the measures selected for review include ACEI medications.

**Definition** - representation of a concept by a descriptive statement which serves to differentiate it from related concepts (*A.3.3.1 - Definitions ISO 1087-1:2000*)

**Definition (Extensional)-** is a description of a concept by enumerating all of its subordinate concepts under one criterion of subdivision. Examples of extensional definitions are: Family 18 in the Periodic Table helium, neon, argon, krypton, xenon and radon noble gas helium, neon, argon, krypton, xenon, or radon. Statement which provides further information on any part of a terminological entry (*A.3.3.3 - Definitions ISO 1087-1:2000*)

**Definition** (**Intensional**) - is a definition which describes the intension of a concept by stating the superordinate concept and the delimiting characteristics. The following is an example of an intensional definition for the concept 'incandescent lamp': electric lamp in which a filament is heated by an electric current in such a way that it emits light. (*A.3.3.2 - Definitions ISO 1087-1:2000*)

**EHRVA – The Electronic Health Record Vendor Association sponsored by HIMSS.** HIMSS EHRVA is a trade association of Electronic Health Record (EHR) vendors that addresses national efforts to create interoperable EHRs in hospital and ambulatory care settings. (http://www.himssehrva.org/ASP/index.asp)

**EHRS –** Electronic Health Record System

**Element** – a section of a document defined by start and end tags (or an empty tag), including any associated content.

**General concept** – which corresponds to two or more objects which form a group by reason of common properties? Examples of general concepts are 'planet', 'tower'. (*A.3.2.3 - Definitions ISO 1087-1:2000*)

**HCP–** Health Care Professional

**HIE** – Health Information Exchange

**HIMSS –**The Healthcare Information and Management Systems Society (HIMSS) is the healthcare industry's membership organization exclusively focused on providing leadership for the optimal use of healthcare information technology (IT) and management systems for the betterment of healthcare. (http://himss.org/ASP/index.asp)

**HITSP -** Health Information Technology Standards Panel (HITSP) - a public-private partnership with broad participation across more than 300 health related organizations - to identify and harmonize data and technical standards for healthcare. HITSP operates with an inclusive governance model established through the American National Standards Institute (ANSI). (http://www.hhs.gov/healthit/standards/activities/).

**ICD-9-CM –** The International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) is based on the World Health Organization's Ninth Revision, International Classification of Diseases (ICD-9). ICD-9-CM is the official system of assigning codes to diagnoses and procedures associated with hospital utilization in the United States. The ICD-9 is used to code and classify mortality data from death certificates. (http://www.cdc.gov/nchs/about/otheract/icd9/abticd9.htm).

**The Joint Commission -** An independent, not-for-profit organization, The Joint Commission accredits and certifies more than 15,000 health care organizations and programs in the United States. Joint Commission accreditation and certification is recognized nationwide as a symbol of quality that reflects an organization's commitment to meeting certain performance standards. (http://www.jointcommission.org/AboutUs/)

**LOINC –** Logical Observations Identifier Names and Codes (LOINC) is a terminology to enhance interoperability by facilitating the exchange and pooling of results, such as blood hemoglobin, serum potassium, or vital signs, for clinical care, outcomes management, and research. (http://loinc.org/background).

**NCQA -** The National Committee for Quality Assurance is a private, 501(c) (3) not-for-profit organization dedicated to improving health care quality. Since its founding in 1990, NCQA has been a central figure in driving improvement throughout the health care

system, helping to elevate the issue of health care quality to the top of the national agenda. (http://ncqa.org/tabid/675/Default.aspx)

**NDF-RT -** National Drug File Reference Terminology (OID: 2.16.840.1.113883.3.26.1.5). The NDF-RT and the RxNorm projects are focused on improving interoperability of drug terminology. The National Drug File, Reference Terminology is being developed for the Veterans Administration as a reference standard for medications to support a variety of clinical, administrative and analytical purposes. The RxNorm Project is a developing project of the NLM where new concepts are being added to the UMLS for clinical drug representations. NDF-RT codes can be found on the National Cancer InsNCI web site at: ftp://ftp1.nci.nih.gov/pub/cacore/EVS/FDA/ndfrt/

**NQF – National Quality Forum** is a US based, not-for-profit membership organization created to develop and implement a national strategy for health care quality measurement and reporting. A shared sense of urgency about the impact of health care quality on patient outcomes, workforce productivity, and health care costs prompted leaders in the public and private sectors to create the NQF as a mechanism to bring about national change. (http://www.qualityforum.org/about/)

**Nomenclature –** designs an instance of classification (tables, lists, rules of identity attribution), which are governed by a specific authority and which serve a given discipline. Another possible definition is a terminology in which there is a set of rules for composing new complex concepts

**Object -** anything perceivable or conceivable. Objects may be material (e.g., an engine, a sheet of paper, a diamond), immaterial (e.g., conversion ratio, a project plan) or imagined (e.g., a unicorn) (*A.3.1.1 - Definitions ISO 1087-1:2000*)

**OECD –** The Organisation for Economic Cooperation and Development (OECD - http://www.oecd.org/home/0,3305,en_2649_201185_1_1_1_1_1,00.html). The OECD Health Care Quality Indicators Project with the aim to collect internationally comparable data reflecting the health outcomes and health improvements attributable to medical care delivered in OECD countries.
(http://www.oecd.org/document/31/0,2340,en_2649_33929_2484127_1_1_1_1,00.html)

**OID - object identifier -** is an identifier used to name an object. Structurally, an OID consists of a node in a hierarchically-assigned namespace. Successive numbers of the nodes, starting at the root of the tree, identify each node in the tree. Designers set up new nodes by registering them under the node's registration authority.

**ONC -** The US Office of the National Coordinator for Health Information Technology (ONC) provides counsel to the Secretary of HHS and Departmental leadership for the



development and nationwide implementation of an interoperable health information technology infrastructure. Use of this infrastructure will improve the quality, safety and efficiency of health care and the ability of consumers to manage their health information and health care. (http://www.hhs.gov/healthit/onc/mission/)

**Ontology** - is a representation of a set of concepts within a domain and the relationships between those concepts. It is used to reason about the properties of that domain, and may be used to define the domain. Common components of ontologies include: classes, attributes, relations, function terms, restrictions, rules, axiom, and events.

**Patient Allergies –**A misguided reaction to foreign substances by the immune system, the body system of defense against foreign invaders, particularly pathogens (the agents of infection). The allergic reaction is misguided in that these foreign substances are usually harmless. The substances that trigger allergy are called allergen. Examples include pollens, dust mite, molds, danders, and certain foods. People prone to allergies are said to be allergic or atopic. Source: http://www.answers.com/topic/hay-fever (HL7 V3 Glossary, 2008).

**Patient Allergy or Adverse Reaction** – Untoward noxious reaction associated with drug use. It may result from administration of over-the-counter, prescription, or investigational/research drugs. It includes adverse events occurring from drug overdose, whether accidental or intentional, drug abuse, drug withdrawal, and significant failure of expected pharmacological action. A proven cause-and-effect relationship between the reaction and suspected drug(s) is not required before a reaction is reportable; reasonable suspicion is sufficient. Blood products are specifically excluded from adverse drug event monitoring and should be reported utilizing reporting mechanisms specifically designed for these products. An allergy is an adverse reaction mediated by an immunologic mechanism. Source: Department of Veterans Affairs - Network Memorandum 10N2-120-03 - VA Healthcare Network - July 31, 2003 - Upstate New York http://www1.va.gov/visns/visn02/network/policies/10n2-120-03.doc (HL7 V3 Glossary, 2008).

**PCPI –** Physician Consortium for Performance Improvement, convened by the American Medical Association, is comprised of over 100 national medical specialty and state medical societies; the Council of Medical Specialty Societies; American Board of Medical Specialties and its member-boards; experts in methodology and data collection; the Agency for Healthcare Research and Quality; and Centers for Medicare & Medicaid Services. This consortium has identified more than 200 physician quality measure descriptions and specifications for 33 clinical topics and conditions are available for implementation. (http://www.physicianconsortium.org)

**Pre-coordination** (HL7 V3 Glossary, 2008)

Creation of a new Concept in a terminology, often a post-coordinated expression that links or qualifies several concepts.

**(HL7) -** Representation of the meaning of a class by a single attribute. (as in SCT but also could cover single attribute post-coordination)

Note: This definition is not stated in HL7 documents but is inferred from usage in relation to particular attributes like Procedure.methodCode and Procedure.targetSiteCode.

Contrast this with the definition of pre-coordination in SNOMED CT documentation which implies a single concept identifier is used to represent a meaning.

**SNOMED CT (SCT) -** Representation of a clinical idea using a single concept identifier.

A single concept identifier used to represent a specific meaning is referred to as a pre-coordinated expression (see expression). SNOMED CT also allows the use of post-coordinated expressions (see post-coordination) to represent a meaning using a combination of two or more concept identifiers.

However, including commonly used concepts in a pre-coordinated form makes the terminology easier to use.

For examples see post-coordination.

**Postcoordination** (HL7 V3 Glossary, 2008)

**(HL7) -** Representation of the meaning of a class by a combination of different attributes. (could be single attribute within CD datatype / single class / multi class) Note: This definition is not stated in HL7 documents but is inferred from usage in relation to particular attributes like Procedure.methodCode and Procedure.targetSiteCode.

Contrast this with the definition of post-coordination in SNOMED CT documentation which refers to a collection of concept identifiers which may be applied to a single HL7 attribute. (Defined in Using SNOMED CT in HL7 Version 3; Implementation Guide, Release 1.4)

**SNOMED CT (SCT) -** Representation of a clinical idea using a combination of two or more concept identifiers.

A combination of concept identifiers used to represent a single clinical idea is referred to as a post-coordinated expression (see expression). Many clinical ideas

can also be represented using a single SNOMED CT concept identifier (see pre-coordination).

Some clinical ideas may be represented in several different ways. SNOMED CT technical specifications include guidance of logical transformations that reduce equivalent expressions to a common canonical form.

Example: SNOMED CT includes the following concepts: Fracture of bone (conceptId= 125605004)
Finding site (conceptId= 363698007)
Bone structure of femur (conceptId= 181255000)
SNOMED CT also includes a pre-coordinated concept for this procedure Fracture of femur (conceptId= 71620000)

It is possible to represent "fracture of femur" in different ways: 71620000 (pre-coordinated expression) 125605004 : 363698007 = 181255000 (post-coordinated expression).

Note: In an HL7 representation a SNOMED CT expression is represented in a single HL7 attribute using the HL7 CD (Concept Descriptor) data type.

**Problem –** A clinical statement that a clinician chooses to add to a problem list. (HL7 V3 Glossary, 2008).

**Problem List -** A series of brief statements that catalog a patient's medical, nursing, dental, social, preventative and psychiatric events and issues that are relevant to that patient's health care (e.g. signs, symptoms, and defined conditions). Source: Consolidated Health Initiative (HL7 V3 Glossary, 2008).

**Procedure –** Concepts that represent the purposeful activities performed in the provision of health care. This hierarchy includes a broad variety of activities, including but not limited to invasive procedures (Excision of intracranial artery), administration of medicines (Pertussis vaccination), imaging procedures (Radiography of chest), education procedures (Instruction in use of inhaler), and administrative procedures (Medical records transfer). Note: As expected, this definition includes concepts that would be used to represent HL7 Procedures. However, it also includes measurement procedures and actions that involve administration of a substance. Therefore, the code attribute of many HL7 Observations and SubstanceAdministration Acts may also be expressed using concepts from the SNOMED CT procedures hierarchy. (HL7 V3 Glossary, 2008).

**Protocol -** The International Conference on Harmonization (ICH) defines a protocol as: "a document that describes the objective(s), design, methodology, statistical



considerations and organization of a clinical trial. The protocol usually also gives the background and rationale for the trial, but these could be provided in other protocol referenced documents. Throughout the ICH GCP Guideline, the term protocol refers to protocol and protocol amendments." (Clinical Data Standards Consortium <CDISC> - http://www.cdisc.org/publications/CDISK_ed.pdf)

**Quality measure –** "a mechanism that enables the user to quantify the quality of a selected aspect of care by comparing it to a criterion. A subtype of a quality measure is a clinical performance measure. Specifically, a clinical performance measure is a mechanism for assessing the degree to which a provider competently and safely delivers clinical services that are appropriate for the patient in the optimal time period. Such measures can address access, outcome, patient experience, process, and structure." (Agency for Healthcare Research and Quality <AHRQ>, US, http://www.qualitymeasures.ahrq.gov/resources/measure_use.aspx). For the purpose of this document, the terms quality measure and performance measure are considered synonymous and only quality measure is used.

***Access measure*** - an access measure assesses the patient's attainment of timely and appropriate health care. Barriers to access may include inability to pay for health care, difficulty traveling to health care facilities, unavailability of health care facilities, lack of a "medical home," cultural and health beliefs that prevent recognition of the need for and benefits of health care, and disparities in responding to persons seeking health care. (Agency for Healthcare Research and Quality <AHRQ>, US, http://www.qualitymeasures.ahrq.gov/resources/measure_use.aspx)

***Outcome measure*** - an outcome of care is a health state of a patient resulting from health care. An outcome measure can be used to assess quality of care to the extent that health care services influence the likelihood of desired health outcomes. Outcome-based measures of quality reflect the cumulative impact of multiple processes of care. Outcome measures may suggest specific areas of care that may require quality improvement, but further investigation is typically necessary to determine the specific structures or processes that should be changed. (Agency for Healthcare Research and Quality <AHRQ>, US, http://www.qualitymeasures.ahrq.gov/resources/measure_use.aspx)

***Patient Experience measure*** - a patient experience measure aggregates reports of patients about their observations of and participation in health care. These measures provide the patient perspective on quality of care. (Agency for Healthcare Research and Quality <AHRQ>, US, http://www.qualitymeasures.ahrq.gov/resources/measure_use.aspx)

***Process measure*** - a process measure assesses a health care service provided to, or on behalf of, a patient. Process measures are often used to assess adherence to recommendations for clinical practice based on evidence or consensus. To a greater extent than outcome measures, process measures can identify specific



areas of care that may require improvement. (Agency for Healthcare Research and Quality <AHRQ>, US, http://www.qualitymeasures.ahrq.gov/resources/measure_use.aspx)

***Structure measure*** - a structure measure is a feature of a health care organization or clinician relevant to its capacity to provide health care. Structure data describe the capability of organizations or professionals rather than care provided to, or results achieved for, specific patients or groups of patients. For example, nurse/patient ratio is a structure-based measure because it does not describe care given to specific patients or specific groups of patients. (Agency for Healthcare Research and Quality <AHRQ>, US, http://www.qualitymeasures.ahrq.gov/resources/measure_use.aspx)

**Uses of Quality Measures:**

**Quality Improvement**

Quality measures can be used for both quality improvement within an institution or system of care (internal quality improvement) or across institutions or systems of care (external quality improvement). (Agency for Healthcare Research and Quality <AHRQ>, US, http://www.qualitymeasures.ahrq.gov/resources/measure_use.aspx)

Using measures for internal quality improvement involves three basic steps: identifying problems or opportunities for improvement, selecting appropriate measures and using them to obtain a baseline assessment of current practices, and using them to reassess or monitor the effect of improvement efforts on measure performance. Baseline quality measure results can be used to better understand a quality problem, provide motivation for change, and establish a basis for comparison across institutional units or over time. Baseline results also enable the user to prioritize areas for quality improvement. Results from repeated measurements of clinical performance can be used by internal quality improvement programs to assess whether performance has changed after improvement efforts have been implemented. (Agency for Healthcare Research and Quality <AHRQ>, US, http://www.qualitymeasures.ahrq.gov/resources/measure_use.aspx)

Quality measures may be used for external quality improvement in programs operated by state, regional, or national entities; other quality improvement organizations; or professional organizations. These organizations may coordinate cycles of clinical quality measurement and reporting of comparative performance to stimulate health care institutions to undertake internal quality improvement efforts. The usual audiences for results of external quality improvement are the participating institutions or providers of care within institutions. External agencies frequently collect the quality measurement data, verify their accuracy, and report quality performance results among providers of



care in a format that allows direct comparison of providers. External agencies may also provide "benchmark" results that can be used to encourage providers to strive to perform at the best level shown to be achievable. (Agency for Healthcare Research and Quality <AHRQ>, US, http://www.qualitymeasures.ahrq.gov/resources/measure_use.aspx)

**Accountability –** Uses of quality measures for the purpose of accountability include purchaser and/or consumer decision-making, accreditation and external quality oversight. Although the use of quality measures for accountability may be quite similar to their use for external quality improvement, and the same set of organizations may conduct measurement for both purposes, the requirements for validity and reliability are higher when using measures for accountability. Greater validity and reliability demand that each provider collect data in the exact same way using standardized and detailed specifications. This ensures that comparisons are fair or that predefined measure performance has indeed been achieved. (Agency for Healthcare Research and Quality <AHRQ>, US, http://www.qualitymeasures.ahrq.gov/resources/measure_use.aspx)

**Research –** The primary use of quality measures in research is to develop or produce new knowledge about the health care system that is generalizable to a wide range of settings and useful in setting health policy. Quality-of-care research is often conducted to evaluate programs and assess the impact of policy changes on health care quality. Compared with their use for other purposes, the use of quality measures for research purposes may require larger sample sizes, longer time horizons, more detailed data collection, the merging of multiple sources of data, and more complex analyses. However, quality measures applied for other purposes are becoming increasingly useful in a research context. (Agency for Healthcare Research and Quality <AHRQ>, US, http://www.qualitymeasures.ahrq.gov/resources/measure_use.aspx)

Quality measures may be used in multiple ways. The current uses of each quality measure, as indicated by the submitting organization, are captured in the "Current Use" field of the Complete Measure Summary. NQMC has divided the broader categories of measure uses (i.e., Quality Improvement, Accountability, and Research) into more detailed and specific categories. Examples of "Current Use" include accreditation, internal quality improvement, decision-making, external quality oversight, quality of care reporting, and research. (Agency for Healthcare Research and Quality <AHRQ>, US, http://www.qualitymeasures.ahrq.gov/resources/measure_use.aspx)

**Realm** - A realm is a conceptual space where the vocabulary follows certain rules. It may be universal (ie all countries) or may be the US or French Public Health system, or an Example Realm for HL7 use.



**RIM modelers** – The combination of people and tools that create and define HL7 message content.

**RHIO -** Regional Health Information Organization

**RxNorm** - RxNorm is a product of the National Library of Medicine (NLM). It is a standardized nomenclature for clinical drugs that connects the standard names for clinical drugs to the varying names of drugs present in many different controlled vocabularies within the Unified Medical Language System (UMLS) Metathesaurus, including those in commercially available drug information sources. These connections are intended to facilitate interoperability among the computerized systems that record or process data dealing with clinical drugs. For more information, refer to the National Library of Medicine's website on Unified Medical Language System (http://www.nlm.nih.gov/research/umls/rxnorm/overview.html).

**SNOMED CT –** Systematized Nomenclature of Medicine Clinical Terms (SNOMED CT) is a dynamic, scientifically validated clinical health care terminology and infrastructure. The terminology provides context and interrelationship among terms. SNOMED CT combines the content and structure of the SNOMED Reference Terminology (SNOMED RT) with the United Kingdom's Clinical Terms Version 3 (formerly known as the Read Codes). It is now managed by the International Health Terminology Standards Development Organization (IHTSDO - http://www.ihtsdo.org/).

**Software Developers** – The people who build the software for use in providing clinical care. In the context of this document, it is expected that software developers will create, validate, and process HL7 v3 messages.

**Terminology** is the study of terms and their use of words and compound words that are used in specific contexts. Terminology also denotes a more formal discipline which systematically studies the labeling or designating of concepts particular to one or more subject fields or domains of human activity, through research and analysis of terms in context, for the purpose of documenting and promoting correct usage. This study can be limited to one language or can cover more than one language at the same time.

**Term** – is a verbal designation of a general concept in a specific subject field (*A.3.4.3 – Definitions ISO 1087-1:2000*)

**Value Set –** A uniquely identifiable set of valid concept representations where any concept representation can be tested to determine whether or not it is a member of the value set. A value set may be a simple flat list of concept codes drawn from a single code system, or it might be an unbounded hierarchical set of possibly post-coordinated



expressions drawn from multiple code systems. Also known as a list of valid concept codes. A Value Set may include a list of zero or more Coded Concepts drawn from a single Code System. A Value Set can represent: all of the Coded Concepts defined in exactly one Code System, a specified list of Coded Concepts that are defined in exactly one Code System, or a set of Coded Concepts represented by another Value Set.

**Value Set (extension)** – Value Sets defined by extension are comprised of an explicitly enumerated set of codes. The simplest case is when the value set consists of only one code.

**Value Set (intension)** – An intensional definition of a Value Set describes the intension of a concept by stating the superordinate concept and the delimiting characteristics. Value sets defined by intension are value sets that are defined by a computable expression that can be resolved to an exact list of codes. For example, an intensional value set definition might be defined as, "All SNOMED CT concepts that are children of the SNOMED CT concept 'Diabetes Mellitus.'"

**Value Set Consumer:** an actor who retrieves a specific new or updated Value Sets based on its OID and possibly its version.

**Value Set Registry -** A value set registry is responsible for storing information about value sets so that the value sets of interest for clinical guidelines, clinical decision support, quality measurement, clinical research, public health and/or direct care delivery may be easily found, selected and retrieved irrespective of the repository where they are actually stored. The Value Set Registry Actor maintains metadata about each registered value set entry. This includes a link to the value set in the Repository where it is stored. The Value Set Registry responds to queries from Value Set Consumer actors about value sets meeting specific criteria. It also enforces some healthcare specific technical policies at the time of value set registration..

**Value Set Repository*:*** actor whose role is to store the brand new or updated Value Sets. A value set repository is responsible for storing value sets in a transparent, secure, reliable and persistent manner and responding to value set retrieval requests. The value set repository is also responsible for value set registration with a Value Set Registry.

**Vocabulary -** All the words of a language. The sum of words used by, understood by, or at the command of a particular person or group. A list of words and often phrases,



usually arranged alphabetically and defined or translated; a lexicon or glossary. A supply of expressive means; a repertoire of communication

**Vocabulary Domain –** describes a “conceptual space” from which the values of an attribute can be drawn. A vocabulary domain serves as the link between an HL7 coded attribute and the set(s) of valid concept codes for that attribute, representing an abstract conceptual space such as "countries of the world", "the gender of a person used for administrative purposes", etc.
Each Vocabulary Domain has a unique *name* along with a *description* of the conceptual space that it represents. Also see Concept Domain.

**VocabularyDomainValueSet** - A VocabularyDomainValueSet represents an association between exactly one VocabularyDomain and exactly one ValueSet. Each association between a VocabularyDomain and a ValueSet may apply in zero or one ApplicationContexts.

**Vocabulary Translators** – A combination of tools and people that translate the abstract HL7 v3 specifications into the structure and terms of actual data processing applications.

**XML - Extensible Markup Language -** general-purpose markup language. It is classified as an extensible language because it allows its users to define their own elements. Its primary purpose is to facilitate the sharing of structured data across different information systems.



## Appendix I: ACEI Value Set XML

```
<?xml version="1.0" encoding="utf-8"?>
<CodeGroup ID="CG1" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:ihe="urn:ihe:iti:svs:2008"
xsi:noNamespaceSchemaLocation="../schema/Collaborative/Measure.xsd">
  <ihe:ValueSet id="1.2.6.1.4.1.21367.2008.3.1.2008.1" displayName="ACEIs - NHIQM - Appendix C, Table 1.2" version="2.5" />
  <ihe:SourceCodeSystem id="2.16.840.1.113883.6.88"/>
  <ihe:ConceptList>
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="349442" displayName="Amlodipine 10 MG / benazepril 20 MG Oral Capsule" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="629569" displayName="Amlodipine 10 MG / benazepril 40 MG Oral Capsule" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="308137" displayName="Amlodipine 2.5 MG / benazepril 10 MG Oral Capsule" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="308138" displayName="Amlodipine 5 MG / benazepril 10 MG Oral Capsule" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="308139" displayName="Amlodipine 5 MG / benazepril 20 MG Oral Capsule" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="629570" displayName="Amlodipine 5 MG / benazepril 40 MG Oral Capsule" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="308608" displayName="benazepril 10 MG / Hydrochlorothiazide 12.5 MG Oral Tablet"
/>
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="308607" displayName="benazepril 10 MG Oral Tablet" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="308610" displayName="benazepril 20 MG / Hydrochlorothiazide 12.5 MG Oral Tablet"
/>
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="308611" displayName="benazepril 20 MG / Hydrochlorothiazide 25 MG Oral Tablet" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="308609" displayName="benazepril 20 MG Oral Tablet" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="308612" displayName="benazepril 40 MG Oral Tablet" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="313866" displayName="benazepril 5 MG / Hydrochlorothiazide 6.25 MG Oral Tablet"
/>
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="308613" displayName="benazepril 5 MG Oral Tablet" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="310796" displayName="Hydrochlorothiazide 12.5 MG / quinapril 10 MG Oral Tablet"
/>
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="310797" displayName="Hydrochlorothiazide 12.5 MG / quinapril 20 MG Oral Tablet"
/>
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="310809" displayName="Hydrochlorothiazide 25 MG / quinapril 20 MG Oral Tablet" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="312311" displayName="Perindopril 2 MG Oral Tablet" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="312312" displayName="Perindopril 4 MG Oral Tablet" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="312313" displayName="Perindopril 8 MG Oral Tablet" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="312748" displayName="quinapril 10 MG Oral Tablet" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="312749" displayName="quinapril 20 MG Oral Tablet" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="314203" displayName="quinapril 40 MG Oral Tablet" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="312750" displayName="quinapril 5 MG Oral Tablet" />
```



```
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="346568" displayName="Ramipril 1.25 MG Extended Release Capsule" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="401965" displayName="Ramipril 1.25 MG Oral Tablet" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="348000" displayName="Ramipril 10 MG Extended Release Capsule" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="261962" displayName="Ramipril 10 MG Oral Capsule" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="401968" displayName="Ramipril 10 MG Oral Tablet" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="198188" displayName="Ramipril 2.5 MG Oral Capsule" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="251856" displayName="Ramipril 2.5 MG Oral Tablet" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="198189" displayName="Ramipril 5 MG Oral Capsule" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.88" code="251857" displayName="Ramipril 5 MG Oral Tablet" />
  </ihe:ConceptList>

</CodeGroup
```

******Note: Test OID used for illustrative purposes only. It is not to be used in actual implementations.**

## Appendix J: AMI Diagnosis Value Set XML

```
<?xml version="1.0" encoding="utf-8"?>
<CodeGroup ID="CG1" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:ihe="urn:ihe:iti:svs:2008"
xsi:noNamespaceSchemaLocation="../schema/Collaborative/Measure.xsd">
  <ihe:ValueSet id="1.2.6.1.4.1.21367.2008.3.1.2008.4" displayName="Acute Myocardial Infarction (AMI) - NHIQM – Appendix A, Table 1.1"
version="2.5" />
  <ihe:SourceCodeSystem id="2.16.840.1.113883.6.103" />
  <ihe:ConceptList>
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="410.00" displayName="Anterolateral wall, acute myocardial infarction-episode of care
unspecified" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="410.01" displayName="Anterolateral wall, acute myocardial infarction-initial episode"
/>
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="410.10" displayName="Other anterior wall, acute myocardial infarction-episode of care
unspecified" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="410.11" displayName="Other anterior wall, acute myocardial infarction-initial episode"
/>
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="410.20" displayName="Inferolateral wall, acute myocardial infarction-episode of care
unspecified" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="410.21" displayName="Inferolateral wall, acute myocardial infarction-initial episode"
/>
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="410.30" displayName="Inferoposterior wall, acute myocardial infarction-episode of
care unspecified" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="410.31" displayName="Inferoposterior wall, acute myocardial infarction-initial
episode" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="410.40" displayName="Other inferior wall, acute myocardial infarction-episode of care
unspecified" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="410.41" displayName="Other inferior wall, acute myocardial infarction-initial episode"
/>
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="410.50" displayName="Other lateral wall, acute myocardial infarction-episode of care
unspecified" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="410.51" displayName="Other lateral wall, acute myocardial infarction-initial episode"
/>
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="410.60" displayName="True posterior wall, acute myocardial infarction-episode of care
unspecified" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="410.61" displayName="True posterior wall, acute myocardial infarction-initial episode"
/>
```

```
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="410.70" displayName="Subendocardial, acute myocardial infarction-episode of care
unspecified" />
2964  <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="410.71" displayName="Subendocardial, acute myocardial infarction-initial episode" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="410.80" displayName="Other specified sites, acute myocardial infarction-episode of
care unspecified" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="410.81" displayName="Other specified sites, acute myocardial infarction-initial
episode" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="410.90" displayName="Unspecified site, acute myocardial infarction-episode of care
2970 unspecified" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="410.91" displayName="Unspecified site, acute myocardial infarction-initial episode" />
  </ihe:ConceptList>
</CodeGroup>
```

***** ****Note: Test OID used for illustrative purposes only.  It is not to be used in actual implementations.**



# Appendix K: Emergency Department Encounters Value Set XML

```
<?xml version="1.0" encoding="utf-8" ?>
- <CodeGroup ID="CG1" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:ihe="urn:ihe:iti:svs:2008"
xsi:noNamespaceSchemaLocation="../schema/Collaborative/Measure.xsd">
<ihe:ValueSet id="1.2.6.1.4.1.21367.2008.3.1.2008.3" displayName="E/M Codes for Emergency Department Encounters" version="1.0a" />
<ihe:SourceCodeSystem id="2.16.840.1.113883.6.12" />
- <ihe:ConceptList>
<ihe:Concept codeSystem="2.16.840.1.113883.6.12" code="99281" displayName="Emergency department visit, new or established patient" />
<ihe:Concept codeSystem="2.16.840.1.113883.6.12" code="99282" displayName="Emergency department visit, new or established patient" />
<ihe:Concept codeSystem="2.16.840.1.113883.6.12" code="99283" displayName="Emergency department visit, new or established patient" />
<ihe:Concept codeSystem="2.16.840.1.113883.6.12" code="99284" displayName="Emergency department visit, new or established patient" />
<ihe:Concept codeSystem="2.16.840.1.113883.6.12" code="99285" displayName="Emergency department visit, new or established patient" />
<ihe:Concept codeSystem="2.16.840.1.113883.6.12" code="99281" displayName="Critical care, evaluation and management" />
</ihe:ConceptList>
</CodeGroup>
```

******Note: Test OID used for illustrative purposes only. It is not to be used in actual implementations.**

# Appendix L: LVSD Value Sets

## L.1 LVSD Acceptable Assessment Procedure Value Set XML

```
<?xml version="1.0" encoding="utf-8"?>
<CodeGroup ID="CG1" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:ihe="urn:ihe:iti:svs:2008"
xsi:noNamespaceSchemaLocation="../schema/Collaborative/Measure.xsd">
  <ihe:ValueSet id="1.2.6.1.4.1.21367.2008.3.1.2008.8" displayName="LVSD Acceptable Assessment Procedure" version="2.5" />
  <ihe:SourceCodeSystem id="2.16.840.1.113883.6.103" />
  <ihe:ConceptList>
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="88.79" displayName="Other diagnostic ultrasound Ultrasonography of: multiple sites
nongravid uterus total body" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="00.24" displayName="Intravascular imaging of coronary vessels, Intravascular
untrasound (IVUS), coronary vessels" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="88.72" displayName="Diagnostic ultrasound of heart Transesophageal
echocardiography" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="37.28" displayName="Intracardiac echocardiography [ICE], Echocardiography of heart
chambers" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="88.72" displayName=" synchronous Doppler flow mapping " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="37.22" displayName="Left heart cardiac catheterization " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="88.50" displayName=" Angiocardiography, not otherwise specified " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="88.53" displayName="Cardiac/coronary angiogram with LV gram" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="89.44" displayName=" Other cardiovascular stress test, Thallium stress test with or
without transesophageal pacing " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="92.05" displayName=" Cardiovascular and hematopoietic scan and radioisotope
function study, Cardiac output scan or function study" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="88.92" displayName=" Magnetic resonance imaging of chest and myocardium" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.103" code="87.41" displayName=" Computerized axial tomography of thorax " />
  </ihe:ConceptList>
</CodeGroup>
```

***** ****Note: Test OID used for illustrative purposes only. It is not to be used in actual implementations.**

## L.2 LVSD ModSev Determination Pre-Coordinated Value Set XML

```
<?xml version="1.0" encoding="utf-8"?>
```

```
<CodeGroup ID="CG1" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:ihe="urn:ihe:iti:svs:2008"
xsi:noNamespaceSchemaLocation="../schema/Collaborative/Measure.xsd">
  <ihe:ValueSet id="1.2.6.1.4.1.21367.2008.3.1.2008.10" displayName="LVSD ModSev Determination Pre-Coordinated”="2.5" />
  <ihe:SourceCodeSystem id=" 2.16.840.1.113883.6.96" />
  <ihe:ConceptList>
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="371869002" displayName=" Moderate hypokinesis of cardiac wall " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="371870001" displayName=" Severe hypokinesis of cardiac wall " />
  </ihe:ConceptList>
</CodeGroup>
```

******Note: Test OID used for illustrative purposes only. It is not to be used in actual implementations.**

## L.3 LVSD Condition Post-Coordinated Value Set XML

```
<?xml version="1.0" encoding="utf-8"?>
<CodeGroup ID="CG1" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:ihe="urn:ihe:iti:svs:2008"
xsi:noNamespaceSchemaLocation="../schema/Collaborative/Measure.xsd">
  <ihe:ValueSet id="1.2.6.1.4.1.21367.2008.3.1.2008.9" displayName="LVSD Condition Post-Coordinated”="2.5" />
  <ihe:SourceCodeSystem id=" 2.16.840.1.113883.6.96" />
  <ihe:ConceptList>
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="92506005" displayName=" Biventricular congestive heart failure " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="70822001" displayName=" Cardiac ejection fraction " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="250908004" displayName=" Left ventricular ejection fraction " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="46258004" displayName=" Determination of ventricular ejection fraction with probe
technique " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="41466009" displayName=" Myocardial imaging for infarct with ejection fraction, first
pass technique " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="37706002" displayName=" Hypokinesis of cardiac wall " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="395704004" displayName=" Left ventricular diastolic dysfunction " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="250908004" displayName=" Left ventricular ejection fraction " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="195114002" displayName=" Acute left ventricular failure " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="426263006" displayName=" Congestive heart failure due to left ventricular systolic
dysfunction " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="250907009" displayName=" Left ventricular function " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="366188009" displayName=" Left ventricular function " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="275514001" displayName=" Impaired left ventricular function " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="371862006" displayName=" Depression of left ventricular systolic function " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="134401001" displayName=" Left ventricular systolic dysfunction " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="371037005" displayName=" Systolic dysfunction " />
```

```
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="371862006" displayName=" Depression of left ventricular systolic function " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="255236000" displayName=" Peak systolic function " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="250907009" displayName=" Left ventricular function " />
  </ihe:ConceptList>
</CodeGroup>
```

******Note: Test OID used for illustrative purposes only. It is not to be used in actual implementations.**

## L.4 LVSD NotModSev Post-Coordinated Value Set XML

```
<?xml version="1.0" encoding="utf-8"?>
<CodeGroup ID="CG1" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:ihe="urn:ihe:iti:svs:2008"
xsi:noNamespaceSchemaLocation="../schema/Collaborative/Measure.xsd">
  <ihe:ValueSet id="1.2.6.1.4.1.21367.2008.3.1.2008.12" displayName="LVSD NotModSev”="2.5" />
  <ihe:SourceCodeSystem id=" 2.16.840.1.113883.6.96" />
  <ihe:ConceptList>
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="371868005" displayName=" Mild hypokinesis of cardiac wall " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="371930009" displayName="Possible" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="33678008" displayName=" Risk of" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="15508007" displayName=" High Risk of" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="75976002" displayName=" Mild Risk of " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="25594002" displayName="Moderate Risk of" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="33678008" displayName="Disease ruled out after examination" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="7196007 " displayName="Suggestive of " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="75189007" displayName="Borderline" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="371932001" displayName="Borderline normal" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="413164001" displayName=" No evidence of left ventricular diastolic dysfunction " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="414072005" displayName=" Echocardiogram shows normal left ventricular function " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="371857005" displayName=" Normal left ventricular systolic function and wall motion "
/>
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="255510006" displayName=" Slight " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="74314007" displayName=" Subclinical " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="260405006" displayName=" Trace " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="162466003" displayName=" Not necessarily related – Symptom trivial " />
  </ihe:ConceptList>
</CodeGroup>
```

******Note: Test OID used for illustrative purposes only. It is not to be used in actual implementations.**

## L.5 ModSev Value Set XML

```
<?xml version="1.0" encoding="utf-8"?>
<CodeGroup ID="CG1" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:ihe="urn:ihe:iti:svs:2008"
xsi:noNamespaceSchemaLocation="../schema/Collaborative/Measure.xsd">
  <ihe:ValueSet id="1.2.6.1.4.1.21367.2008.3.1.2008.11" displayName="ModSev”="2.5" />
  <ihe:SourceCodeSystem id=" 2.16.840.1.113883.6.96" />
  <ihe:ConceptList>
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="24484000" displayName=" Severe " />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="371924009" displayName="Moderate to Severe" />
    <ihe:Concept codeSystem="2.16.840.1.113883.6.96" code="6736007" displayName=" Moderate " />
  </ihe:ConceptList>
</CodeGroup>
```

******Note: Test OID used for illustrative purposes only.  It is not to be used in actual implementations.**