

CORE MEASURES ALL ABOUT THE DATA

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Introduction

A major part of the externally-driven quality improvement agenda in the hospital is centered on the “core measures,” a set of national quality performance measures. Hospitals began to address a subset of the current core measures nearly 15 years ago as part of hospital accreditation by the Joint Commission. Since then, the core measures have been aligned with CMS quality measurement for the Medicare program and adopted by the National Quality Forum consensus process. Today they are used broadly to benchmark hospital clinical performance and spur improvement. In many states, they represent some portion of hospital reporting to regulatory authorities. Core measure results are also posted on public Web sites such as HospitalCompare¹ to facilitate comparison shopping by consumers, and increasingly linked to reimbursement as part of the Centers for Medicare & Medicaid Services (CMS) Value-Based Purchasing and the pay-for-performance programs of many other payers.

The end game, of course, is performance rather than measurement. Achieving good performance on core measures presents challenges on a number of different fronts:

- Hospital quality improvement committees devise customized paper forms and other mechanisms at the point of care to remind the clinical team to consider the care recommended in core measures and other quality indicators *and* to document the right information. Although these approaches have made a difference, they are unwieldy, time-consuming and not always successful. As the list of quality standards and targets grows, these tactics become more complicated and less effective. An electronic health record (EHR) permits integrating standards of practice into the care procedures and clinician workflow more naturally and consistently. However, the full capability of the EHR won't be in place anytime soon.
- To comply with required external reporting, hospitals use dedicated staff — usually nurses — to collect and collate the necessary patient-specific information. Making this labor-intensive work more efficient is a high-priority not only to reduce costs, but also to have a bigger impact on quality.
- Traditional, retrospective quality reporting doesn't provide useful information for the clinical team to improve care in real time and isn't flexible enough to support overall quality improvement efforts. Increasingly, hospitals are attempting to examine quality performance concurrent with each patient's stay in the hospital, i.e., in time to make a difference, and to complete quality reporting by the time the patient is discharged.

The data requirements for core measures are at the crux of making improvements on all of these fronts.

To gain better insights into possible strategies for increasing progress, we deconstructed the medical and surgical core measures² to examine the data elements. For the analysis, each data element was assigned to a data category and type (using a schema adapted from prior work at the National Quality Forum³) and to the equivalent ancillary department system (Pharmacy or Laboratory) or EHR module (eMAR, History and Physical) of the sources specified in the guidelines for chart abstraction for each data element.⁴

| General Medical and Surgical Core Measures | |
|--|--------------|
| Condition | No. Measures |
| Acute Myocardial Infarction | 11 |
| Heart Failure | 4 |
| Pneumonia | 13 |
| Surgical Care (SCIP) | 30 |



Analyzing the patterns that emerged provides a new view of the overall challenges presented by core measures and other quality indicators and answers broader questions that can inform strategies for using the inpatient electronic health record (EHR) to optimize core measure data collection and accomplish real-time quality management.

This white paper shares what we learned from using the tool to help answer the following questions:

What types of information are needed for core measures?

How many data elements can the typical hospital core systems provide?

What types of clinician documentation are major sources of the information needed for core measures?

What does this information tell us about quality reporting and concurrent quality management?

What Types of Information Are Needed for Core Measures?

Core measures are much more complicated than they appear at first glance. Behind the apparently simple percentage calculated for each measure, many other data elements are needed to:

1. Determine which patients to include in the population (inclusion criteria),
2. Determine which patients from that population to exclude from this particular measure (exclusion criteria), and
3. Determine if the recommended care was delivered (the outcome).

For the current set of 58 general medical and surgical core measures, 179 distinct data elements are required. The total is reduced significantly by the fact that many data elements are used repeatedly in the set of measures for a condition (e.g., exclusions for heart failure measures) or in similar measures applied to different conditions (e.g., beta blocker therapy in the measures for AMI and SCIP). The schema on the following page illustrates what is needed for a fairly typical measure, AMI-6:

DATA ELEMENTS NEEDED FOR:

1. INCLUSION

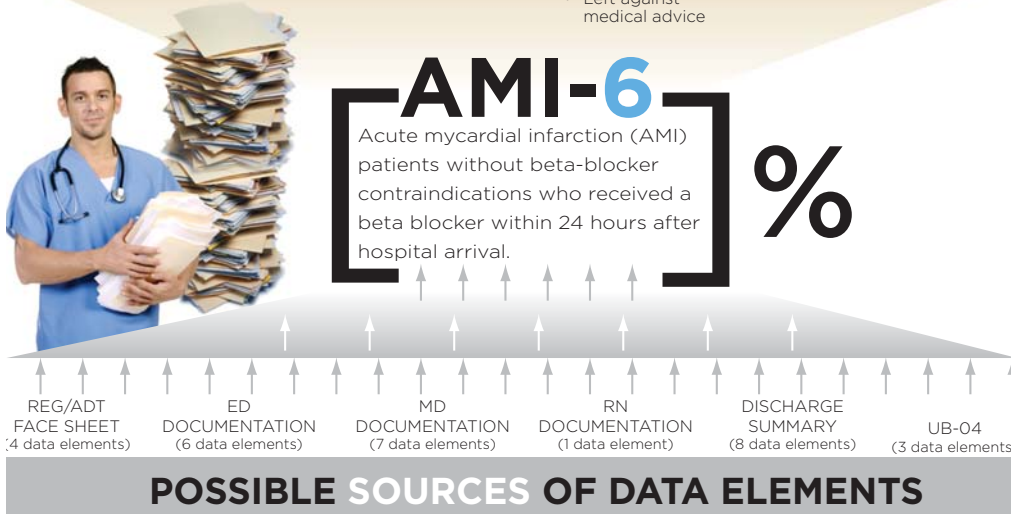
- Principal dx of AMI-6

2. OUTCOME

- Arrival date/time
- Beta blocker administered (date/time)

3. EXCLUSION

- Birth date
- Admission date
- Discharge date
- Transfer from hospital/ED
- Transfer out soon after arrival
- Receiving CMO only
- Involved in clinical trial
- Discharged to hospice
- Expired
- Left against medical advice
- HF on arrival/within 24 hr
- Shock on arrival/within 24 hr
- Bradycardia day of/ before disc
- Heart transplant during stay
- LVAD during hospital stay
- Patient has pacemaker
- 2nd or 3rd degree block on ECG
- Allergy to beta blocker
- Other contraindication to beta blocker



Exclusion criteria in particular add significantly to the data requirements; for AMI 6, the exclusion criteria account for 19 of the 22 data elements. For this measure, the quality nurse may need to search within registration/ADT information, Emergency Department (ED) documentation, physician documentation, nursing documentation, the discharge summary, and even the UB-04 form to assemble the necessary information to determine if the measures apply to a patient and to verify that recommended care was delivered. For many data elements there are multiple possible sources. For example, secondary diagnoses and other relevant patient history may be documented in the ED and/or by the admitting physician, and treatments for AMI may be performed and documented in the ED or while the patient is on an inpatient unit.

How Many Data Elements Can the Typical Hospital Core Systems Provide?

As can be seen in our examination of the data elements for AMI-6, the only possible source of some of the information is the inpatient chart. However, patient demographic information and other information pertaining to the timing (e.g., admission date) and other characteristics of the patient’s hospital stay are routinely captured by hospital core systems as part of every inpatient encounter long before the hospital begins to roll-out the more advanced modules of the inpatient EHR. Today virtually every hospital has electronic applications supporting the registration/Admission-Discharge-Transfer (ADT) functions, order entry (non-CPOE), and the ancillary departments — clinical laboratory, radiology and pharmacy. Therefore, one question we explored is the extent to which these core applications are a potential source of the information needed for core measures.

| Current Use of Hospital Core Applications in U.S. Hospitals ⁵ | |
|--|----------------|
| Application | % of Hospitals |
| Registration /ADT | 99.71% |
| Laboratory Information System | 97.63% |
| Order Entry (Non-CPOE) | 94.35% |

—HIMMS Analytics

Registration/ADT, the Face Sheet, laboratory results and orders are all specified as sources for a number of data elements that we assumed could be derived from these core systems. For data elements that can be derived from orders, we differentiated between those instances in which the order itself provides the information (e.g., service ordered) and other situations where notations on the manual order sheet in the chart might contain additional information concerning patient allergies or other potential contraindications needed for exclusion criteria for some measures. We only included the former in the analysis because additional written commentary provided by the physician on the orders sheet can be viewed in the paper chart, but is very unlikely to be entered along with the electronic order.

According to the analysis, core applications can contribute only a small percentage of the needed information.

Registration/ADT is a fairly limited source of core measure data, primarily for information such as patient date of birth and admission date and time. The low reliance on laboratory test results and total absence of pharmacy systems as sources of the required information are both striking. Core measures that involve medications administered during the hospital stay require documentation that the medication was administered, rather than ordered or dispensed. The discharge summary, a potential source of 27 data elements, is eventually available electronically.

However, because it is completed upon patient discharge (often weeks later), the discharge summary is only useful for retrospective quality reporting and was not counted as a source for real-time quality management.

| Core System Contributions to Data Elements for Medical and Surgical Core Measures | |
|---|---------------------------|
| <i>Application</i> | <i>% of Data Elements</i> |
| Registration/ADT | 4% |
| Laboratory Information System | 6% |
| Face Sheet | 13% |
| Orders | 6% |

What Types of Clinician Documentation are Major Sources of Information Needed for Core Measures?

Clearly, clinician documentation, rather than the information in hospital core systems, is the major source of the information needed for core measures.

Specifications regarding appropriate sources are quite explicit as to when nursing documentation or physician documentation can be relied upon and when information found in either is sufficient. Therefore, we examined the relative contributions of physician and nurse documentation to data elements that must be derived from the patient chart (or EHR). Because a specialized clinical system is often implemented in the operating room (OR), the types of documentation for perioperative care were analyzed separately.

Somewhat surprising is the relatively small role of nursing documentation as a source of needed information, except for medication administration. Specific information regarding vital signs is only needed for four data elements.

| Clinical Documentation Sources for Medical and Surgical Core Measures | |
|---|---------------------------|
| <i>Type of Documentation</i> | <i>% of Data Elements</i> |
| MD only | 29% |
| MD or RN | 13% |
| Med Admin* | 9% |
| OR/MD only+ | 18% |
| OR/RN Notes | 4% |
| PACU** | 4% |

* ED, inpatient, OR

+ Including anesthesia record

** Other than med admin

Closer examination of the data elements for which both physician and nurse documentation is a potential source revealed

that, in most cases, physician documentation would be the logical source (e.g., often through documentation of the history and physical). If not available in physician documentation, the nursing documentation is likely to serve as a secondary place to look. For example, documentation that a patient had taken an antibiotic prior to admission or the patient was already taking warfarin

or beta-blocker therapy may be recorded by a physician in the history and physical or by a nurse in the admission assessment. For a small number of data elements (mostly regarding allergies), pharmacist documentation is considered an acceptable source.

The specifications regarding sources of information are geared to the paper chart, rather than the electronic medical record. Despite the fact that accomplishing (and documenting) medication reconciliation at admission is receiving so much attention today, this is not acknowledged as a source, even in the paper chart.

We believe electronic problem and allergy lists, consistently updated by physicians and available to all caregivers as the single source of truth, meet the spirit of the current specifications for many data elements. In addition, many hospitals are at some stage of capturing medication reconciliation electronically, including physician electronic signature. Therefore, we examined the potential contributions of these three electronic sources to the information needed for core measures.

| Information Needed for Medical and Surgical Core Measures | |
|---|--------------------|
| Part of EHR | % of Data Elements |
| Medical Reconciliation* | 8% |
| Allergy List* | 5% |
| Problem List | 16% |

* Overlap

An electronic allergy list, often available in the first stage of EHR implementation, is obviously a good start, but would eventually be subsumed into the electronic medication reconciliation process. Once the “home” medication list (including allergies) and a proactively-maintained problem list are electronic, these sources could provide 24 percent of the data elements for the current medical and surgical core measures (assuming that the coding schema used corresponded to, or could be mapped to the specified coding).

What Does This Information Tell Us About Quality Reporting and Concurrent Quality Management?

Because, as shown above, so much of the necessary information resides in the patient chart, quality nurses spend a lot of time searching through clinical documentation, still mostly on paper. In one study, the time required for collecting the 43 data elements for each AMI patient amounted to 20-23 minutes⁶. It is important to note that this assumed that all of the necessary information was documented and legible, so that the nurse didn't have to track down various members of the care team to discuss gaps in documentation. As the hospital incrementally implements the EHR, more of the information becomes available electronically.



To better understand the likelihood that the job of the quality nurse will be made easier in the short-term, we assumed that the typical hospital is at Stage 3 of the journey to a fully implemented inpatient EHR and has at least four more years of work before the journey to Stage 6 is complete (admittedly an aggressive plan). We then categorized the 43 data elements for AMI measures as likely to be available electronically today (Stages 1-3) or in the near- or longer-term (Stages 4-5, and 6, respectively):

| Stages of Inpatient EHR Implementation ⁵ | |
|---|---|
| Stage 1 | Reg/ADT, Laboratory, Pharmacy |
| Stage 2 | CDR, Results Management |
| Stage 3 | Nursing Documentation*, eMAR* |
| Stage 4 | CPOE*, Medication Reconciliation* |
| Stage 5 | Closed-loop Medication Management* |
| Stage 6 | Physician Documentation* (structured), Problem List |
| Stage 7 | Paper-less EHR, Data Warehouse, Data Exchange |

* Including relevant clinical decision support
 —Adapted from HIMMS Analytics

- More than one-third (35 percent) of the data elements should be available online today
- Another 28 percent would become available within the next one to two years
- The remainder (37 percent) would only become available in three to four years, when all physician documentation is electronic (and sufficiently structured), including an actively maintained problem list

This analysis assumes an aggressive roll-out strategy. In reality it may take much longer in some hospitals.

The finding that so much of the needed information is not likely to be captured electronically in the immediate future has implications far beyond job security for quality nurses. We believe that electronic clinical surveillance is required to enable real-time quality management and achieve clinical outcomes, as defined by the quality standards including core measures. This is the bridge strategy that relies upon the available electronic information at each stage of the EHR roll-out, reduces the work of quality nurses, and provides real-time quality reporting. Several levels of electronic clinical surveillance are possible, defined by the electronic data available from feeder systems, the complexity of the rules that can be used to identify patients and monitor their care, and the ability to support the work of the quality nurse and the clinical care team.

| Level of Clinical Surveillance | What It Does | Quality Nurse Questions It Answers |
|--------------------------------|--|---|
| Basic | <ul style="list-style-type: none"> • Rules-based search of available electronic information for inpatients | <ul style="list-style-type: none"> • Who are the patients of interest for core measure reporting? |
| Intermediate | <ul style="list-style-type: none"> • All of the above • Provides the quality nurse with other required information to: <ul style="list-style-type: none"> – Confirm applicability of core measures – Assemble other information necessary to complete measurement and reporting | <ul style="list-style-type: none"> • All of the above • Who are the confirmed patients to whom core measures apply? • Where am I in assembling the necessary data elements for the relevant measures for the confirmed patients? |
| Advanced | <ul style="list-style-type: none"> • All of the above • Incorporates structured data elements available electronically that are needed to complete measurement and reporting • Assists in identifying patients with apparent gaps in care or documentation* | <ul style="list-style-type: none"> • All of the above • What is available electronically to meet data needs for relevant measures for confirmed patients? • Which patients appear to have gaps in care or documentation that I should investigate further?* |
| Ideal (some day) | <ul style="list-style-type: none"> • All of the above • Using trigger rules based on coding specifications for core measures, searches electronic free-text documentation for word patterns and combinations that may provide needed information for measure data elements • Using trigger rules based on care recommendations in core measures, notifies care team of apparent gaps in care* | <ul style="list-style-type: none"> • All of the above • What additional information can be gathered from clinical documentation that may be relevant to core measures? • What information can be provided to the care team, e.g., notifications or alerts, to resolve outstanding care or measurement issues? • Which care team notifications or alerts are still outstanding and may need follow-up? |

* Adjunct to clinical decision support delivered via core clinical applications used by physicians and nurses.

Clinical surveillance at each level can occur concurrently (or very close to concurrently). Both the basic and intermediate levels are possible with information available from hospital core systems, as discussed above. As the scope of the inpatient EHR increases, the reach of clinical surveillance expands to advanced levels.

Early clinical surveillance efforts related to core measures primarily targeted the work of the quality nurse—both in accomplishing reporting and in influencing care during the patient’s hospital stay. Examples are starting to emerge of using the electronic information every hospital has in the core systems in complex rule-based clinical surveillance. Additional triggers beyond the data for core measures are used to identify patients and inform both quality management staff and the patient’s care team about apparent gaps in care.⁸ Clearly, electronic clinical surveillance is even within the reach of hospitals just beginning to implement the inpatient EHR.

The Bottom Line

The analysis of data requirements for core measures yields several key messages for hospitals.

- The typical sequence of implementing the inpatient EHR usually places electronic problem lists and physician documentation at the end of the journey, although the medical and surgical core measures rely heavily on information that can be provided by these sources. Moving up the implementation of the electronic documentation of the physician history and physical and the electronic problem list (including for surgical care and in the ED) is worth considering because it would provide a more complete information base for concurrent quality management. (It would also be a big step up in providing the information for coding Present on Admission and MS-DRGs.) Documenting medication reconciliation electronically is another big win, assuming that the information is accessible throughout the patient’s hospital stay and sufficiently structured for rules-based surveillance and reporting.
- In most hospitals, the EHR implementation plan sequences CPOE before structured physician documentation. The above analysis does not point to CPOE as an important contributor to the information needed for core measures. Despite this, CPOE can play a major role in accomplishing quality management in real time. Electronic order sets are a powerful form of decision support and most EHR solutions provide functionality to provide instructions to the ordering physician or request required information within the electronic order set. Via this mechanism, CPOE can not only provide care recommendations directly to physicians, but also capture other information for exclusion criteria. When physicians electronically sign orders, information captured in this way meets the spirit of the guidelines for documentation.
- During each step in the journey to a fully implemented inpatient EHR, hospitals need to build-in core-measure-related clinical decision support and maximize the ability to collect the information needed for quality management. Because quality metrics such as core measures are so complicated, we recommend that quality nurses participate during both planning and detailed design phases of an EHR implementation. They have the most in-depth knowledge of the nuances of quality measures, exclusion criteria in particular.
- Given the urgency of improving quality performance and reporting, and the reality of the timeline for the comprehensive inpatient EHR, we also urge every hospital to put electronic clinical surveillance and related quality management processes in place as soon as possible. This is an essential infrastructure for concurrent quality management.

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