



Quality and Patient Safety Division  
Massachusetts Board of Registration in Medicine

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**USE OF MORTALITY MEASURES BY  
MASSACHUSETTS HOSPITALS**

**Results of a Statewide Survey with  
Follow-Up Interviews**

**October 2012**

**Analysis Conducted by:  
JSI Research & Training Institute, Inc.**

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## I. BACKGROUND ON HOSPITAL MORTALITY MEASURES

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In 2008, the Massachusetts (MA) Health Care Quality and Cost Council (Council) set forth a 2008 goal of identifying and adopting meaningful measures of whole system quality and safety. As part of its deliberations, the Council considered whether to adopt a hospital-wide mortality measure for public reporting. The Council convened an Expert Panel to evaluate measures of hospital-wide mortality (HWM) for accuracy, reliability, and appropriateness for public reporting. Over nearly two years, the Expert Panel studied the issue in-depth and analyzed hospital data using four vendor software products to compare the results[1]. The comparative analysis found substantially different results due to:

- A lack of standardized eligibility and exclusion criteria; and
- Different statistical methods employed within the products.

The Expert Panel concluded that the available evidence did not support adopting a HWM measure for public reporting, since none of the products tested met a minimum standard for scientific acceptability, importance, usability and feasibility, based on National Quality Forum criteria and Council Principles adopted at the beginning of the assessment.

While public reporting on HWM continues to be debated, tracking of mortality within specific diagnostic groups or among patients who undergo selected common surgical procedures is now becoming routine. For example, the Centers for Medicare and Medicaid Services (CMS) tracks several measures and provides consumer access for a subset on the Hospital Compare website. The current list of federal condition-specific mortality measures from CMS and the Agency for Healthcare Research and Quality (AHRQ) is shown in Table 1.

**Table 1. Condition-specific mortality measures required to be reported to CMS**

<b>1. 30-day risk-standardized mortality measures</b>	<ul style="list-style-type: none"><li>• Acute Myocardial Infarction</li><li>• Heart Failure</li><li>• Pneumonia</li></ul>
<b>2. AHRQ Patient Safety Indicators (PSIs)</b>	<ul style="list-style-type: none"><li>• PSI 04 - Death among surgical inpatients with serious treatable complications</li></ul>
<b>3. AHRQ Inpatient Quality Indicators (IQIs)</b>	<ul style="list-style-type: none"><li>• IQI 11 - Abdominal aortic aneurysm repair mortality</li><li>• IQI 19 - Hip fracture mortality rate</li><li>• IQI Composite #2 - Mortality for selected medical conditions</li></ul>

While the Expert Panel in 2010 concluded that existing evidence did not support public reporting of a measure of HWM at that time, many hospitals do track HWM measures for quality improvement and other initiatives. In this light, the Expert Panel recommended that the Quality and Patient Safety Division (QPSD) of the Board of Registration in Medicine collect hospitals' data on the use of HWM measures as part of its regulatory oversight program.

In 2011, the QPSD surveyed Massachusetts hospitals, in an effort to identify trends, characterize practices for mortality review and measurement and share successful improvement strategies for reducing hospital mortality. This report provides the results of this survey and findings from follow-up interviews with four hospitals.

## II. BACKGROUND ON MASSACHUSETTS HOSPITAL SURVEY

### *Survey Methods*

Under QPSD's regulatory authority at 243 CMR 3.07(3)(g), Massachusetts hospitals are required to submit semi-annual reports containing recommendations for quality assurance, risk management, patient care assessment and education. As part of their 2011 semi-annual reports, hospitals were asked to submit additional information on their use of a HWM measure and their mortality review and quality improvement (QI) programs. QPSD staff developed an open-ended survey instrument to obtain this information. The survey consisted of thirteen open-ended questions that covered the following topic areas:

- A description of the hospital's mortality review and improvement program;
- Whether the hospital measures HWM, and if so, what tools/methods are used;
- Any other mortality measures calculated that are not HWM measures;
- A description of the numerators and denominators of the measure(s), exclusions, and risk-adjustment methods;
- Frequency with which mortality measures are calculated and reported;
- Parameters considered when identifying rates as "in control;"
- Identification of comparison group(s);
- Any findings or conclusions drawn from the mortality analyses;
- Actions taken by the hospital in response to their findings or conclusions, and identifying what actions have resulted in demonstrable improvement; and
- Other information that they want to relay about their review and QI program.

The survey was distributed to 94 hospitals throughout Massachusetts (70 acute care hospitals and 24 non-acute hospitals) and a 100% response rate was achieved. The non-acute hospitals included psychiatric, specialty, Department of Public Health, rehabilitation, and long term acute care hospitals.

JSI Research and Training Institute, Inc. (JSI) was contracted by QPSD to analyze and summarize findings from the survey in September 2011. Consistent with the QPSD's responsibility to protect the confidentiality of information received by hospitals, only de-identified survey data were provided to JSI.

### *Survey Analysis*

With a survey consisting of open-ended questions, JSI developed a review template by analyzing a subset of surveys and creating an Excel file that would allow different topic areas to be coded by theme. After all 94 hospital submissions were coded, the data were converted to a SAS file and frequencies were run in SAS version 9.2 (SAS Institute, Inc., Cary NC). Data were initially analyzed separately for acute and non-acute hospitals. Based on the initial analysis, HWM review and related QI were determined to be more pertinent to acute care hospitals, so further analysis was subsequently limited to the 70 acute care hospitals.

### *Follow-up Semi-structured Interviews*

Following review of the initial survey data submitted, JSI identified hospitals to participate in follow-up interviews based on the level of detail about the measurement of HWM and the QI process they provided in their survey response. The surveys from an initial selection of 12 hospitals were then reviewed again in greater detail, looking for indications of comprehensive approaches to hospital mortality, associated QI activities and subsequent interventions. Four hospitals were selected for follow-up interviews: Baystate Medical Center, Boston Medical Center, Mount Auburn Hospital, and Cooley-Dickinson Hospital. Follow up interviews with these hospitals were conducted using a semi-structured interview guide to ensure that similar questions were asked across all four interviews, while at the same time allowing flexibility for interviewers to delve deeper into certain areas that were more relevant to certain hospitals. Interview questions covered the following topic areas:

- Characteristics of the hospital;
- Structure of the hospital's quality department/program;
- Questions specific to their responses to the survey, as well as updates on the program activities reported in the survey (if anything has changed);
- Whether mortality data are driving quality efforts at the hospital, and what else drives the QI efforts;
- Preliminary or final results of the projects or interventions reported in the survey;
- From the respondent's viewpoint, the key to a successful hospital mortality quality program;
- Any challenges they have encountered in their work; and
- The three most important lessons learned in their quality work that they would like to share with other hospitals in Massachusetts.

Summaries of the interviews were written and submitted to the hospitals by JSI for review and approval. All four hospitals elected to be identified in the case summaries, after review of the summaries.

### *Limitations*

There were a number of limitations to this survey analysis that should be considered. Due to the open-ended nature of the questions included in the survey, responses varied in depth and emphasis, and were not standardized. Not all of the surveys received for analysis were in the original question and answer format; several appeared to be narrative reports addressing the Mortality Review Program or Mortality Initiative. Extracting information from these narrative formats was not always a clear process and posed some difficulties for matching up with the survey items directly.

Some hospitals provided very detailed responses to the questions, while other hospitals gave only sparse information. Consequently, the information should be viewed as a minimum description of the mortality review programs, not necessarily fully inclusive of all relevant elements in all cases. In addition, all the information reported by the hospitals in the surveys was “self reported” and has not been verified.

For the selection of hospitals for follow-up interviews, the evaluation of the depth and quality of the hospital mortality review programs was again limited by the quantity and quality of information given on the surveys. Other hospitals may have equally good programs, but the level of detail included in their surveys was minimal, and thus, the reviewers were unable to adequately evaluate the programs.

### **III. MASSACHUSETTS HOSPITAL SURVEY RESULTS**

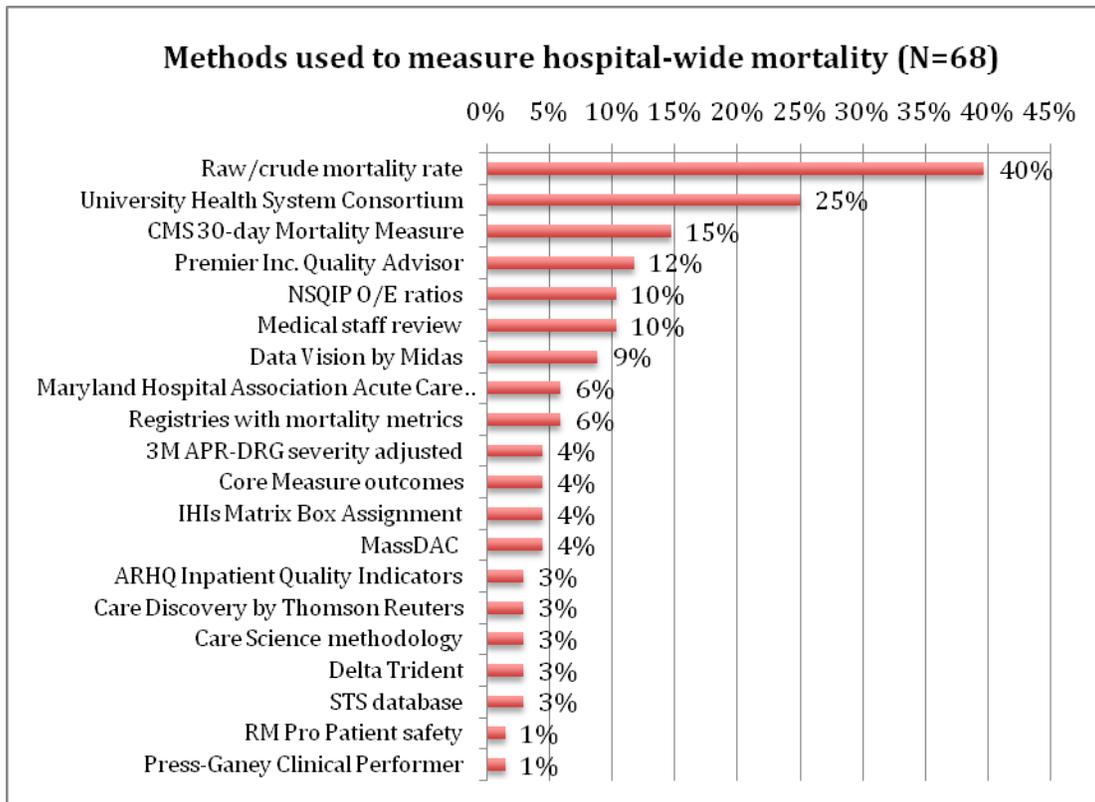
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At the time of the survey, there were 70 acute care facilities in Massachusetts and 100% of this group responded to the survey. Responses indicated that 68 of 70 hospitals (97%) use mortality review as a QI tool. The two hospitals that responded negatively to this question did provide information on their mortality measures and QI programs, so they are included in the rest of the analysis.

The second question addressed the major impetus for the survey --- whether HWM was measured and 68 (97%) responded affirmatively. One hospital did not answer this question, and the other reported not calculating rates. These two hospitals are not included in results related to HWM reporting (Figure 1 and Table 2). However, these facilities did report on mortality-related quality improvement efforts, and were included in the results to subsequent questions (see page 10).

Facilities reported the use of numerous HWM measures and methods, ranging from a crude rate or medical staff review to proprietary tools provided by national vendors. Figure 1 shows the percentage of facilities reporting the use of each HWM measure. Twenty different measures were mentioned by two or more facilities.

**Figure 1. Methods of HWM measurement being used by MA acute care hospitals by percent of hospitals reporting use**



Many hospitals reported multiple methods of HWM measurement, with several citing four or more different approaches. A natural stratification was identified between the 43 facilities (63%) using electronic data vendor products and the 25 others (37%) that rely solely on crude rates and medical staff review. Given the robust analytic potential contained within the vendor software, this categorization helps to differentiate facilities with the capacity for complex electronic analysis from those who use mortality data in a more basic, manual sense. Other factors for differentiation, such as hospital size and type were not known to JSI.

Table 2 provides a summary of the key survey questions on HWM measurement, according to whether or not hospitals use vendor products for analysis. As would be expected, risk adjustment was used by 100% of the vendor product group but only 8% of the others. The number of measures cited was higher for the vendor product group, as was the focus on studying rates for individual departments or conditions.

**Table 2. Mortality Measurement-related Responses, by Use of Vendor Software Products, in MA Hospitals Measuring Hospital-wide Mortality**

	Total		Vendor Product		No Vendor Product	
	N=68	%	N=43	%	N=25	%
<b>Number of methods mentioned</b>						
1	20	29%	5	12%	15	60%
2	32	47%	24	56%	8	32%
3 or more	16	24%	14	33%	2	8%
<b>Condition-specific mortality</b>	40	59%	35	81%	5	20%
<b>Department-specific mortality</b>	27	40%	22	51%	5	20%
<b>Risk adjustment used</b>	45	66%	43	100%	2	8%
<b>Frequency of internal reporting</b>						
Monthly	39	57%	24	56%	15	60%
Quarterly	20	29%	15	35%	5	20%
Biannually	4	6%	3	7%	1	4%
No response	5	7%	1	2%	4	16%
<b>Comparison /benchmark used</b>						
Benchmarks in vendor software	32	47%	31	72%	1	4%
Internal benchmarks	18	26%	10	23%	8	32%
CMS Hospital Compare	11	16%	7	16%	4	16%
National average	9	13%	6	14%	3	12%
Regional/local benchmarks	5	7%	0	0%	5	20%
No response	9	13%	1	2%	8	32%
<b>Mortality findings/conclusions</b>						
Similar/lower than comparison	46	68%	30	70%	16	64%
Higher than comparison	10	15%	9	21%	1	4%
None provided	12	18%	4	9%	8	32%
<b>Provided data on mortality in survey response</b>						
Yes	23	34%	21	49%	2	8%
No	45	66%	22	51%	23	92%

Frequency of reporting on HWM was similar for those with and without vendor products, with most tracking data monthly. A range of comparison groups and benchmarks were identified, with software users highlighting the national comparison groups embedded in most vendor products. The next most common were internal benchmarks (26% overall), such as comparison to previous time points within the hospital, followed by the CMS Hospital Compare reports (16% overall) that use Medicare administrative data. Other regional or national benchmarks were also in use, particularly among facilities who lacked vendor products.

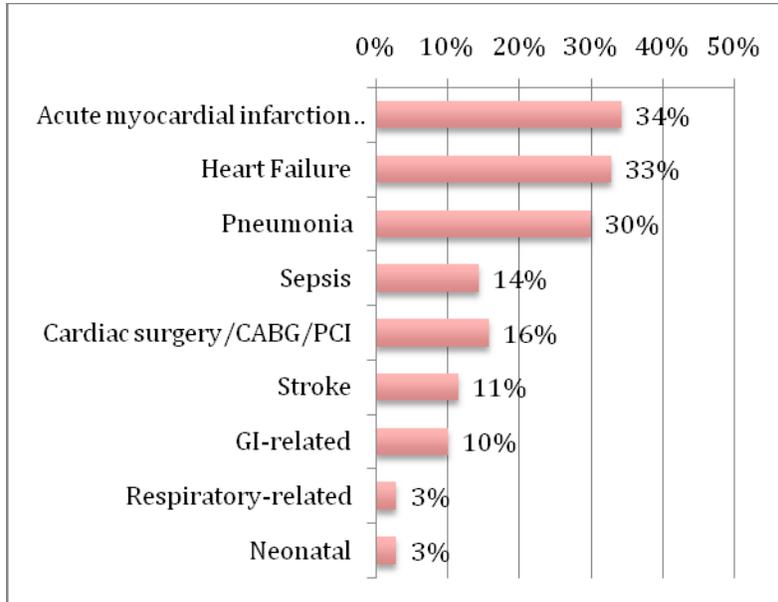
Responses to the question on findings or conclusions of the mortality measurement indicated that 46 of 68 (68%) were similar to or lower than the comparison and 10 (15%) identified rates that were higher than the comparison.<sup>1</sup> Interestingly, the rate of recognized elevation of rates is higher among vendor product users than non-users, at 21% vs. 4%, respectively. However, 32% of the non-vendor group did not comment on findings. As noted above, 34% of the surveys included actual mortality data; the inclusion of data was clearly facilitated by the use of vendor products (49%) compared to others (8%).

Hospitals indicated that they report on a number of condition-specific mortality measures . As shown in Figure 2, the three condition-specific measures publically reported by CMS (acute myocardial infarction, heart failure and pneumonia) were most commonly identified as being tracked by hospitals.

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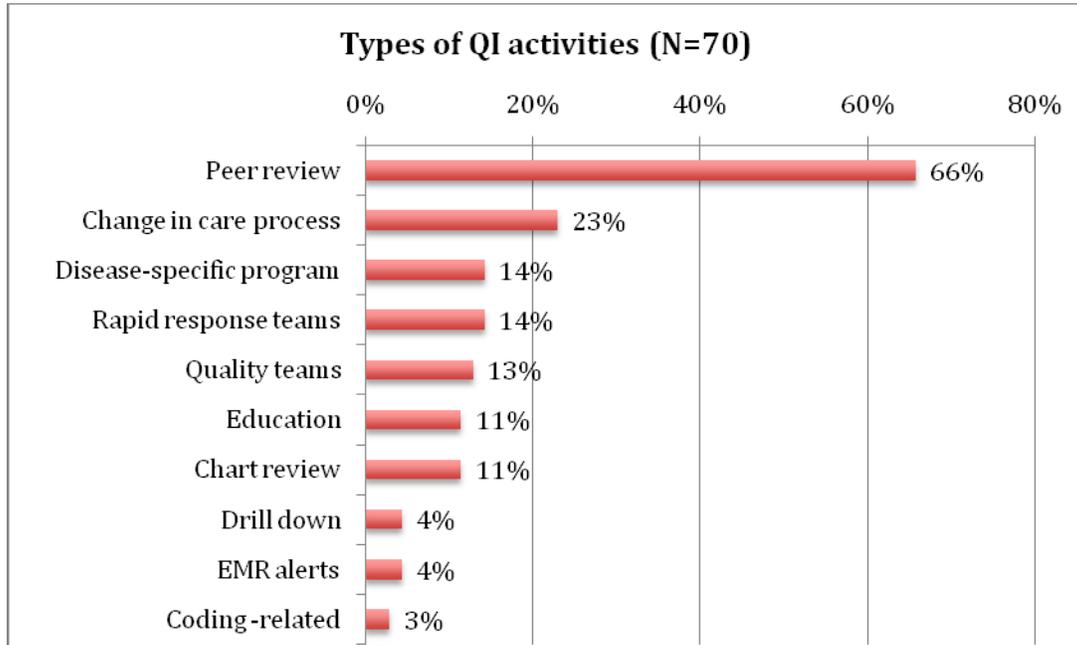
<sup>1</sup> See Table 2 on page 8.

**Figure 2. Condition-specific mortality measures monitored by MA hospitals by percent of hospitals reporting use (N=70)**



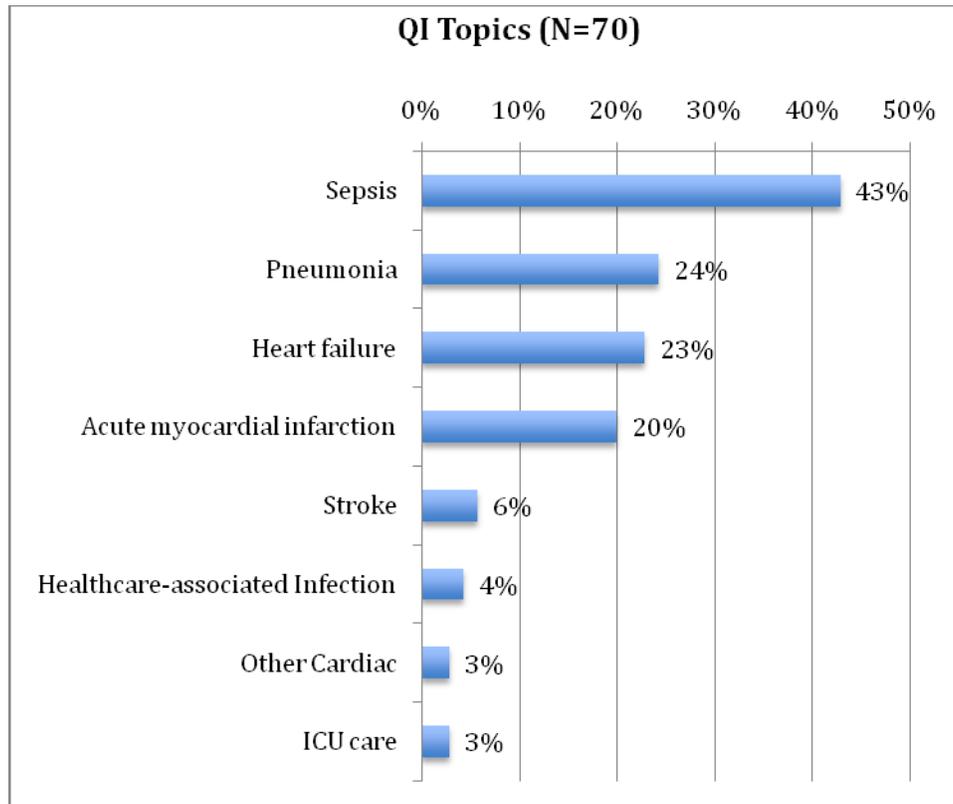
The final section of the survey addressed QI activities related to mortality measurement, and all but two of the hospitals (97%) described engaging in one of more specific types of QI programs. Ten common themes were mentioned by two or more hospitals, with peer reviews being the most common at 66%. Figure 3 provides the details of the programs reported.

**Figure 3. Most frequently reported Quality Improvement activities related to mortality measurement by percent of hospitals reporting use**



Of the topics addressed by QI activities, sepsis was the most commonly mentioned topic (43%). The three conditions for which CMS publically reports 30-day mortality rates (acute myocardial infarction, heart failure and pneumonia) were each mentioned by more than 20% of the hospitals.

**Figure 4. Topics addressed with Quality Improvement activities related to mortality measurement by percent of hospitals reporting use**



In addition to the topics shown in Figure 4 above, other quality topics mentioned by one respondent each were unexpected mortality, medication safety, urinary tract infections, venous thromboembolism (VTE), enhanced neurologic exams, respiratory-related, end of life, and aortic aneurysm.

#### **IV. DISCUSSION**

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The survey results characterize current hospital mortality-related activities in Massachusetts acute care hospitals. The survey results suggest that approximately two-thirds of acute care facilities use automated/electronic data products that generate a “dashboard” of informative mortality statistics, including HWM with risk adjustment. Nearly all facilities report that they track HWM.

HWM is a high-level measure that routinely gets attention but may not be specific enough to drive QI efforts. All but two of the facilities (97%) reported conducting at least one QI activity associated with their mortality data, such as tracking specific medical conditions or department specific efforts, or conducting peer review of deaths. Overall the survey findings provide initial descriptive information about the relationship of HWM to on-going patient safety and quality improvement initiatives that can help further research in this area.

## REFERENCES

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1. Shahian DM, Wolf RE, Iezzoni LI, Kirle L, Normand SL. Variability in the measurement of hospital-wide mortality rates. *The New England Journal of Medicine* 2010,**363**:2530-2539.

## CASE STUDY 1

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**Name: Baystate Medical Center**

**Interview Date: April 27, 2012**

Baystate Medical Center serves Western Massachusetts and discharges 45,000 patients annually. Baystate Medical Center's quality program falls under the auspices of the larger Baystate Health system's greater quality program. The Chief Quality Officer (CQO), Director of Performance Improvement, and Director of Quality were interviewed about their mortality measure, review and quality improvement program.

The success that Baystate Health has experienced in the area of quality starts at the top of the organization. They have created a "robust leadership system around quality and patient safety." Over 12 years ago, they created the Board Quality Committee to oversee all quality activities in the health system, including their mortality quality work. The Board is comprised of members of Baystate Health's full board, quality experts, academics, other health systems' CQOs, statisticians, community members, and providers within Baystate. The Board sets, reviews and tracks progress on quality and patient safety goals.

The Hospital Quality Council receives direction regarding the quality goals and reports to the Board Quality Committee. This council is comprised of leaders in the organization, physicians, department chairs, and all operating vice presidents in organization. The Hospital Quality Council reviews data against specific goals and devises a dashboard on specific areas of quality and patient safety, such as mortality, on which they want to focus.

There are 11 Performance Improvement (PI) Teams that report to the Council. Each PI team is chaired by a physician leader and an operational leader and is staffed by a PI nurse from the Division of Health Care Quality. The PI teams are responsible for implementing the interventions that ultimately impact the systems issues. In parallel to the PI teams, there are Peer Review teams that look at professional issues related to quality and patient safety, and a Patient Safety Committee that looks at cross-cutting issues, such as hospital acquired infections and medication safety. Baystate Health has a safety reporting system (SRS) that allows staff to enter near misses and errors; all events are reviewed by the Quality Director and vetted through the appropriate improvement teams for review and action. Additionally, the Patient Safety Committee reviews the data in aggregate for trends and improvement opportunity.

Baystate's Division of Health Care Quality has an established infrastructure to support the quality, safety, and outcome research and improvement initiatives within and across the organization. The Patient Care Assessment Committee reports mortality and patient safety data to the MA Board of Registration in Medicine and MA Department of Public Health.

In 2011, the Board Quality Committee identified three goals for Baystate Health's quality work, including lowering overall hospital wide mortality. This goal was "handed off" to the Hospital Quality Council, which directed initiatives down to the clinical service lines and PI teams responsible for taking action. Improvement strategies are identified within an improvement framework of Plan-Do-Study-Act (PDSA) cycles. Driver diagrams are then developed to determine primary, secondary and tertiary drivers that impact mortality. For example, the primary drivers for reducing unnecessary deaths include: reducing patient harm; improving communication and teamwork; optimizing evidence-based care; and enhanced transitions of care interventions. For reducing patient harm, the secondary drivers include: reducing hospital acquired infection, adverse drug events; and post-operative deep venous thrombosis (DVT). Process and outcome measures are

developed, measured and shared with the clinical and PI teams for ongoing evaluation and improvement strategies to reduce overall mortality. Baystate Health engages “champions” at the bedside to ensure that actionable items are consistently in place and being done.

A cultural norm for this health system is collaborative partnerships with leading improvement organizations to ensure high quality, evidence based care and clinical outcomes are achieved. The Institute of Healthcare Improvement (IHI) and Premier are examples of two such organizations. The Division of Health Care Quality identifies different collaboratives that would benefit the health system and decides who participates based on the topic or goal that they are trying to achieve. Along with the collaborative work, Baystate Health participates in short webinars that are available through their vendor (Premier). For the most recent webinar from Premier on surgical mortality, Baystate Health had nurses and physicians participating. Baystate Health also participates in a number of clinical data registries to help guide best practices and provide benchmark data, including registries in cardiac services, trauma, and cardiac surgery. Baystate Health partners and collaborates with organizations such as IHI, Premier, National Patient Safety Foundation, MA Coalition for the Prevention of Medical Errors, and the MA Department of Public Health, to learn about what is cutting edge in the world of quality.

Quality indicators are calculated using Premier, a comparative database that includes information on all discharges, mortality, core measures, length of stay and cost of care. Rates are risk adjusted and benchmark data are provided for comparison. Baystate Medical Center has observed a significant reduction in harm events, improvement in patient safety, decrease in readmission rates, and a reduction in mortality rates both overall and in the specific areas they have focused on (e.g., sepsis). The CQO commented that the results they have observed “haven’t happened by serendipity. There is a lot of planning along the way.” Baystate Medical Center was recently recognized by Thomson Reuters (the second year in a row) as

one of the top 100 hospitals in the country, based on mortality and readmission rates and patient safety indicators.

Baystate Health feels that transparency and data sharing are important to their quality work. Their website includes all of their quality and mortality data, which allows not only staff, but the public, to see how they are doing, overall and across all service lines. There is a link to their quality reports on [www.baystatehealth.com](http://www.baystatehealth.com), which provides an overview of their work around quality, including mortality, example dashboards, and background information. The public reports are updated biannually. Quality dashboard reports that track mortality, patient safety and core measures are available to staff internally and are updated on a more frequent basis (quarterly). These internal dashboard reports are discussed at every meeting of the Board Quality Committee and Health Care Council.

A primary challenge of quality work at Baystate Medical Center has been “keeping the will and having staff engaged in the meaningful work that they’re doing.” As with any organization, there are competing priorities, and it can be challenging to determine the best way to appropriately allocate resources and juggle different priorities. Also, it is difficult to maintain the staff’s energy and level of commitment to these prioritized issues. It has helped to have a strong organization and leadership from the “top down and bottom up that are committed to quality work.”

Baystate Medical Center offers a number of important lessons learned from their hospital mortality quality and review work to other hospitals across Massachusetts. They reported that it is important for the providers who are caring for patients to “own the process.” If the quality initiatives are seen as an executive initiative and process, then the staff will not engage in the process. It is important for staff to own the process and be committed to it. It is a strong partnership between administration, the quality department and clinicians, and “ownership from people at bedside is critical.” Further, most of Baystate Medical Center’s quality initiatives are clinically driven. The individuals working in Baystate’s Division of Health Care

Quality are “just the supporters of those doing the work” and they are very appreciative of staff across the organization working on patient safety and quality issues.

## CASE STUDY 2

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**Name: Boston Medical Center (BMC)**

**Interview Date: April 17, 2012**

Boston Medical Center (BMC) is a general hospital with approximately 500 beds that serves adult and pediatric populations in Boston MA. The Director of Patient Safety, Risk Management and Regulatory Compliance, the Chief Quality Officer (CQO) and the Director Clinical Analytics were interviewed about their hospital mortality measure review and quality improvement program.

BMC was described as having a broad-based quality committee structure with a robust degree of oversight. The quality team includes a Chief Quality Officer (CQO), a Director of Quality, Patient Safety and Regulatory Compliance, four quality specialists, four patient safety risk specialists, and two medication safety specialists. Further, three analysts work under the Director of Clinical Analytics to analyze quality and mortality data, support quality improvement and safety efforts, and provide reports. The hospital has designated quality leaders in all of 22 clinical departments, who review cases and adverse events. As stated by the CQO: "In an institution this size, the only way to maintain quality is really to incorporate it into the daily work of individual departments." The hospital has several multi-disciplinary quality and safety committees that meet at least monthly if not more often

BMC tracks over 180 indicators, a subset of which is mortality-specific. They tend to focus their work on the indicators that represent the largest opportunities for quality improvement in the hospital. Efforts are in areas that are a mix of core issues for the hospital overall and a more narrow focus on issues important at the departmental level.

Since submitting their survey, BMC has seen a decrease in their mortality ratio, which is calculated as observed mortality over expected mortality. It is difficult to distinguish direct “cause and effect” when looking at mortality data (i.e., what are the direct causes of the high mortality rates), but they have attempted to identify issues that contribute to increased mortality and design interventions to address these issues, including interventions to: increase appropriate attending physician involvement, improve open communication lines between nurses and house staff and attending physicians, work on post-operative care and mobilization of surgical patients to prevent pulmonary complications and DVT, standardize DVT prophylaxis across surgical departments, improve care for sepsis, and recognize early clinical deterioration. They are also beta-testing a new mortality review form, which will be rolled out in the next two to three months. This new form will be used throughout the hospital and is more systems focused than the old form, which was more individual case-focused.

The Information Technology (IT) Department at BMC is an important asset to their hospital mortality, quality and reporting work. The hospital has both inpatient and outpatient EMR systems in place, and they have incorporated a number of templates and order sets into the EMR to promote quality and safety. Also, the hospital has an electronic, anonymous incident reporting system in place called STARS, which allows staff to report patient safety issues and the quality department can follow up on these issues of concern. Finally, the Enterprise Data Warehouse includes inpatient and outpatient EMR data and is used to create and manage metrics and generate standardized reports. They can look at data – including mortality data – at the patient level or aggregate level, over time and against benchmarks. The hospital participates in the University Health Consortium and openly shares data and benchmarks with other like institutions.

The hospital not only looks at overall mortality, but also drills down the data by individual department and DRG category. Both are important to their work because the overall rate results from a mixture of systems issues and opportunities that are generic across the hospital and individual department issues. For example, standards for increasing attending physician involvement are applied across the hospital (system-wide). Alternatively, if excess mortality for a certain condition within a specific department is identified, then the intervention is driven by the individual department.

Currently, they are trying to look at inter-department issues in a more interdisciplinary way. There is a lot of great work being done at the department level, and they want to increase their focus on sharing best practices across the hospital. To some extent, this is currently happening, but it can be improved. They presently have case presentations for some corporate committees and ask different departments to present cases that have learning value across the institution.

The key to this hospital's success is organizational commitment and transparency. At BMC, there is an organizational commitment that starts at the executive level. If staff members do not perceive the executive team as committed to quality and investing resources in it, then they will not be engaged. Further, the hospital is very transparent about their successes and failures and opportunities. The culture of the hospital is to come together and discuss successes and failures in a very open, non-judgmental way.

According to the hospital, the challenge with quality work is achieving the right prioritization and scope of efforts. "The data don't directly speak to causality in a quantitative way so there's some judgment involved in terms of where to focus." Another challenge, specific to reporting, has to do with small numbers. Mortality data are risk adjusted; however, once the hospital starts to look at rates by individual condition or at the department level, then the small number issue arises, which makes it difficult to interpret the data and more difficult to discern the trends.

There are always a few physicians at a hospital that are less engaged in the quality process. The CQO commented: "I think that happens everywhere." However, clinician engagement has not been a major issue at BMC for a number of reasons. For one, the hospital is thoughtful in their selection of individual department chiefs and physician quality leaders. They have found that the peer model works well for addressing issues with physicians in the departments. In addition, the hospital is clear about their expectations. It is the "institutional expectation" that staff be involved in the quality work, review the mortality cases, present on their work, and/or perform a root cause analysis. Also, the hospital positively engages its physicians in the quality process. "The physicians trust data and that's critical to them reviewing and taking action on it." At the same time, the hospital's quality department is very open about the limitations of the data. Further, they don't make the blanket assumption when looking at mortality that something inappropriate happened. Rather, they see it as an opportunity for improvement. Finally, the hospital develops reports and analysis in collaboration with the physicians ("it doesn't happen in a vacuum"). They meet with end users (clinicians) and work with them to develop the reports and analyses. "It's a journey."

BMC has a number of lessons learned to share with other hospitals in Massachusetts when it comes to hospital mortality quality and reporting. First, it is important to focus on a small number of critical drivers to mortality. If you do not manage the scope thoughtfully and aggressively, then you will be less effective in your quality work. Second, you have to have risk-adjusted mortality data driving and backing up what you are doing. It is important to spend time educating clinicians about the data and getting their buy in to the validity of the data before they can engage and make efforts to improve. Finally, there needs to be a partnership between clinicians and administration. "It can't be a top down process telling clinicians that they are doing a bad job or a good job. Rather, it should be a conversation, asking clinicians 'is there something we do that we can do better?'" and trying to look at every review of a death as an opportunity for improvement. It is important to work with the clinicians

and ensure that they are getting the information they need, that they understand it, and that it is actionable.

### CASE STUDY 3

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**Name: Cooley-Dickinson Hospital (CDH)**

**Interview Date: April 4, 2012**

Cooley-Dickinson Hospital (CDH) is a 140 bed acute care hospital in Western Massachusetts. The Chief Medical Officer (CMO) – who has been in this role for two years – was interviewed about the hospital’s mortality measure, review and quality improvement (QI) program.

The Quality Improvement Department, Case Management Department and Risk Management Department all report to the CMO. The staff members include the department director who is a certified improvement advisor and is also the director for the case management department. Other staff members include a quality coach who teaches the micro-systems QI approach adapted from Dartmouth methodology, a full-time nurse for QI core measures and assisting department chiefs in doing QI, a full-time data analyst, the risk manager and two staff people who work on core measures, physician performance and other areas. The hospital uses 3M APR-DRG severity adjusted methodology. Multiple mortality reports are available through their vendor, MIDAS+ for all inpatients, all acute care patients and four severity illness subclasses for a specific APR-DRG.

Two years ago, the hospital medical staff had limited involvement in QI activities, which the QI department felt was an unworkable situation. The decision was made that “quality improvement has to be led by the medical staff with support of the quality department.” The medical staff was asked for feedback and to identify topics they were interested in addressing and issues they were worried about – an approach that was helpful to increasing their involvement in quality work. The department chiefs and the 19 medical directors are now more engaged and talk

about QI and mortality at each of their meetings, something that was not occurring before. In addition, a heightened level of medical staff accountability is demonstrated at the Board Quality Committee meetings by requiring the chief or medical director to attend and present their QI plans for measurements that are not goals, as well as follow up presentations to demonstrate improvement.

There are many foci for QI efforts at CDH including nursing, housekeeping and medical staff activities. Mortality is a highly visible metric that is reported monthly on the intranet and at many key meetings including the Quality and Safety Committee, the Medical Executive Committee and the Board of Trustees. When the CMO came to his position, he brought new approaches to the review of hospital mortality data, such as dividing out mortality by DRG and diagnosis. This closer analysis of the data found that the diagnoses of sepsis and pneumonia had higher mortality rates. These findings were brought to the Medical Executive Committee and various departments to publicize the current clinical state and to solicit suggestions on QI efforts. The CMO discussed sepsis and pneumonia initiatives as two illustrative but contrasting examples of quality work.

For sepsis, a critical care unit physician director was initially skeptical of the data showing higher than expected mortality due to sepsis and encouraged further investigation. The physician reviewed every death over a year and examined the coding and spoke with the coders. Some of the deaths were found to be patients in palliative care, but the exclusion of these patients did not significantly change the sepsis mortality rate. The critical care physician felt that “we are not identifying these people (with sepsis) early enough” and that it was putting patients at unnecessary risk. Consequently, the physician and a critical care nurse manager took on the project, creating a QI team and holding meetings with various staff members. The IHI 4 Box Process was used as a QI tool. Eventually, the task force chose eight focus areas, including SIRS (systemic inflammatory response syndrome), time to antibiotic administration and admission to the appropriate hospital unit. They found that most of the problems were related to a lack of early

identification of sepsis that led to patients getting sick rapidly on the medical/surgical/ED units. The team worked to create a sepsis response team and to educate nurses on both the early identification of sepsis and the use of the rapid response teams.

Using the resources of the QI Department, they created sepsis order sets and ensured that the order sets were being used appropriately. In addition, a protocol was set up in which nursing leaders reviewed the electronic health records of current inpatients up to three times daily to identify possible vulnerable patients, essentially a type of early warning system. The CMO believed that this initiative was driven by the passion of the CCU director and nurse manager. The two leaders cultivated support among medical staff for their efforts by telling stories of patient losses and saves due to sepsis and early recognition; they also presented evidence and stories in front of the Board of Trustees. Within eight months of initiating the changes noted above, there was a 45% drop in the sepsis mortality rate. There has been a slight recent increase in the mortality rate, but this increase was found to be related to a significant increase in the number of palliative care patients admitted to the hospital.

Another QI project focused on mortality due to pneumonia was initiated at the same time, but did not experience the same level of success. The initial team was headed by a physician and a nurse manager and used a different approach than was used for sepsis. Rather than engaging the medical staff and seeking regular feedback, the team created a complex multi-page nursing care plan to be used in various medical units. A pneumonia order set was meticulously designed from the literature. The care plan was required to be used by each nurse, went through several iterations but never really gained traction with the medical or nursing staff; thus, the mortality rate from pneumonia never changed. After review by the medical executive and quality committees, the team was reconstituted with new leaders and a new focus. A review of the pneumonia mortality data led to the realization that it was not just mortality from pneumonia, but also mortality from chronic obstructive pulmonary

disease (COPD), that led to the higher overall mortality rate for pneumonia, including chronic COPD patients who may die from respiratory failure without pneumonia. While sepsis is an acute defined condition that can usually be addressed within a hospital-based treatment plan, chronic lung disease with accompanying pneumonia is more of a community care issue and the hospital is less able to influence the patient outcome during an admission. Care in the community, communication in care transitions, medication reconciliation and follow up with primary and specialty care providers all influence the risk for mortality. The CMO acknowledged that the diseases were different, but the primary distinctions in QI process results were related to team leadership, ability to execute a plan, the energy of the team, commitment to the outcome and use of process improvement tools. The new leader of the pneumonia quality team is a pulmonary physician who is concerned about the high mortality rates, very committed and brings palpable energy to the project. There is hope that this new team will achieve greater success in reducing the pneumonia mortality rate.

There were several lessons learned from these two QI initiatives at CDH. First, the medical and nursing staff must be involved from the identification of problems through the release of new protocols and order sets. Lack of ownership of the QI process and the results will undermine even well researched and designed tools. Second, the team leaders must be passionate about their goals and communicate those feelings to the administration and medical and nursing staffs. Finally, QI initiatives addressing acute discrete conditions, such as sepsis, can be primarily hospital focused, while QI efforts focused on chronic conditions, such as COPD, must include the community providers and hospital-community transitions to be effective.

## CASE STUDY 4

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**Name: Mount Auburn Hospital (MAH)**

**Interview Date: April 20, 2012**

Mount Auburn Hospital (MAH) is a Harvard University-affiliated, 200 bed teaching hospital located in Cambridge, Massachusetts that provides all service lines. The Director of Risk Management, the Clinical Data Manager and a Registered Nurse Quality Specialist were interviewed about their hospital's mortality measure, review and quality improvement (QI) program.

The Department of Quality and Patient Safety (DQS) includes patient safety, QI, medical staff credentialing, infection prevention, risk management, patient relations, oversight for external reporting, regulatory management, peer review, quality measures (pay-for-performance and additional measures), and safety reporting and care transitions. The Chair of the Department of Quality and Patient Safety is a physician who has served in this role for nearly eight years. This full-time position provides oversight and leadership for QI and patient safety programs at Mount Auburn and involves chairing several committees, including quality review, patient safety, clinical effectiveness, credentials and care transitions. The Executive Director of the Department of Quality and Patient Safety is a registered nurse who has been at Mount Auburn Hospital for more than 30 years in many advanced nursing leadership positions, such as Vice President of Nursing, prior to her taking this position. She works with the Chair of the Department to establish priorities and provides direction and guidance to the nurses in the department, while working with the hospital's leadership to coordinate quality and patient safety initiatives. The Director of Risk Management is a registered nurse who has been with the department for 20 years. There are seven quality and safety specialist nurses in total with four assigned as quality and patient safety liaisons to specific departments,

such as general medicine, surgery, radiology, etc. Two of the nurses are infection prevention nurses. There is a clinical data manager and two dedicated data analysts. DQS feels that having centralized data management of all outcomes and mortality data overseen by the Quality Department is unique to Mount Auburn Hospital's structure.

The hospital uses the MIDAS+ DataVision program to measure and trend all inpatient hospital mortality rates. MIDAS+ benchmarks mortality data against a comparative database of over 600 hospitals on a quarterly basis. The department also oversees several condition specific data registries including dedicated registries for Cardiac Surgery, Cardiac Intervention, Implantable Cardiac Defibrillators (ICD), Stroke and the American College of Surgeons' National Surgical Quality Improvement Program (NSQIP).

Mount Auburn has a quality dashboard that is distributed quarterly to leadership and to the Board of Trustees; it includes detailed information on all process and outcome measure data the department oversees. Mortality is a key quality metric in the hospital's outcomes data analysis. Mortality data is reviewed both at a condition specific aggregate level, as well as the patient level. Two quality nurse specialists screen every mortality case on a weekly basis using an internally developed mortality tool with specific criteria. Cases are identified in real time. Areas for improvement are identified using aggregate benchmarked and risk adjusted data, as well as individual case analysis, which includes questions related to whether the death was expected at the time of admission and at the time of death.

Mount Auburn Performance Improvement initiatives related to improving mortality include implementing rapid response teams (RRT), the intensive care units' (ICU) use of electronic daily goals for all patients, the development of protocols for early mobility and sedation management and standardized order sets for high risk conditions, such as sepsis and hypothermia.

The RRT committee is responsible for reviewing the rapid response data and includes the Executive Director of Quality and Safety, an intensivist, and a critical care nurse Clinical Specialist. The ICU group carried out a QI project to decrease the number of dislodged lines in the ICUs by adding the Richmond Agitation-Sedation Scale (RASS) and the Confusion Assessment Method (CAM) to their patient assessment. By classifying the ICU patients' risk of self-harm, they were able to reduce the rate to one line lost per month.

MAH voluntarily started publicly reporting CABG mortality data on their public website. In addition, MAH has been developing standardized order sets for physicians, some of which include antibiotic prophylaxis, catheter/urinary tract infection (UTI), and deep venous thrombosis (DVT). Each order set has a physician champion or expert who can help shepherd the order set through the process and facilitate its use. There is a central process in the Quality Department to manage the development of order sets, which are continually reviewed by a nurse to ensure that they are up to date. All order sets need final approval from DQS medical director before implementation.

Mount Auburn provided a number of important "lessons learned" with respect to their mortality measure, review and QI program that can be shared with other hospitals across Massachusetts. The first is the importance of involving and communicating with the medical staff. Departments review their own data and therefore understand the needs and areas for improvement. MAH physicians champion many QI initiatives, such as the development of key order sets, as mentioned above. The second lesson involves the review and sharing of clinical outcomes data. Many hospitals only analyze their data to satisfy regulatory requirements. Mount Auburn, on the other hand, believes that it is important, not just to follow what is required, but look across the board and drill down into the data when opportunities for improvement are apparent. It is the expectation that the mortality data will be comprehensively reviewed and analyzed within each department. With MIDAS+, there is broad capability for analyzing the data and

identifying opportunities that may benefit from further review and assessment, some of which result in department specific referrals for peer review.

Finally, using the peer review process and an open approach to medical teaching can allow for more objective, productive and positive assessment of mortality measures. The in house and external peer review process is used to have reviewers look at cases and identify anything problematic with respect to standards of care and process issues. The peer reviews frequently generate teaching opportunities, and as a teaching hospital, MAH providers are very knowledgeable and up-to-date, and use mortality case review as “teaching moments.”