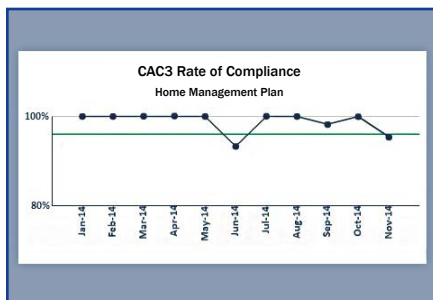


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Front Office to Front Line

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“It is essential that everyone along the chain of accountability—from the board to the bedside—has in-time access to performance data.”

—Sustaining Reliability on Accountability Measures at The Johns Hopkins Hospital (p. 57)

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Performance Improvement

Sustaining Reliability on Accountability Measures at The Johns Hopkins Hospital

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In March 2012 the chairman of the Johns Hopkins Medicine (JHM) Patient Safety and Quality Board Committee and the director of the Armstrong Institute for Patient Safety and Quality (Armstrong Institute) announced a health systemwide goal to become national leaders in patient safety and quality by reliably delivering best practice care to patients at least 96% of the time, as identified through nationally vetted core measures.¹ The JHM Patient Safety and Quality Board Committee, a subcommittee of the JHM Board of Trustees, sets strategic goals for patient safety and quality for the health system and provides oversight and accountability for improvement. JHM is the academic health system for the Johns Hopkins University School of Medicine and the hospitals and health care affiliates comprising the Johns Hopkins Health System (JHHS). The Armstrong Institute coordinates quality and safety research, training, and improvement work throughout JHM and collaborates with other schools and entities residing under the Johns Hopkins University.

Leaders of JHM chose the 96% performance goal to ensure that patients received optimal care and to pursue recognition from both The Joint Commission *Top Performer on Key Quality Measures*[®] program, which had a 95%-or-above requirement in which a hospital must successfully meet all of the criteria in the three-step process,^{2*} and the Delmarva Foundation for Medical Care “Excellence Award for Quality Improvement in Hospitals,” which had a 96% performance requirement.³ To attain these awards, hospitals in the JHHS needed to improve performance on eight Joint Commission accountability measures plus one additional core measure that is tracked for the Delmarva

* As recently announced (The Joint Commission. Joint Commission announces 2016 hiatus for *Top Performer* program. *Jt Comm Perspect.* 2015;35(10):4, 6, 15), the *Top Performer* program is on hiatus for 2016, so ORYX[®] data, which hospitals will continue to collect and submit, will not be used to announce *Top Performer* hospitals in 2016. The Joint Commission will continue to support all its hospitals, including *Top Performer* hospitals, with a new program. The program, which will launch in early 2016, will assist hospitals on their journey toward electronic clinical quality measure adoption and will include educational programs, a resource portal, recognition categories, a modified annual report, and a peer-to-peer solution exchange.

Article-at-a-Glance

Background: In 2012 Johns Hopkins Medicine leaders challenged their health system to reliably deliver best practice care linked to nationally vetted core measures and achieve The Joint Commission *Top Performer on Key Quality Measures*[®] program recognition and the Delmarva Foundation award. Thus, the Armstrong Institute for Patient Safety and Quality implemented an initiative to ensure that $\geq 96\%$ of patients received care linked to measures. Nine low-performing process measures were targeted for improvement—eight Joint Commission accountability measures and one Delmarva Foundation core measure. In the initial evaluation at The Johns Hopkins Hospital, all accountability measures for the *Top Performer* program reached the required $\geq 95\%$ performance, gaining them recognition by The Joint Commission in 2013. Efforts were made to sustain performance of accountability measures at The Johns Hopkins Hospital.

Methods: Improvements were sustained through 2014 using the following conceptual framework: declare and communicate goals, create an enabling infrastructure, engage clinicians and connect them in peer learning communities, report transparently, and create accountability systems. One part of the accountability system was for teams to create a sustainability plan, which they presented to senior leaders. To support sustained improvements, Armstrong Institute leaders added a project management office for all externally reported quality measures and concurrent reviewers to audit performance on care processes for certain measure sets.

Conclusions: The Johns Hopkins Hospital sustained performance on all accountability measures, and now more than 96% of patients receive recommended care consistent with nationally vetted quality measures. The initiative methods enabled the transition of quality improvement from an isolated project to a way of leading an organization.

award. These measures included percutaneous coronary intervention (PCI) \leq 90 minutes (AMI [acute myocardial infarction]); discharge instructions (heart failure); blood culture in emergency department prior to initial antibiotic (pneumonia); home management plan (children's asthma care); three Surgical Care Improvement Project (SCIP) measures: cardiac surgery glucose control, beta-blocker if pre, then post, and urinary catheter removal; and two global immunization measures, pneumococcal vaccination, and influenza vaccination.

Armstrong Institute staff used a four-phase conceptual model, informed by theory and experience, to guide the improvement effort.⁴ As previously described,¹ we declared and communicated the goal across JHM to reach or exceed 96% on the Joint Commission accountability measures (Phase 1). In Phase 2, we created an enabling quality management infrastructure to support the improvement work. This infrastructure included support from the Armstrong Institute for project management, analytics, and Robust Process Improvement[®] (RPI[®]); forming a work group for each low-performing measure; and training and mentoring staff in improvement science.

In Phase 3, we engaged frontline clinicians and connected them in peer learning communities. Engaging clinicians in peer groups was originally part of building capacity (Phase 2), but as the work progressed, it conceptually fit better as an independent phase. Each group had an improvement team of frontline nurses and physicians, quality improvement (QI) staff, and information technology specialists from each JHHS hospital that provided care for the accountability measures. These groups functioned like a clinical community, sharing best practices and lessons, influencing peer norms, and offering social support⁵ as they worked together to identify causes of failures and craft targeted action plans to improve performance. Each hospital team used the A3 problem-solving tool^{1,6} and the Lean Sigma Define-Measure-Analyze-Improve-Control (DMAIC) framework,⁷ in which it *defined* the problem, goal, team members, and key metrics; *measured* performance over time; *analyzed* the root causes of failure; and changed the work process to *improve* and *control* performance.

In Phase 4, we transparently reported performance monthly at each level of the health system and created an accountability plan to review low-performing units and hospitals. The plan involved four levels of review that were activated when a core measure was below the 96% goal (see Figure 3 in Pronovost et al.¹). Briefly, Level 1 corresponded with one month in which the measure performed below the goal, with escalation of levels of review up to Level 4, in which the measure performed below the goal for four consecutive months. A review ranged from

assembly of a local improvement team to identify failures and implement interventions (Level 1), to the hospital president's reporting the performance and the strategy to improve it before the JHM Patient Safety and Quality Board Committee (Level 4). As part of the accountability plan, hospitals were to submit a plan describing how they would sustain performance on a core measure when it was at or above 96% for at least four consecutive months.¹ While we have described the use and impact of this accountability plan across JHM,⁸ we have not evaluated whether the short-term results achieved with this model could be sustained and what additional features might be required to sustain performance. In this article, we briefly review our initial results in 2012 and describe our efforts to sustain them within The Johns Hopkins Hospital (JHH).

Methods

REACHING RELIABILITY: REVIEW OF 2012 RESULTS

The initial evaluation of the initiative focused on results achieved in calendar year 2012 at JHH, one of six JHHS hospitals, for the accountability measures connected to The Joint Commission *Top Performer* program.¹ In 2012 two of the eight low-performing accountability measures (the pneumococcal and influenza vaccinations) were excluded from our evaluation because the national hospital quality measure criteria expanded the population of eligible inpatients after 2011 and prevented a comparison in reporting these results. Of the remaining six accountability measures, five increased at least two percentage points from 2011 to 2012 (Table 1, page 53). All 22 accountability measures (of a total of 40) that JHH tracks and reports as part of the *Top Performer* program achieved a mean performance of \geq 95% in 2012, gaining JHH recognition for its achievement in 2013.

SUSTAINING IMPROVEMENT ON ACCOUNTABILITY MEASURES IN 2013

The measures that hospitals are required to report to external agencies are dynamic—the measures and their specifications change as new evidence becomes available and policy priorities change. In attempting to sustain improvements in calendar year 2013, we were faced with several changes in our reporting of accountability measures. First, The Joint Commission retired the physician-ordered blood clot prevention measure, and second, we added the redefined pneumococcal vaccination and influenza vaccination measures to our list of reported measures. Thus, the total number of accountability measures reported for the sustainability phase increased from 22 to 23, which included all 8 measures that were originally targeted for improvement

Table 1. The Johns Hopkins Hospital Performance on the Joint Commission Accountability Measures, from Baseline (2011) to Sustainability (2013)

Joint Commission Accountability Measure	Mean % (N/D) Performance 2011	Mean % (N/D) Performance 2012	Mean % (N/D) Performance 2013
Pneumococcal immunization	*	80 (395/491)	96 (484/506)
Influenza immunization	*	86 (491/568)	97 (540/559)
Aspirin at arrival	100 (463/463)	100 (491/491)	100 (528/529)
Aspirin prescribed at discharge	100 (427/428)	100 (457/457)	99 (498/502)
ACE inhibitor/ARB for LVSD (AMI)	98 (78/80)	100 (81/81)	96 (91/95)
Beta-blocker at discharge	100 (397/399)	99 (421/426)	100 (447/449)
PCI ≤ 90 minutes (AMI)	93 (13/14)	95 (20/21)	75 (6/8)
Statin prescribed at discharge	98 (404/413)	99 (435/438)	99 (483/487)
ACE inhibitor/ARB for LVSD (heart failure)	99 (136/137)	100 (149/149)	100 (158/158)
Blood culture within 24 hrs of arrival	100 (8/8)	100 (12/12)	100 (9/9)
Blood culture in emergency department prior to initial antibiotic	98 (44/45)	100 (49/49)	100 (34/34)
Antibiotic selection (pneumonia)	100 (46/46)	100 (43/43)	100 (41/41)
Antibiotic ≤ 1 hr	98 (582/595)	98 (562/574)	98 (556/567)
Antibiotic selection (SCIP)	98 (615/627)	98 (559/572)	99 (557/565)
Antibiotic stop timing	98 (563/577)	99 (558/562)	100 (552/554)
Cardiac surgery glucose control (SCIP)	97 (332/343)	96 (333/348)	98 (385/394)
Appropriate hair removal	100 (860/860)	100 (906/906)	100 (902/903)
Beta-blocker if pre, then post	95 (264/278)	99 (324/327)	99 (312/315)
Urinary catheter removal (SCIP)	93 (373/402)	97 (361/373)	99 (338/343)
Physician-ordered blood clot prevention	100 (337/338)	99 (386/388)	na [†]
Blood clot prevention	99 (335/338)	99 (386/388)	99 (337/342)
Reliever medications while hospitalized	100 (247/247)	100 (336/336)	100 (299/299)
Systemic corticosteroid medications	100 (248/248)	100 (334/334)	100 (299/299)
Home management plan	78 (192/246)[‡]	98 (324/332)	98 (292/298)

Accountability measures targeted for ≥ 96% goal are in **boldface**.
 N/D, numerator/denominator; ACE, angiotensin-converting enzyme; ARB, angiotensin receptor blocker; LVSD, left ventricular systolic dysfunction; AMI, acute myocardial infarction; PCI, percutaneous coronary intervention; SCIP, Surgical Care Improvement Project.
 * Measure excluded because the national inpatient hospital quality measure specifications changed starting in 2012, preventing comparison with 2011 data.
 † Measure was retired as of Quarter 1, 2013.
 ‡ 2011 performance on children's asthma care was influenced by an information technology programming issue for one month.

targeted measures, which were in the sustainability phase, two increased by an additional 2 percentage points, including cardiac surgery glucose control (98%, 385 of 394 patients) and urinary catheter removal (99%, 338 of 343 patients) in 2013. Three measures sustained performance at 98% or above, including home management plan (98%, 292 of 298 patients), beta-blocker if pre, then post (99%, 312 of 315 patients), and blood culture in emergency department before initial antibiotic (100%, 34 of 34 patients). One measure decreased by 20 percentage points in 2013 (Figure 1, page 54). The dramatic decrease in performance for the last measure, PCI ≤ 90 minutes for AMI, represented a smaller number of patients undergoing this intervention therapy in 2013 (6 of 8 patients) compared to 2012 (20 of 21 patients), representing a 62% decrease in volume of patients having a PCI. Because the sample size for this measure was below the required 30 cases per year set forth by The Joint Commission for the second *Top Performer* criterion, the measure rate did not affect our hospital's eligibility for the *Top Performer* program.² We investigated the two noncompliant cases to learn why there were delays and to develop a strategy to avoid delays in the future.

Twenty-two of the 23 measures achieved a mean performance of ≥ 96% (Table 1). Of these 22 measures, 13 sustained performance, 7 improved, and 2 decreased, although no measure was below the 96% goal. One measure that dropped four per-

centage points and came close to dipping below 96% was delivery of an angiotensin-converting enzyme (ACE) inhibitor or angiotensin receptor blocker (ARB) to acute myocardial infarction patients for left ventricular systolic dysfunction (LVSD). The scenario for resolving this decrease is described in Sidebar 1

in 2011 and prompted this initiative. Pneumococcal immunizations increased from 80% (395 of 491 patients) in 2012 to 96% (484 of 506 patients) in 2013, and influenza immunizations increased from 86% (491 of 568 patients) in 2012 to 97% (540 of 559 patients) in 2013 (Table 1). Of the remaining six

Performance Trend Showing Sustainability of Six Accountability Measures Targeted for Improvement, 2011–2013, The Johns Hopkins Hospital

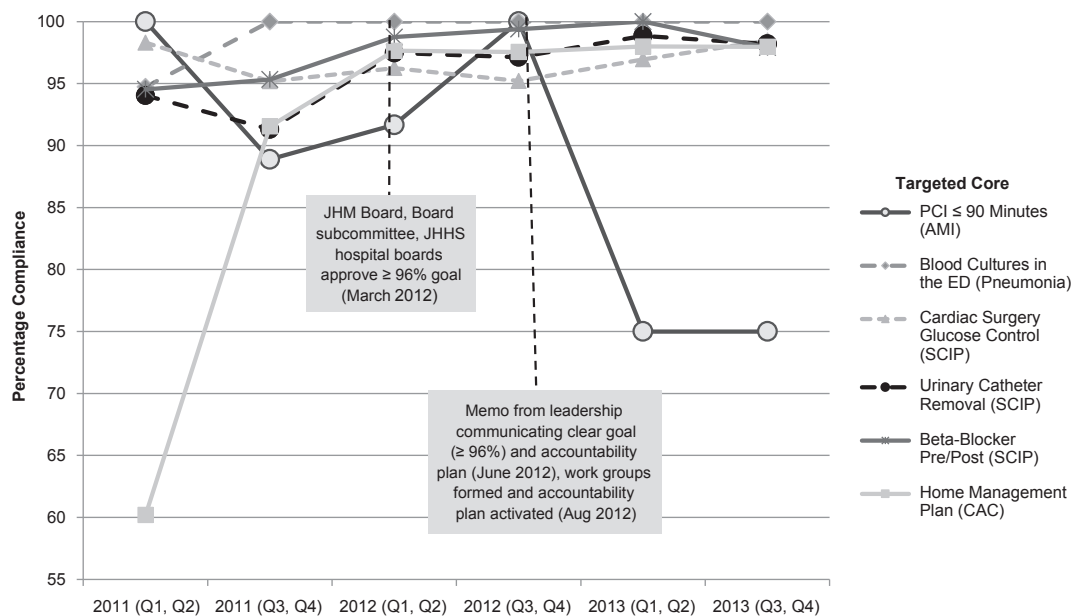


Figure 1. The trend lines for the six Joint Commission accountability measures that were targeted for improvement at The Johns Hopkins Hospital are shown. Performance is depicted in six-month increments for the baseline (2011), initial evaluation (2012), and sustainability (2013) periods. Global immunization measures were excluded because of a change in national inpatient hospital quality measure specifications, which expanded the population of patients eligible for the measure in calendar year 2012; performance on these measures is reported in Table 1. JHM, Johns Hopkins Medicine; Board subcommittee, Patient Safety and Quality Board Committee; PCI, percutaneous coronary intervention; AMI, acute myocardial infarction; ED, emergency department; SCIP, Surgical Care Improvement Project; CAC, children’s asthma care; Q1, Quarter 1.

(page 55). Figure 2 (page 56) compares the percentage of accountability measures that were ≥ 95% each month for the initial evaluation (2011 and 2012) and sustainability period (2013). On the basis of this performance and our focus on enabling sustainability of improved performance, JHH achieved recognition from The Joint Commission as a *Top Performer* for a second consecutive year.⁹

THE SUSTAINABILITY PROCESS

Hospital leaders and improvement teams, with support from the Armstrong Institute, sustained the improvement initiative by continuing to operate under the conceptual model of declaring and communicating the ≥ 96% goal across the hospital and creating an enabling quality management infrastructure to support teams and build capacity, engaging clinicians and connecting them in peer learning communities, and transparently reporting and ensuring accountability for performance. As part of the accountability plan, the teams worked to sustain performance by establishing reliable processes of care for the accountability measures.

Declaring and Communicating Goals. Goals and performance on all measures were continuously communicated at monthly hospital quality committee meetings and through JHM-wide e-mails and newsletters, as well as the core measure dashboard. Starting in April 2014, staff and leaders on every unit could access a new Web-based dashboard (Figure 3, page 57) through an internal quality and patient safety portal and continuously track their progress on monthly and year-to-date summary data, including performance on all core measures.

Creating an Enabling Quality Management Infrastructure. The Armstrong Institute and the JHH QI Department formed a core planning group in 2013, which functioned like a project management office (PMO) in managing all externally reported quality measures for the hospital. Because patient safety and quality across JHM are the responsibility of the Armstrong Institute and its director [P.J.P.], the institute works closely with the QI departments in every hospital and affiliate in the health system. The JHH QI Department has been embedded within the Armstrong Institute since the institute’s inception in 2011. The QI Department director [R. Day] reports

to the JHHS vice president for quality [R. Demski]. The PMO convened the hospital's assigned Lean Sigma Master Black Belt [L.W.], a faculty improvement scientist [S.M.B.], and/or the project manager [T.C.]. The PMO reviews the hospital dashboard of all core measure data every two weeks to stay abreast of performance and prompt action as needed.

The JHH QI Department has a QI team leader assigned to each clinical department and some clinical services. These individuals are typically masters prepared nurses, are Certified Professionals in Healthcare Quality (National Association for Healthcare Quality¹⁰), and have significant clinical and QI experience. All QI team leaders are responsible for partnering with physicians, nurses, pharmacists, and other clinical staff, providing education, conducting failure analysis, communicating failure causes, developing and implementing interventions, and achieving core measure compliance within their assigned departments.

Some QI team leaders were also tasked with hospitalwide responsibility for specific core measures sets. They participated with or led an interdisciplinary group or task force focused on improving hospital performance for a particular measure set. This approach provided both a central focus for hospital QI for each measure set and accountability for following through and achieving results within each of the assigned clinical departments. The QI team leader's hospitalwide assignments for core measure sets proved particularly useful in designing and facilitating global improvements, such as increased specificity of electronic order sets and discharge documentation, and in rapidly identifying and improving performance when it deviated from the $\geq 96\%$ goal.

If a measure dropped below 96%, the PMO connected with hospital QI leaders to convene a team or with the established improvement team and activated the four-level escalating accountability plan. One such measure was the provision of an ACE inhibitor or ARB to AMI patients with LVSD. In the initial improvement work, this measure was not targeted because 98% of patients in 2011 and 100% of patients in 2012 received this therapy. In 2013, however, performance decreased to below 96% in January, rebounded to 100% in February and March, only to decrease to 85.7% in April and 81.8% in May. Sidebar 1 (right) and Figure 4 (page 58) describe the process undertaken to improve performance on this measure.

When a targeted measure remained above 96% for four consecutive months, the PMO contacted the hospital's improvement team to complete a sustainability plan. The team developed the plan using their A3, which had the original failure modes and action steps taken to improve performance. To

Sidebar 1. Improving the Prescribing of an Angiotensin-Converting Enzyme (ACE) Inhibitor or Angiotensin Receptor Blocker (ARB) at The Johns Hopkins Hospital

After a two-month drop (April–May) in the percentage of patients receiving an ACE inhibitor or ARB for left ventricular systolic dysfunction (LVSD), following an acute myocardial infarction (AMI), The Johns Hopkins Hospital (JHH) took action. A quality improvement (QI) team composed of hospital leadership, QI staff, physicians, nurses, pharmacists, and information services specialists was assembled in June 2013 to improve performance on the ACE inhibitor/ARB measure. The team immediately initiated the Lean Sigma Define-Measure-Analyze-Improve-Control (DMAIC)¹ process to identify what had caused the dramatic drop in compliance and determine what was needed to improve it; their problem-solving A3 is shown in Figure 4 (page 58). Several key failure modes were identified at the discharge stage, including omitting the medication from the patient's instructions and not documenting the contraindications and reason for not administering the medication. Four main work process changes were made to target these failures in managing AMI patients:

1. Each weekday, QI staff concurrently review all admissions in the adult and pediatric cardiac care units to identify patients diagnosed with an AMI and review their charts for documentation of an ACE inhibitor or ARB.
2. Each weekday afternoon, a confirmed list of AMI patients is sent to the pharmacy. The point-of-care pharmacist for each adult or pediatric unit connects with prescribing physicians when medication or documentation for contraindications is missing from the chart.
3. Each weekday evening, a QI leader reviews the list of AMI patients for discharges and *Pings* the prescriber's mobile device if the appropriate medication or reason for withholding it is not documented in the computer-based discharge orders.
4. An alert was built into the computer-based core measure area of the discharge orders, reminding residents to check for missing medications.

These targeted interventions increased prescribing practices at JHH, and performance on the ACE inhibitor/ARB accountability measure returned to 100% by the end of June and was sustained for the remainder of 2013. This sustained performance led to JHH receiving The Joint Commission *Top Performer on Key Quality Measures*[®] program recognition for a second consecutive year.

Reference

1. Pande PS, Neuman RP, Cavanaugh RR. *The Six Sigma Way: How GE, Motorola, and Other Top Companies Are Honing Their Performance*. New York City: McGraw-Hill, 2000.

develop the document into the sustainability plan, the PMO revised the "Improve" section of the A3 to include the implemented interventions that led to sustained performance. The sustainability plan also included a section prompting the team to periodically audit the process it put in place to ensure the interventions were being implemented. The audit section asked if the hospital conducted a thorough review of the implemented interventions, assessed the need to communicate any changes to

Percentage of Accountability Measures Performing at $\geq 95\%$ in 2011–2013, The Johns Hopkins Hospital

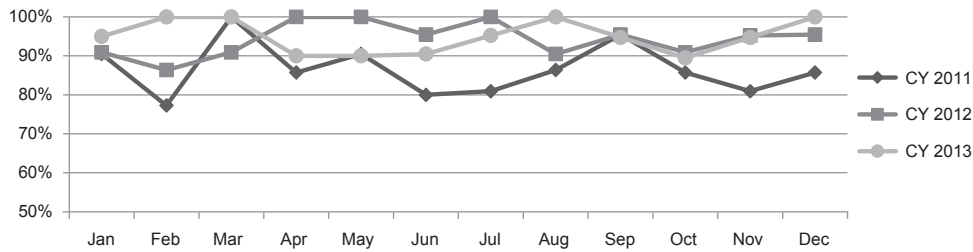


Figure 2. The monthly trend lines for calendar years (CYs) 2011 through 2013 for the percentage of accountability measures that performed at $\geq 95\%$ are shown. Global immunization measures were excluded because of a change in national inpatient hospital quality measure specifications, which expanded the population of patients eligible for the measure in calendar year 2012.

staff, and reviewed the existing training process to ensure that current and new staff continued to be trained. At the end of this section, space was provided for the team to document any actions taken to maintain the process that had resulted in improved performance.

The JHH QI Department implemented concurrent review near the end of 2012 as another strategy to sustain improvements. Four full-time QI specialists with at least two years of full-time clinical experience as a bedside nurse (preferably with a BSN degree or higher) were hired as concurrent reviewers and trained in core measure specifications by experts in the QI Department. Concurrent reviewers conduct detailed case reviews, beginning with patient admission and continuing until the care process or therapy for the core measure is done or until discharge. They audit the charts of hospitalized patients to identify those in which a therapy or process is missing and send an instant cell phone or pager message (called a *Ping*) or an e-mail to alert the prescriber, providing him or her an opportunity to deliver the therapy or document why the patient did not receive the therapy.

The concurrent review process served two purposes—to monitor efforts and to engage the appropriate improvement team, QI team leader for the department or clinical service, or other individual to effect change. For example, if a failure involved admission orders, which are typically written by residents, the reviewer fed back this information to the team responsible for resident oversight. The concurrent reviewers focused on several core measure sets, including AMI, venous thromboembolism, and global immunizations. These sets were targeted because the PMO identified measures or performance with the greatest variation and, thus, at greatest risk for not meeting the goal and because they had an existing mechanism that made concurrent review feasible (for example, a report of patients not receiving

an immunization could be generated for reviewers). The QI Department worked with hospital information technology specialists to provide customized daily work lists of admitted patients sorted by unit for the reviewers.

Lessons Learned. We learned several lessons in the sustainability phase:

1. Our conceptual model established an enabling infrastructure that helped have QI make the transition from a temporary project to a way of organizing work. The PMO we created provided the conduit needed for this transition. In addition, the Armstrong Institute, providing health system-wide support, collaborated closely with the hospital's QI Department, balancing independence of the hospital with interdependence across our health system. The PMO coordinated efforts to improve performance on all externally reported measures and supported the hospital improvement teams and the core measure clinical work groups in their efforts to enhance value.¹¹ The QI Department assigned QI team leaders to each clinical department, providing a structure for peer learning and performance.

2. Sustaining the work required a quality management infrastructure that functioned similar to a fractal model; a fractal is a pattern that repeats at different scales or sizes and is interconnected. Fractals are common in nature, such as fern fronds or the blood vessels of our circulatory system. How this is working at JHH is that there are teams of staff, varying in size, trained and working on quality and safety, and connected horizontally for peer learning, and increasingly larger teams vertically who are managing and supporting the work and ensuring accountability—involving every level of the health system.¹² For example, a patient care team can connect to the improvement team on quality and safety issues, which can then connect to the clinical community or the clinical departmental or service-based QI team, which can then connect to JHH leaders

Sample Johns Hopkins Medicine Safety and Quality Dashboard

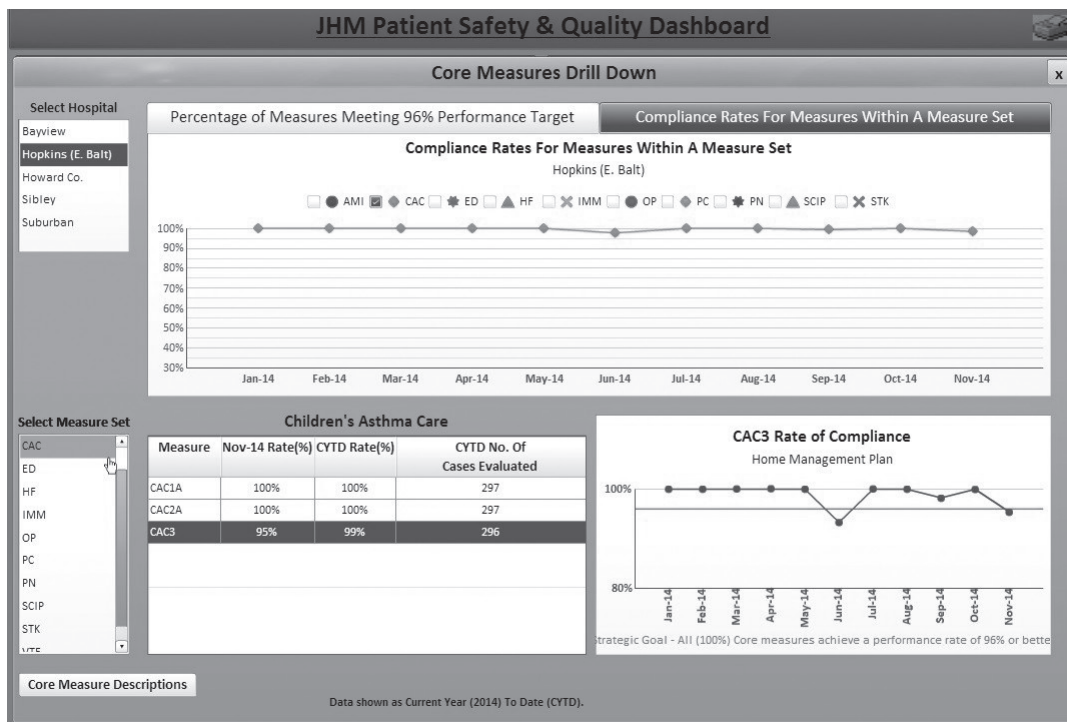


Figure 3. This sample Johns Hopkins Safety and Quality Dashboard depicts a core measure drill-down dashboard for children’s asthma care, Hopkins (East Baltimore, January–November 2014), accessible to all employees through the Johns Hopkins Medicine intranet. Performance data are organized by hospital and core measure set and report on the percentage of measures in the set achieving the 96% goal, the aggregate performance on the measures in the measure set, and data reported for individual measures. AMI, acute myocardial infarction; CAC, children’s asthma care; ED, emergency department; HF, heart failure; IMM, immunization; OP, outpatient; PC, perinatal care; PN, pneumonia; SCIP, Surgical Care Improvement Project; STK, stroke; CYTD, calendar year to date. (Available in color in an enlarged version in online article.)

and the Armstrong Institute. Thus, hospitals, departments, divisions, and units all need staff with the appropriate skills, dedicated time, necessary support, and appropriate accountability to implement interventions and to monitor and improve performance. At this point, we are close to fully implementing this model throughout all clinical systems in JHM, and our understanding of the skills, roles, and resources, including staff time, needed at each level is maturing.

3. Our accountability model was crucial in defining the process to activate a response when performance on any therapy or care process fell below the 96% goal. This model helped us to evolve from a reactive process of recovering when performance slipped to a proactive and disciplined approach. Moreover, by having an explicit accountability model, we avoided managers and staff feeling that the focus on their area was arbitrary, capricious, or punitive. A key component of the accountability plan is the requirement for each team to produce a sustainability plan.

4. This approach created shared leadership accountability.⁵

It is essential that everyone along the chain of accountability—from the board to the bedside—has in-time access to performance data. The core measure dashboard provided such a resource and also provided transparency. Any employee can view the performance of a unit, department, or hospital in JHHS. We have expanded the number and types of measures on the dashboard. For example, the dashboard includes patient experience, hand hygiene, and several health care–associated infections.

Discussion

In this article, we describe how JHH sustained the goal of ≥ 96% performance on accountability measures, thereby achieving recognition as a top-performing hospital by The Joint Commission for a second consecutive year. We sustained improvements largely by establishing an enduring quality management infrastructure, a PMO, and a formal accountability mechanism that enabled us to have the initiative make the transition from a temporary project to a way of organizing work and

The Johns Hopkins Hospital A3: Acute Myocardial Infarction (AMI) Core Measure Failures

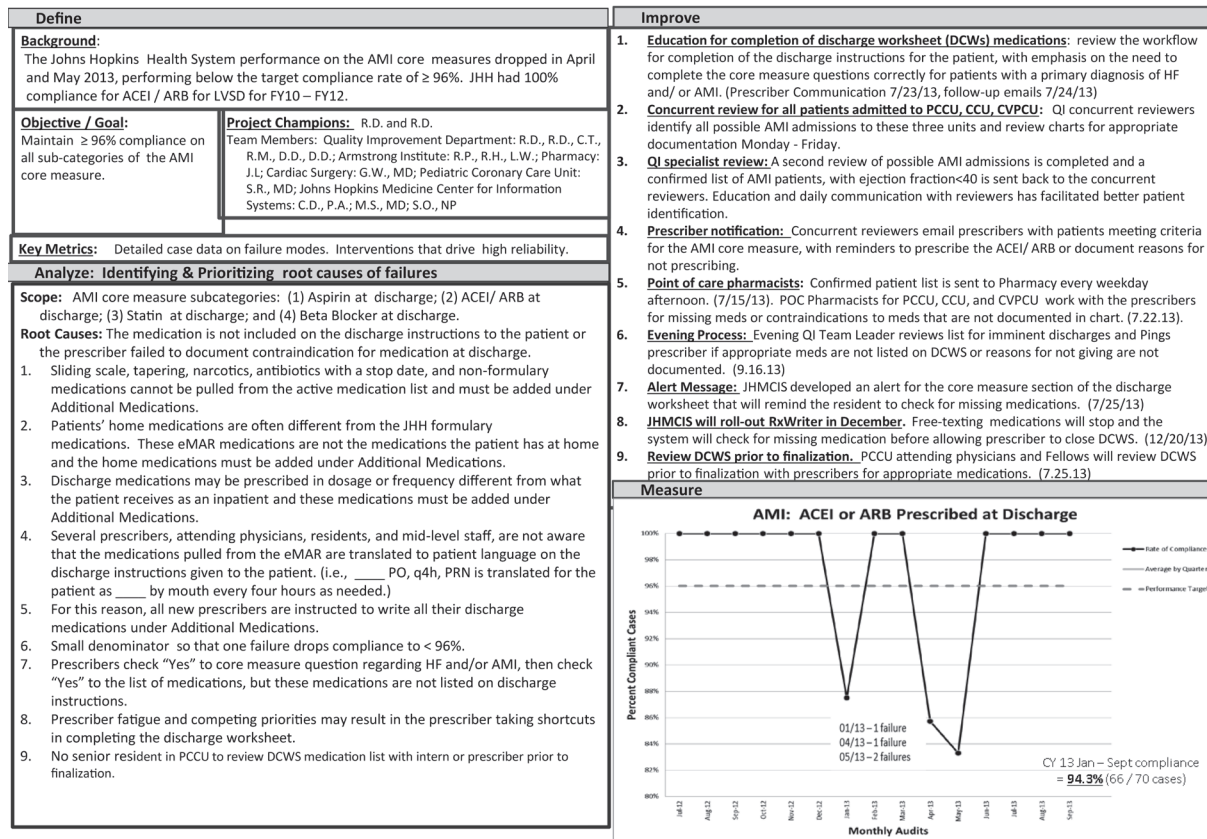


Figure 4. As shown on this A3, the improvement team for the angiotensin-converting enzyme inhibitor (ACEI) or angiotensin receptor blocker (ARB) for acute myocardial infarction (AMI) patients with left ventricular systolic dysfunction (LVSD) measure identified failures at the discharge stage and implemented four main work process changes (described in Sidebar 1) to rectify them. JHH, Johns Hopkins Hospital; FY, fiscal year; PCCU, progressive cardiac care unit; CCU, critical care unit; CVPCU, cardiovascular progressive care unit; eMAR, electronic medication administration record; PO, by mouth; PRN, as needed; POC, point of care. (Available in color in an enlarged version in online article.)

ensuring responsibility for achieving results. Key features of this infrastructure were continuously declaring and communicating goals; creating an enabling infrastructure to manage projects, to support teams and work groups, to establish RPI® skills, and to provide access to data to monitor and track performance; engaging clinicians and connecting them in peer learning communities to influence peer norms; and transparently reporting performance and creating accountability systems with oversight by the JHM Patient Safety and Quality Board Committee. Four other JHHS hospitals participated in this initiative, one of which received the *Top Performer* recognition in 2013 and two others in 2014.⁸ In this work, we entrusted the clinicians who work to deliver care in these systems to achieve high performance on a core measure, respecting their wisdom and deferring to their expertise.^{1,13,14}

After an improvement team was in the sustainability phase, it

continued the work of achieving high reliability and periodically audited performance to ensure patients were appropriately receiving the recommended interventions. When a high-performing measure dropped in the sustainability phase, it was immediately apparent on the dashboard, and the PMO quickly mobilized an improvement team to identify the problem and implement solutions. In the case of the measure monitoring ACE inhibitor or ARB for AMI patients with LVSD, the assigned team returned compliance with this therapy to 100% within the month.

QI has historically had a limited shelf life, with momentum strong early in a project but ending with its completion.¹⁵ However, in the Keystone collaborative in Michigan,¹⁶ for example, improvement researchers provided the interventions to translate evidence-based practices for the prevention of central line-associated bloodstream infections to bedside practice, and front-line clinicians made these interventions part of their daily work.

Results have been sustained for 10 years.¹⁷ An enabling infrastructure, performance measurement, and ongoing accountability—all characteristic of the Michigan experience—were also evident in our own improvement initiative.

An important end goal for QI interventions is to “migrate” them from episodic projects to a permanent way of governing, leading, managing, and organizing work systems. Through the JHM Patient Safety and Quality Board Committee, the Armstrong Institute, faculty members, and hospital staff, we created an enduring infrastructure that supported this migration.⁸ Our investment in this initiative is paying off in improved and sustained performance. Although, in some instances, this meant allocation of resources (for example, concurrent reviewers), and we have not performed a formal return-on-investment analysis, we are confident that this model improved the quality of care delivered to our patients, enhanced financial benefits to the health system, and increased joy and engagement of staff who worked on this effort. The fractal quality management structure populated the hospital with interconnected teams that increased in size and scope, horizontally linking clinicians and units to support learning and vertically linking units, departments, and the hospital to the board to align QI work, exchange information about performance, and support accountability—all to support the transformation into a learning health care system.¹²

We recognize several study limitations. First, our study design lacked a control group, which limits our ability to make causal inferences between the interventions implemented and the results achieved. Second, we studied an academic medical center that has a relatively mature QI infrastructure through the Armstrong Institute, so that our results might not be generalizable to other academic medical centers or to other health systems. Nevertheless, the majority of components that we implemented, such as the governance, leadership, management, and process improvement interventions, are readily available in academic medical centers and health systems. A hospital’s QI department could provide the same role as the Armstrong Institute. In fact, the JHH QI Department provides this support for its hospital. Although the Armstrong Institute has significant resources in patient safety and QI research, this effort drew on few of them. We have, in fact, spoken with several large health systems about how they can replicate the Armstrong Institute’s governance, leadership, and management model in their organizations. Third, our evaluation of improvements in process measures might not translate into improved patient outcomes. Nevertheless, these were accountability measures endorsed by The Joint Commission, supported by evidence, and associated with improved patient outcomes. Fourth, our hospital hired

staff to perform concurrent review, and other hospitals might not have these resources. We do not know how much we would have improved without these resources. Hospitals could implement this model without concurrent reviewers and likely realize improved performance. Moreover, health information technology likely can automate the work done by concurrent reviewers, reducing the costs of this approach. Fifth, we focused on measures linked to accreditation that may therefore be inherently associated with more internal motivations to improve performance. We do not know whether this approach will work with measures of recommended care that are not part of such oversight. Our experiences and learnings, however, suggest that we would achieve comparable results.

Summary

We describe how JHH sustained performance on Joint Commission accountability measures for a second consecutive year. To accomplish this, JHM established a governance to provide oversight and, through the Armstrong Institute, declared and communicated goals, created an enabling and enduring quality management system to sustain performance on these measures, engaged clinicians and connected them in peer learning communities, and transparently reported performance and created accountability systems. We are now applying this framework to other quality and safety measures, enabling QI to make the transition from an isolated project to a way of leading an organization, furthering our journey to become a learning health care system. If this type of approach was broadly applied to other health systems, quality would likely improve. ■

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Figure 3. Sample Johns Hopkins Medicine Safety and Quality Dashboard (color version)

Figure 4. The Johns Hopkins Hospital A3: Acute Myocardial Infarction (AMI) Core Measure Failures (color version)

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Figure 3. Sample Johns Hopkins Medicine Safety and Quality Dashboard

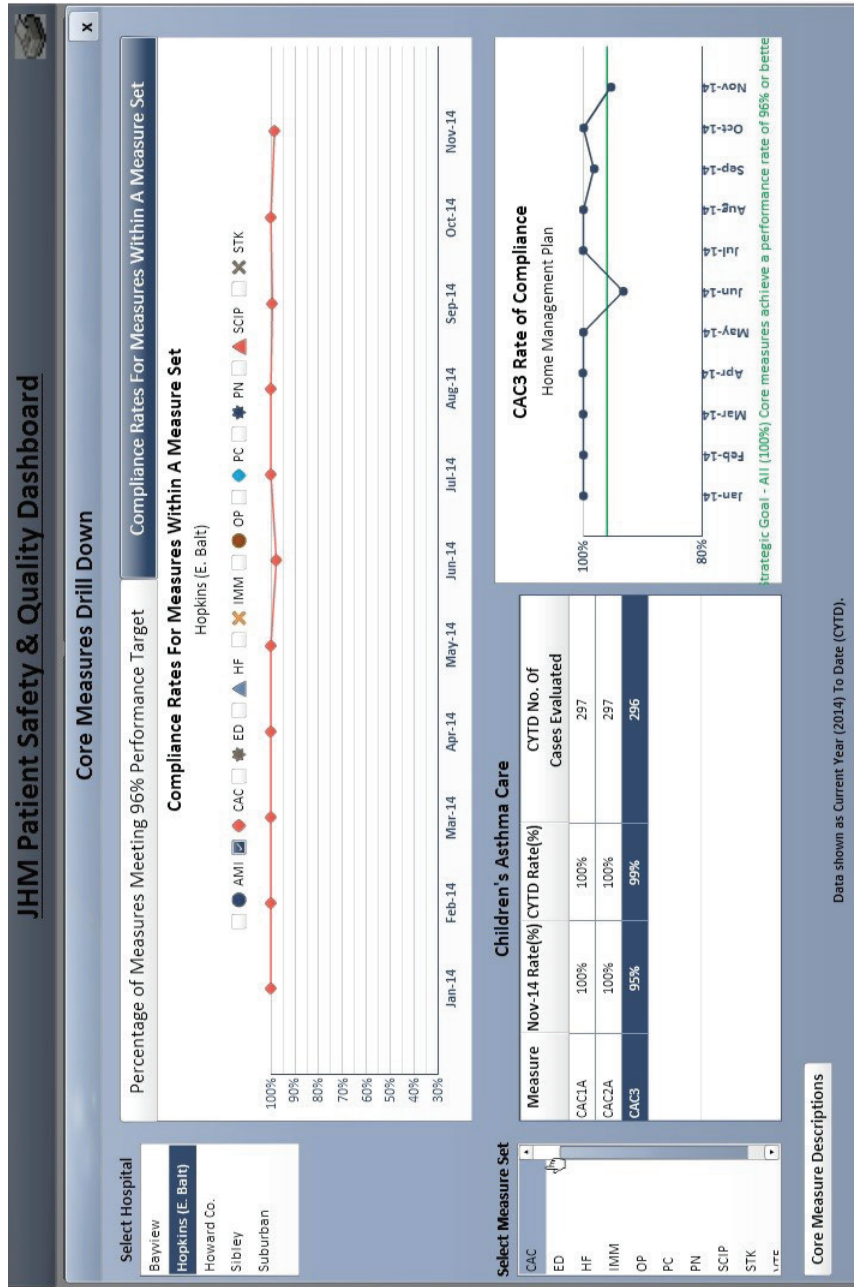


Figure 3. This sample Johns Hopkins Safety and Quality Dashboard depicts a core measure drill-down dashboard for children's asthma care, Hopkins (East Baltimore, January–November 2014), accessible to all employees through the Johns Hopkins Medicine intranet. Performance data are organized by hospital and core measure set and report on the percentage of measures in the set achieving the 96% goal, the aggregate performance on the measures in the measure set, and data reported for individual measures. AMI, acute myocardial infarction; CAC, children's asthma care; ED, emergency department; HF, heart failure; IMM, immunization; OP, outpatient; PC, perinatal care; PN, pneumonia; SCIP, Surgical Care Improvement Project; STK, stroke; CYTD, calendar year to date.

Figure 4. The Johns Hopkins Hospital A3: Acute Myocardial Infarction (AMI) Core Measure Failures

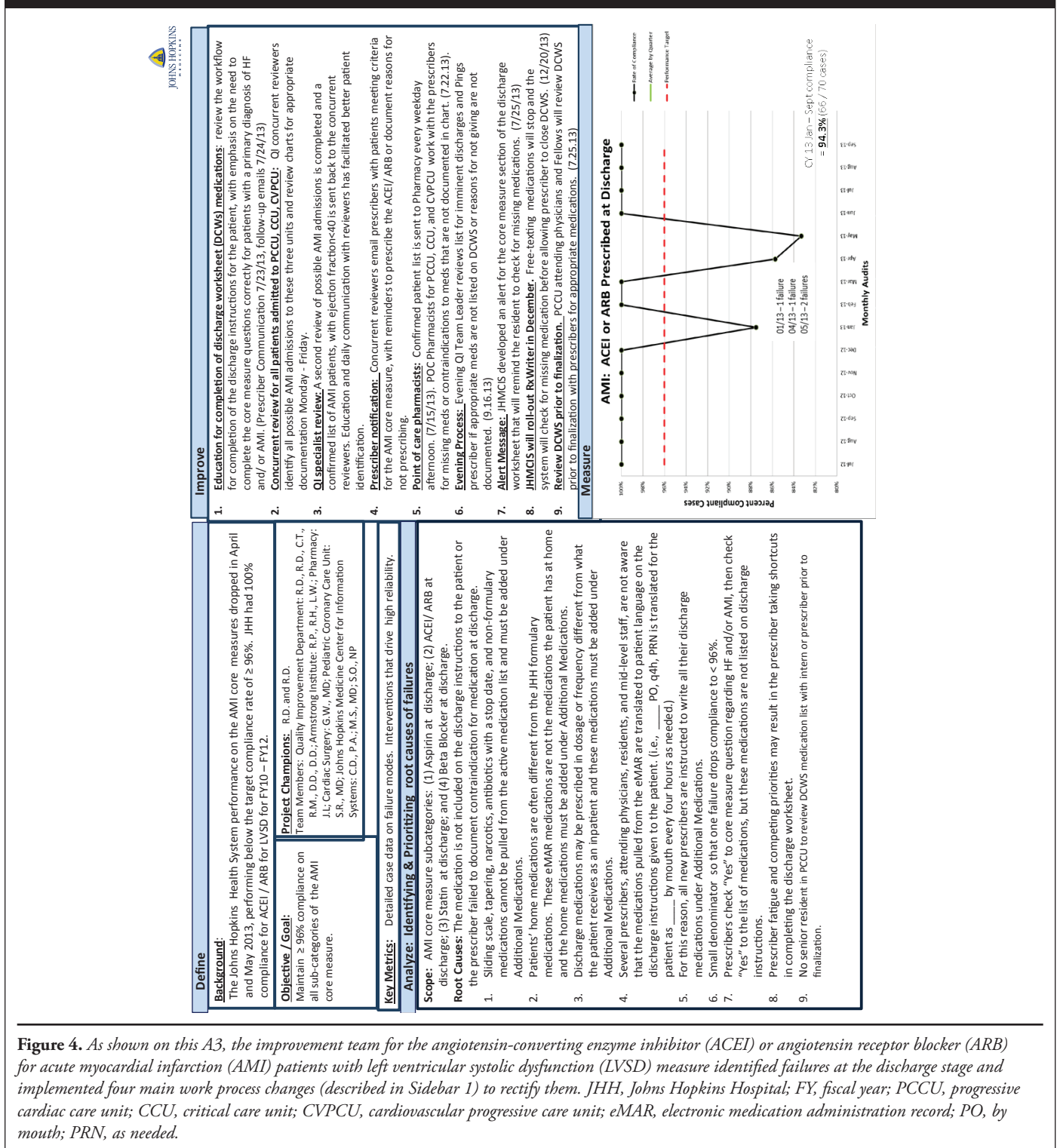


Figure 4. As shown on this A3, the improvement team for the angiotensin-converting enzyme inhibitor (ACEI) or angiotensin receptor blocker (ARB) for acute myocardial infarction (AMI) patients with left ventricular systolic dysfunction (LVSD) measure identified failures at the discharge stage and implemented four main work process changes (described in Sidebar 1) to rectify them. JHH, Johns Hopkins Hospital; FY, fiscal year; PCCU, progressive cardiac care unit; CCU, critical care unit; CVPCU, cardiovascular progressive care unit; eMAR, electronic medication administration record; PO, by mouth; PRN, as needed.