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# Linking Joint Commission inpatient core measures and National Patient Safety Goals with evidence

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As an initiative of Baylor Health Care System's Best Care Committee, we summarized the association between the Joint Commission's hospital core measures/safety goals and patient outcomes. This summary (which will be formatted as a small, laminated card) can be used by change leaders to communicate the relevance of clinical quality goals. By disseminating this evidence broadly, we aim to further invest clinical staff in delivery of specific care processes, maximize care efforts related to core measures, and extend quality improvement efforts within our organization.

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The Joint Commission's core measures serve as a national, standardized performance measurement system providing assessments of care delivered in given focus areas (1–3). The current set of hospital-based Joint Commission core measures represents the results of a stepwise development process including input from multiple stakeholders (clinicians, hospitals, consumers, medical societies), a testing/validation phase, and alignment of patient care indicators among organizations such as the Centers for Medicare and Medicaid Services, Institute for Healthcare Improvement, and National Quality Forum (4–6). To augment the core measures and promote specific improvements in patient safety, the Joint Commission has also issued National Patient Safety Goals (7).

Despite widespread dissemination of the core measures, safety goals, and related quality guidelines, there is significant variation in their application across hospitals (8–13). Reasons for this variance are complex and may include differences in guideline familiarity, provider training, and tools and systems to ensure that recommended care is provided and documented (8). In addition, hospital type, size, and location have been found to correlate with compliance rates (9, 12). Other hospital characteristics such as physician leadership and organizational support also appear to contribute to the consistent use of evidence-based processes of care (14–17).

One factor causing varying compliance with core measures and safety goals may be a lack of awareness of the evidence connecting processes of care to improved outcomes (18). Studies examining compliance with ventilator-associated pneumonia care processes have found that nurses and other providers often had restricted knowledge of the evidence supporting recommended

interventions. Compliance improved after the evidence for these therapies and the potential benefits for patients were communicated to staff members (19, 20).

Recognizing the challenges in undertaking quality improvement within a large, multihospital environment and in response to the 2001 Institute of Medicine report calling for health care delivery that is safe, timely, effective, efficient, equitable, and patient-centered (STEEEP), Baylor Health Care System (BHCS) has developed a systemwide Best Care Committee. This committee oversees the clinical implementation of STEEEP objectives by planning and enacting initiatives to improve the quality and safety of care throughout BHCS (21). In conjunction with efforts of the Best Care Committee, methods for rapid cycle improvement and standardization of health care processes are taught to BHCS personnel in the multisession training program Accelerating Best Care at Baylor (ABC Baylor).

Based on the guiding principles of the Best Care Committee, ABC Baylor, and identified BHCS needs, this article aims to emphasize the evidence link between hospital-based core measures and safety goals as they relate to patient outcomes. The objective in portraying these associations is to create added, perceptible incentives for performance of these care processes and thereby further encourage improved health care quality within our organization. The article is not intended to be a comprehensive review of all aspects of the core measures and safety goals, but rather a readily available summary for use by clinical staff and process change leaders.

## METHODS

Elements from the 2008 Joint Commission hospital core measures (3) and Joint Commission National Patient Safety Goals (7) were selected to develop the summary. Due to the broad nature of some of the chosen National Patient Safety Goals (reduction in health care-associated infections and prompt responses to changes in patient condition), components of the Institute for Healthcare

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Improvement's 5 Million Lives Campaign interventions (for ventilator-associated pneumonia and rapid response teams) (4) were also included to allow evidence mapping to specific care processes. In view of plans to distribute a summary of the results as a 1-page laminated card, the focus was limited to 10 areas felt to be of major importance to hospital-based clinical staff. For each selected area, the authors (AM and KR) conducted electronic searches of the published literature from January 1987 (start date chosen to increase the timeliness and relevance of the references in relationship to the development of core measures) through June 2008 on MEDLINE and the Cochrane Library databases and manually examined reference lists from review articles to identify additional published studies that the electronic searches may have missed. Priority was placed on finding primary source documents or meta-analyses supporting the core measures and safety goals, with a secondary objective of finding summary documents and guideline statements related to specific topics. Supportive evidence was graded according to the US Preventive Services Task Force research classification scheme (*Table 1*).

The evidence promoting the core measure or care process was described in more complete text and then condensed into a tabular format (*Table 2*). In order to facilitate staff comprehension of the linking evidence, articles that originally reported their findings in odds ratios were approximated to percentage reductions or increases in relative event risk (22). For topics where results from multiple well-designed studies were available, a range in risk reduction was reported. Summary documents or societal guidelines for each of the 10 areas addressed in the manuscript appear in *Table 3*.

## RESULTS

Findings from the literature search are presented in expanded and short formats. *Table 2* was constructed to facilitate conversion into pocket-sized reference cards for use by staff.

### Myocardial infarction management

#### *Acute ST elevation myocardial infarcts*

- Percutaneous transluminal coronary angioplasty decreases the risk of death by 15% to 25% compared with thrombolytic drug treatment for acute ST elevation myocardial infarction if angioplasty is performed in <90 minutes after hospital arrival (23).
- Thrombolytics should be administered if necessary. If angioplasty within 90 to 120 minutes is not possible, administration of thrombolytic drugs within 30 minutes after hospital arrival reduces the risk of death by 18% compared with no treatment with thrombolytics (24).

#### *All myocardial infarcts*

- Beta-blockers can reduce the risk of death 13% to 23% in patients without contraindications (e.g., bradycardia, heart block, hypotension). They should be given upon hospital arrival and prescribed at discharge (25, 26).
- Aspirin reduces the risk of a serious vascular event (i.e., stroke, recurrent myocardial infarction, or cardiovascular death) by 20% to 30%. It should be given upon hospital arrival and prescribed at discharge (27).

**Table 1. Evidence grading system: the US Preventive Services Task Force hierarchy of research design**

Level	Explanation
I	Evidence obtained from at least one properly randomized controlled trial or from meta-analyses of multiple randomized controlled trials
II-1	Evidence obtained from well-designed controlled trials without randomization
II-2	Evidence obtained from well-designed cohort or case-control analytic studies, preferably from more than one center or research group
II-3	Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled experiments could also be regarded as this type of evidence (e.g., the results of the introduction of penicillin treatment)
III	Opinions of respected authorities, based on clinical experience, descriptive studies and case reports, or reports of expert committees

- Angiotensin-converting enzyme (ACE) inhibitors reduce the risk of death 10% to 20%. The greatest benefit is seen in patients who have a left ventricular ejection fraction (EF) <40%. ACE inhibitors should be given during the hospital stay and prescribed at discharge (28).
- Smokers who quit after myocardial infarction lower their risk of death (compared with ongoing smokers) by up to 40%. Combined results from 12 studies with 2 to 10 years of follow up indicate that one life is saved for every 13 patients who can stop smoking (29).
- The patient's lipid profile should be assessed and treatment administered if necessary. Lipid therapy (such as a statin drug) reduces the risk of death by 12% to 20% and the risk of recurrent myocardial infarction by 20% to 30% (30).

### Heart failure management

- The strongest evidence for these measures is found in patients with systolic dysfunction and EF <40%.
- Left ventricular EF should be documented. EF results indicate severity of heart failure, help determine treatment, and correlate with mortality and morbidity risk. Measurement of EF is also useful at times of change in clinical status.
- Beta-blockers (e.g., bisoprolol, metoprolol XL, carvedilol) reduce the risk of death by 30% to 35% (31). Note: As of 2009, this has not been officially designated as a core measure despite endorsement by specialty societies and high levels of evidence support.
- ACE inhibitors reduce the risk of death by 15% to 25%. Angiotensin-receptor blockers (ARBs) may be used in patients who are allergic to ACE inhibitors (32).
- Smoking cessation improves heart failure patients' self-reported quality of life (33).
- Discharge instructions with specific information about diet, daily weight measurements, medication use, and detailed follow-up planning reduce the risk of rehospitalization by up to 25% and the risk of mortality by up to 10% (34).

**Table 2. Core measures' and safety goals' level of evidence and impact on patient outcomes**

Core measure/safety goal	Level of evidence*	Impact on patient outcomes†	Core measure/safety goal	Level of evidence*	Impact on patient outcomes†
<b>Myocardial infarction</b>			<b>Central line infection prevention</b>		
PTCA within 90 minutes	I	20% mortality reduction compared with thrombolytics	Central line infection	II-2	15% mortality increase
Timely thrombolytics	I	18% mortality reduction compared with no treatment	Central line bundle¶	II-3	Near elimination of line-associated infections
Beta-blockers	I	18% mortality reduction	<b>Prevention of falls</b>		
Aspirin	I	25% reduction in stroke, myocardial infarction, or death	Multifaceted fall prevention programs**	I	21% reduction in falls
ACE inhibitors if EF <40%	I	20% mortality reduction	<b>DVT prophylaxis</b>		
Smoking cessation	II-2	40% mortality reduction (one life saved for every 13 patients who quit)	DVT	II-2	10% of all hospital deaths (from PE related to DVT)
Lipid therapy	I	16% mortality reduction and 25% reduction in recurrent myocardial infarction	DVT prophylaxis	I	50% reduction in DVT
<b>Heart failure</b>			<b>Medication reconciliation</b>		
Beta-blockers‡	I	33% mortality reduction	Adverse drug events	II-2	Doubling in mortality
ACE inhibitors/ARBs	I	20% mortality reduction	Medication reconciliation	II-3	75% reduction in medication errors and drug discrepancy–related adverse drug events
Smoking cessation	II-2	Improved quality of life	<b>Rapid response team</b>		
Discharge education	I	10% mortality reduction, 25% reduction in readmission	Rapid response team	II-3	40% reduction in cardiac arrests
<b>Community-acquired pneumonia</b>			<b>Care coordination/discharge planning</b>		
Timely antibiotics	II-2	15% mortality reduction	Multidisciplinary care coordination	II-2	1.5-day LOS reduction, reduced readmission rate
Blood cultures prior to first antibiotics	II-2	40% of cases of severe pneumonia antibiotic selection adjusted based on blood culture results	*Level of evidence describes the type of study supporting the core measure (see Table 1). Level 1 evidence is generally from randomized, controlled trials; level 2 studies are usually observational or retrospective. In many cases, it is not practical to generate level 1 evidence (e.g., it would be unethical to randomize heart disease patients to a study arm that requires smoking).		
Smoking cessation	II-2	50% reduction in individual's risk of developing pneumonia	†Reported in terms of relative risk change or time (sedation vacation, care coordination). For items associated with ranges of relative risk change, an average is reported to preserve the intent of use as a quick reference.		
Pneumovax	II-2	40% reduction in pneumococcal pneumonia	‡Recommended practice in congestive heart failure patients with depressed EF <40%. This has not been officially designated as a core measure yet despite endorsement from specialty societies and high levels of supportive evidence showing a mortality benefit.		
Flu vaccination	II-2	50% reduction in pneumonia, hospitalization, or death	§Surgical site infection bundle includes appropriate selection and timing of antibiotic administration and discontinuation, avoidance of hyperglycemia, and appropriate hair removal.		
<b>Ventilator-associated pneumonia prevention</b>			¶Central line bundle includes handwashing, use of full barrier precautions during central venous catheter insertions, chlorhexidine skin antisepsis, optimal line site selection, and removal of unnecessary central lines.		
Ventilator-associated pneumonia	II-2	30% increase in mortality	**Fall prevention programs involve medication adjustment of predisposing drug classes, scheduled mobilization and toileting, balance and gait training, and use of bed rails.		
45° bed tilting	I	70% reduction in ventilator-associated pneumonia	PTCA indicates percutaneous transluminal coronary angioplasty; ACE, angiotensin-converting enzyme; EF, ejection fraction; ARB, angiotensin-receptor blockers; PPI, proton pump inhibitor; DVT, deep vein thrombosis; PE, pulmonary embolism; LOS, length of stay.		
H2 blockers or PPIs	I	50% reduction in upper gastrointestinal bleed			
DVT prophylaxis	I	50% reduction in DVT			
Sedation vacation	I	2-day reduction in mechanical ventilation			
<b>Surgical site infection prevention</b>					
Surgical infection	II-2	Doubling in mortality			
Hair shaving	I	Doubling of surgical infections			
Poor glucose control	II-2	Doubling of surgical infections			
Surgical site infection bundle§	II-3	27% reduction in surgical infections			

**Pneumonia management**

*Community-acquired pneumonia*

- Timely antibiotics should be administered. Antibiotic administration within 4 hours of a patient's arrival to the hospital has been associated with a 15% lower risk of mortality

(35); administering antibiotics within 6 hours may avoid unnecessary treatment of patients with suspected pneumonia who ultimately receive a different diagnosis without adversely impacting outcomes (36, 37).

**Table 3. Evidence summaries and practice guidelines for inpatient core measures and safety goals**

Area	Summary and guideline articles
Myocardial infarction management	2007 focused update of the ACC/AHA 2004 guidelines for the management of patients with ST-elevation myocardial infarction <i>Circulation</i> 2008;117:296–329
	ACC/AHA guidelines for the management of patients with ST-elevation myocardial infarction <i>J Am Coll Cardiol</i> 2004;44:E1–E211
	ACC/AHA 2002 guideline update for the management of patients with unstable angina and non-ST-segment elevation myocardial infarction <i>J Am Coll Cardiol</i> 2002;40:1366–1374
Congestive heart failure management	ACC/AHA 2005 guideline update for the diagnosis and management of chronic heart failure in the adult <i>J Am Coll Cardiol</i> 2005;46:e1–e82
Community-acquired pneumonia management	Infectious Diseases Society of America/American Thoracic Society consensus guidelines on the management of community-acquired pneumonia in adults <i>Clin Infect Dis</i> 2007;44:S27–S72
	Practice guidelines for the management of community-acquired pneumonia <i>Clin Infect Dis</i> 2000;31:347–382
	Update of practice guidelines for the management of community-acquired pneumonia in immunocompetent adults <i>Clin Infect Dis</i> 2003;37:1405–1433
	American Thoracic Society Guidelines for the management of adults with community-acquired pneumonia: diagnosis, assessment of severity, antimicrobial therapy, and prevention <i>Am J Respir Crit Care Med</i> 2001;163:1730–1754
Ventilator-associated pneumonia prevention bundle	Evidence-based clinical practice guideline for the prevention of ventilator-associated pneumonia <i>Ann Intern Med</i> 2004;141:305–313
Surgical site infection prevention	Guideline for prevention of surgical site infection, 1999 <i>Infect Control Hosp Epidemiol</i> 1999;20:250–278
	Hospitals collaborate to decrease surgical site infections <i>Am J Surg</i> 2005;190:9–15
Prevention of central line-associated blood-stream infection	Guidelines for the prevention of intravascular catheter-related infections <i>MMWR Morb Mortal Wkly Rep</i> 2002;51:1–29
Prevention of falls	Guideline for the prevention of falls in older persons <i>J Am Geriatr Soc</i> 2001;49:664–672
Deep vein thrombosis prophylaxis	Prevention of venous thromboembolism: the seventh ACCP Conference on antithrombotic and thrombolytic therapy <i>Chest</i> 2004;126:338–400
Medication reconciliation and prevention of adverse drug events	<i>Reducing Adverse Drug Events</i> Boston: Institute for Healthcare Improvement, 1998
	Frequency, type and clinical importance of medication history errors at admission to hospital: a systematic review <i>CMAJ</i> 2005;173:510–515
Rapid response team utilization	<i>Move Your Dot: Measuring, Evaluating, and Reducing Hospital Mortality Rates</i> Boston: Institute for Healthcare Improvement, 2003
	Findings of the first consensus conference on medical emergency teams <i>Crit Care Med</i> 2006;34:2463–2478
Transitional care planning	Discharge planning from hospital to home <i>Cochrane Database Syst Rev</i> 2004;(1):CD000313
	Written and verbal information versus verbal information only for patients being discharged from acute hospital settings to home <i>Cochrane Database Syst Rev</i> 2003;CD003716

- Oxygenation should be assessed with pulse oximetry or arterial blood gas. It is difficult to determine hypoxemia based only on history and clinical examination since 10% of hypoxemic patients have no signs or symptoms. Hypoxemia (saturation of <92% or a decrease in baseline saturation of >3%) may indicate a more severe pneumonia (38).
  - Blood cultures should be performed before administering the first dose of antibiotic. Microbiology testing can lead to a change in antibiotic therapy in up to 40% of patients with severe pneumonia (39).
  - Guideline-recommended antibiotics can reduce the risk of death from pneumonia up to 30% compared with non-guideline-recommended antibiotics and are more likely to be given in a timely manner (40).
  - Smoking cessation counseling should be provided. Smokers are 2 to 3 times more likely to get pneumonia than non-smokers and are at risk of more severe disease (41).
  - Pneumonia vaccination should be administered to patients meeting criteria. The pneumonia vaccine is 40% effective in preventing pneumonia in high-risk patients. Vaccinated patients who develop pneumonia have a reduced risk of death and bacteremia, as well as shorter hospitalizations (42, 43).
  - Influenza vaccination should be administered to patients meeting criteria. There is a 50% reduction in the rate of pneumonia, hospitalization, or death in patients receiving influenza vaccination (44).
- Ventilator-associated pneumonia prevention bundle*
- Intubated patients who develop ventilator-associated pneumonia have a 30% higher risk of death (45).
  - Elevating the head of the bed 30 to 45 degrees reduces the risk of developing ventilator-associated pneumonia by 70% (46).
  - Peptic ulcer disease prophylaxis (with an H2 blocker or proton pump inhibitor) in at-risk critically ill (mechanical ventilation, coagulopathy) patients reduces the incidence of upper gastrointestinal bleeding by up to 50% (47, 48).

- It is estimated that 10% to 35% of intensive care unit patients develop deep vein thrombosis (DVT) (49). Pharmacologic prophylaxis can reduce the risk of DVT by 50% (50).
- Daily interruption of sedation/awakening trials can reduce the length of mechanical ventilation by up to 2 days (51).

### Surgical site infection prevention

- Surgical site infections account for 15% of all hospital-acquired infections (52); in addition, patients who develop surgical site infections are twice as likely to die as other surgical patients (53).
- Preoperative antibiotics given within 1 hour of incision optimize drug levels in the tissues and are more effective than prophylactic antibiotics administered during or after the operation (54–56).
- Appropriately chosen antibiotics provide effective protection against bacteria common at surgical sites without giving excessively broad coverage (54, 57).
- Antibiotics should be discontinued within 24 hours postoperatively. Longer durations of antibiotics have been shown to offer no benefit and may increase a patient's risk of developing resistant bacteria (54, 58).
- Glucose levels should be controlled. The incidence of surgical site infection increases 2 to 3 times with worsening hyperglycemia (59).
- Hair should be removed by clipping. The rate of surgical site infection is twice as high when hair is removed by shaving instead of clipping (60).
- When these measures are performed in combination (as the "SCIP bundle"), they can reduce the overall incidence of surgical site infections at individual hospitals by 27% (61).

### Prevention of central line–associated bloodstream infection

- There is a 5% to 20% risk of death in patients who develop a catheter-related bloodstream infection, as well as associated increases in cost and length of hospitalization (62, 63).
- Implementation of the multistep central line bundle (including evidence-based infection control guidelines for hand-washing, use of full-barrier precautions during the insertion of central venous catheters, chlorhexidine skin antiseptics, optimal site selection, and removal of unnecessary central lines) can nearly eliminate catheter-related bloodstream infections (64, 65).

### Prevention of falls

- Falls account for up to 70% of inpatient accidents (66), can lead to severe injury, and are associated with increases in length of stay and cost (67).
- Risks for falls include gait/balance deficit, confusion, use of psychotropic medications, use of diabetes medications, "up with assistance" activity orders, and increased patient-to-nurse ratio (68).
- More than half of falls occur with attempts at bladder or bowel voiding (68).

- Multifaceted fall prevention programs involving medication adjustment of predisposing drug classes, scheduled mobilization/toileting, balance/gait training, and use of bed rails can reduce fall risk by as much as 21% (69).

### DVT prophylaxis

- DVT occurs in 10% to 40% of hospitalized patients who do not receive prophylaxis. Patients with risk factors (e.g., malignancy, immobility, pelvic surgery, joint replacement, previous DVT, hypercoagulable state) have a higher incidence of DVTs (70, 71).
- Pulmonary embolism can be a fatal complication of DVT. Up to 10% of in-hospital deaths are attributable to pulmonary embolism (72).
- Pharmacologic prophylaxis can reduce a hospitalized patient's risk of developing a DVT by 40% to 60% (73, 74).
- Compression devices are recommended as the sole method of prophylaxis only in those patients who have a contraindication to pharmacologic prophylaxis (such as high bleeding risk) (75).

### Medication reconciliation and prevention of adverse drug events

- Adverse drug events in hospitalized patients are associated with nearly twofold increases in mortality and length of stay (76).
- Medication errors are estimated to account for over 7000 annual nationwide deaths (77).
- Approximately 50% of medication errors occur at times of transitions in care (i.e., admission, transfer, discharge) (78, 79).
- Medication reconciliation done consistently at all stages of care can reduce 70% to 80% of medication errors and up to 75% of drug discrepancy–related adverse drug events (80–83).

### Rapid response team use

- Most patients who have cardiac arrest show identifiable signs of deterioration (e.g., abnormal vital signs, hypoxemia, change in mental status) prior to the event (84–86).
- Only 17% of patients experiencing cardiac arrests survive to discharge (87).
- Implementation of a rapid response team can reduce the rate of cardiac arrest by 20% to 50% (88–91).
- For unstable patients at risk of cardiac arrest, resuscitative care can be delivered more quickly and effectively in critical care units (92).

### Transitional care planning

- With transitional care planning, the risk of readmission is reduced by one third (93).
- Multidisciplinary care coordination improves patient satisfaction, postdischarge quality of life, and communication with the outpatient practitioner and may shorten length of stay by 1 to 2 days (94–97).

## DISCUSSION

The supportive evidence given for core measures and selected safety goals is meant to facilitate delivery of evidence-based practices to the bedside. Extensive text-based and electronic research resources are often not utilized by busy clinicians who are engaged in real-time decision making (98–100). The reference card being developed to summarize the results presented in this article addresses the issue of accessibility to evidence without impeding workflow. It is also amenable for use during discussions between staff and individual patients regarding the reasoning behind certain aspects of care.

Targeting heightened compliance with core measures and safety goals as an isolated objective in the absence of more wide-ranging improvements in inpatient care processes and staff education appears to have limited benefit and in some cases can result in undesirable consequences. For instance, in a sample of 86 patients with discharge diagnoses of pneumonia, Metersky et al found that approximately 20% of these cases had atypical presentations (lack of infiltrate on chest x-ray, normal oximetry) that would be potential valid reasons for delays in antibiotic administration (101). Given this diagnostic uncertainty, rewarding 100% adherence to antibiotic delivery within 6 hours to all patients with suspected pneumonia may lead to inappropriate use of antibiotics and divert scarce resources from those who are more acutely ill (36, 101). Thus, efforts to drive performance of this core measure need to be concurrent with care pathways that include prompt diagnostic workup, disease recognition, and appropriate treatment. BHCS has undertaken a systemwide endeavor to operationalize such protocols (21, 102). Clinicians may be motivated to comply with these practices if they are educated about the usefulness of the interventions and believe they will improve patient outcomes (20, 103, 104). Pay-for-performance programs and public reporting related to core measures and safety goals add further incentives for adherence. As a type of clinical decision support, the summary card to be developed from this article can aid delivery of these care processes directly to patients.

The inconsistent relationships among core measures, safety goals, and outcomes in larger populations on recent retrospective analyses do not undermine their importance. Investigators have found varying correlations between compliance with acute myocardial infarction care guidelines and short-term outcomes, with Bradley et al demonstrating that delivering the composite bundle of acute myocardial infarction core measures accounted for only 6% of the hospital-level variation in risk-standardized 30-day mortality rates (12, 104). Likewise, Fonarow et al demonstrated that only one congestive heart failure core measure (ACE inhibitor or ARB for left ventricular systolic dysfunction at hospital discharge) was associated with a reduction in combined risk of mortality/rehospitalization at 60 or 90 days; only beta-blocker use at discharge (not currently a congestive heart failure core measure) was associated with both reduced risk of mortality and reduced risk of mortality/rehospitalization at 60 or 90 days (105). Multiple factors may account for the limited correlations between core measures and short-term mortality. Most of the core measures were selected to improve

long-term outcomes, and their benefit may not be immediately captured. As inpatient care becomes increasingly complex, there are a number of issues contributing to mortality that cannot be addressed well by core measures (e.g., frailty, underlying comorbidities). Lastly, although a core measure such as congestive heart failure discharge education may be identified as having been completed, it does not necessarily follow that the patient understands these instructions in a meaningful way that would prevent rehospitalization (106). We believe that our summary of the evidence highlights the potential benefits of the core measures and safety goals for individual patients while providing stimulus to avoid perfunctory performance of these interventions, particularly those involving patient education.

Our approach to this summary had several limitations. Since we planned to prepare a synopsis of the evidence on a pocket-sized card, we could not list all of the hospital-based core measures or safety goals. We are planning to put a dynamic version of the pocket-sized card on the BHCS website; users will be able to pull specific areas of interest, and we will be able to update and revise the information based on Joint Commission and system priorities. As odds ratios and absolute risk reductions can be difficult to interpret and apply in real time, we approximated these data into percentage relative risk change, which may oversimplify some of the relationships between care processes and outcomes. To address this limitation, a curriculum is in development for a brief training session (2–4 hours) designed to help BHCS clinical staff better interpret statistical descriptions in the literature. Although the pocket-sized summary tool is portable and readily available, it will still require a brief roll out and introduction process to promote successful uptake within BHCS. Finally, successful performance of a core measure or safety goal is driven by many factors that this tool alone would not be able to address (e.g., delayed antibiotic administration in pneumonia due to issues of drug availability). As such, an objective evaluation of the tool's direct impact on the performance of specific core measures in a pre- and post-implementation design would be difficult. This reference tool is best viewed as a method of clinical decision support to be incorporated with other quality improvement efforts.

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