Protocols, Prompters, Bundles, Checklists, and Triggers: *Synopsis of a Preventable Mortality Reduction Strategy*

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In this article...

Take a look at the many patient safety checklists and protocols that are being used by more and more health care organizations.

Preventable mortality has become a prevailing headache for most hospitals. In 2007, the Centers for Medicare & Medicaid Services (CMS) began reporting 30-day mortality on its Hospital Compare for acute myocardial infarction (AMI) and heart failure (HF).

In 2008, CMS added mortality rates for pneumonia (PN) and now classifies hospitals as "better," "no different," or "worse" on its website.

In 2009, HealthGrades reviewed 41 million CMS hospitalizations over the years 2004 to 2006 at the nation's approximately 5,000 hospitals. They found that 152,666 lives may have been saved and 11,772 major complications avoided during the years studied.

Attempts to reduce avoidable patient deaths (preventable defects) must rest with the desire to embrace hospital mortality as a priority and an urgent systems level aim. Only when leaders realize what is permitted is what is promoted, compliance would replace complacency and zero preventable deaths would be attainable.

The logical place to build improvement would be through an executable strategy that targets certain leverage points (Table 1). The leverage points are evidence-based solutions like The Joint Commission's national patient safety goals (NPSG) and CMS core measures. They also include prevention of healthcare-associated infections (HAI), CMS "never events," and adverse drug events (ADE).

This approach involves re-engineering of systems of care, process standardization, physician alignment, and coalitions of high-performance, transformation teams. Each

Table 1: Tools and Tactics of Avoidable Mortality Reduction

Leverage Point		Tactic	
1	National Patient Safety Goals	Protocols	To address who does it? When? Where? How is it validated?
2	Core Measures	Prompters	Standardized order sets, progress notes prompting required documentation.
3	Hospital-Acquired Infections, Sepsis	Bundles	Small, straightforward sets to mistake-proof and support standardized work.
4	"Never Events" Unnecessary Blood Transfusions, Glycemic Control, Surgical complications	Checklists	To address sequence, timing and location of value-added steps.
5	Adverse Drug Events	Triggers	Computerized algorithms/ list of clues.

Figure 1.

The Joint Commission's National Patient Safety Goals	
Goal 1	Improve the accuracy of patient identification
Goal 2	Improve the effectiveness of communication among caregivers
Goal 3	Improve the safety of using medications
Goal 7	Reduce the risk of health care-associated infections
Goal 8	Accurately and completely reconcile medications across the continuum of care
Goal 9	Reduce the risk of patient harm resulting from falls
Goal 10	Reduce the risk of influenza and pneumococcal disease in older adults
Goal 11	Reduce the risk of surgical fires
Goal 13	Encourage patients' active involvement in their own care as a safety strategy
Goal 14	Prevent health care-associated pressure ulcers
Goal 15	Identify safety risks inherent in the organization's patient population
Goal 16	Improve recognition and response in a patient's condition
Universal Protocol	Prevent wrong person, wrong site, wrong procedure surgery

of these leverage points is an individual measure that by itself reduces mortality, but when used together they work in a synergistic manner to have a more profound effect.

For example, deaths from sepsis can be reduced by the NPSGs alone, but adding the core measures offers a more comprehensive tactic.

National patient safety goals

The Joint Commission's NPSGs highlight certain problematic areas in health care and offer expert-based solutions to them. The 2009 goals themselves are requirements that focus on system-wide issues that directly contribute to mortality (Figure 1).

To get the maximum benefit of the NPSGs requires must do protocols rather than should do guidelines. Indeed, even The Joint Commission recommends protocols for prevention of pneumococcal and influenza infections as well other HAIs.

Figure 2. Protocol for NPSG

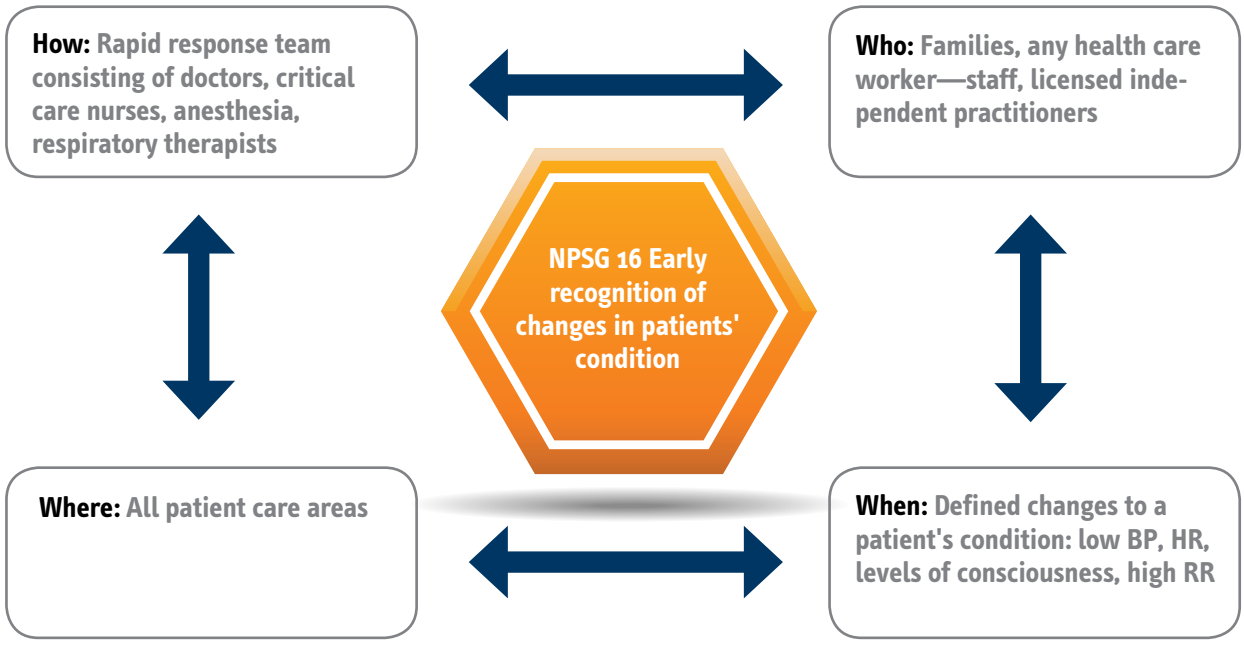

Figure 3. CMS Core Measures.

AMI	Aspirin at arrival and discharge
	ACEI or ARB for LVSD
	Beta blocker at arrival and discharge
	Fibrinolytic therapy received within 30 minutes of hospital arrival
	Primary PCI received within 90 minutes of hospital arrival
	Inpatient mortality
HF	Discharge instructions
	LVF Assessment
	ACEI or ARB for LVSD
PN	Pneumococcal vaccination
	Blood cultures performed within 24 hours after arrival
	Blood cultures performed in the ED prior to initial antibiotics
	Initial antibiotic received within 4 hours of hospital arrival
	Influenza vaccination
SCIP	Prophylactic antibiotic timing
	Prophylactic antibiotic selection/discontinuation
	Cardiac surgery patients with controlled 6am postoperative blood glucose
	Approriate hair removal
	Colorectal surgery patients with immediate postoperative normothermia
	Beta-blocker therapy prior to admission received a beta-blocker during the perioperavie period
	Venous thromboembolism (VTE) prophylaxis ordered/reveived

These protocols should address who, when, where, and how for every NPSG. For example, NPSG 16 deals with timely recognition and intervention of declining patient's condition.

It has been shown that earlier detection (within six hours) of a patient's deteriorating condition can decrease mortality due to timelier medical interventions. Early recognition of pre-morbid conditions like a 30 percent increase in the heart rate, or 30 percent decrease in the blood pressure, or depressed level of consciousness can trigger an alarm and circumvent a "failure to rescue."

An effective tactic to use for this NPSG requires a protocol (Figure 2). Similar protocols should be planned, developed, tested, and implemented for each NPSG. Teams should monitor compliance for each protocol and intervene when there is special cause variation.

Core measures

While CMS core measures are nationally accepted performance measures that are being used to track hospital mortality rates, they can also be recruited as potent tools to decrease avoidable hospital deaths in HF, AMI, and PN (Figure 3).

According to HealthGrades, hospitals in the top quartile of performance of core measures had 11 percent lower mortality for AMI, 7 percent lower for HF, 15 percent lower for PN, and 8 percent lower for surgery (SCIP).

A technique to get the most of the core measures is to concurrently embed them into routine clinical workflow by way of prompters. These prompters are no more than strategically placed physician order entry sets (Table 2).

Placement of prompters while patients are still in the hospital can augment uniform documentation during stay, and act as standardized order sets at admission/discharge. They can also be used to educate front liners, thus allowing ownership of care processes.

Health care-associated infections

Certain hospital-acquired infections contribute directly to mortality (Figure 4).

The Centers for Disease Control and Prevention (CDC) estimates that nearly two million patients (5-10 percent of hospitalized patients) experience an HAI each year, leading to almost 100,000 deaths and $4.5 to $6.5 billion in extra costs.

A number of factors contribute to this problem, including increasing rates of antimicrobial resistance, progressively more complex medical procedures, and invasive medical technology that place patients at risk for procedure-or device-related infections.

It has been shown that sepsis alone accounts for close to 30-50 percent of inhospital mortalities. When shock is present, mortality is even higher, at 50-60 percent.

Table 2. Prompter for Core Measure.

AMI PROMPTER		
THE PATIENT HAS THE DIAGNOSIS OF CHEST PAIN OR ACUTE MI.		
Additional Documentation/Orders Are Needed		
❑	LVEF needs to be documented or ECHO needs to be ordered to assess left ventricular function.	
❑	ACE/ARB needs to be ordered.	Your patient's Ejection Fraction is _____. *If this is not possible, please document in the chart why these drugs are not indicated.*
❑	Lipid Panel needs to be ordered for this patient.	If you have checked this patient's lipids as an outpatient, please document the results in the medical record.
❑	Lipid-lowering agent is indicated for this patient.	Your patient's LDL/Cholesterol level is_____. *If contraindicated, please document the reason in the chart.*
❑	ASA is indicated for this patient.	*If contraindicated, please document the reason in the chart.*
❑	Beta-blocker is indicated for this patient.	*If contraindicated, please document the reason in the chart.*

Tackling HAIs requires "a group of interventions related to a disease process that, when executed together, result in better outcomes than when implemented individually."[2] That is what the Institute of Healthcare Initiatives (IHI) bundles are about (Table 3). They ensure that the treatment approach is consistent every time.

Take the sepsis bundle; it involves measurement of serum lactate, blood cultures prior to antibiotics, antibiotics within three hours, and aggressive treatment of hypotension with fluids and vasopressors. There are also other examples of bundles to prevent central line infections, ventilator pneumonias, and urinary tract infections.

Never events

In 2002, the National Quality Forum (NQF) identified 27 adverse "Never Events," which are preventable mistakes that are so serious they should never happen. In 2008, CMS incorporated selected measures into its list of Hospital-Acquired Conditions, which accounted for $9.3 billion in excess charges and 32,600 preventable deaths (Figure 5).

Figure 4 Health Care-Associated Infections

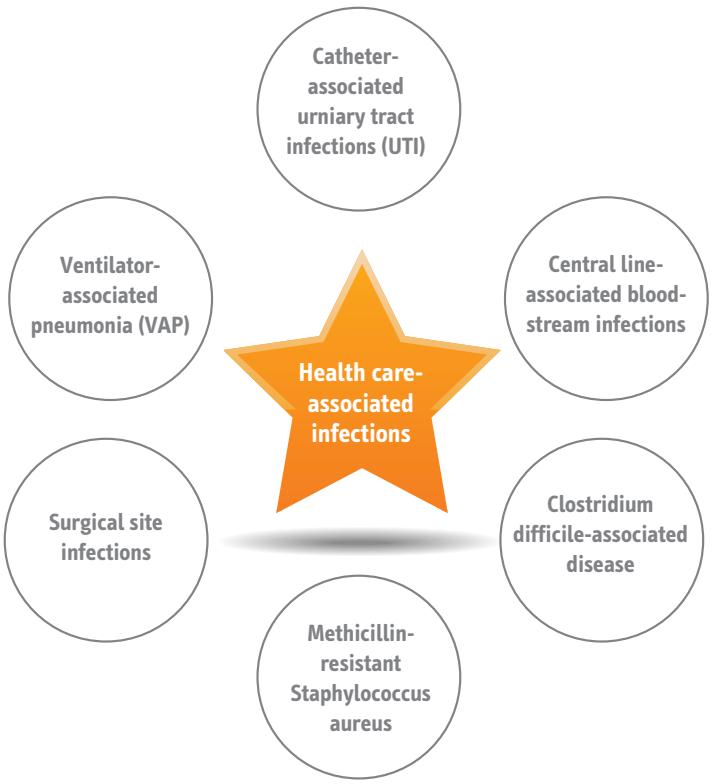

Table 3. Bundles for HAIs

*VAP Bundle	*Central Line Bundle	*Sepsis Bundle	#UTI Bundle
30 degree HOB	CDC hand hygiene	CDC hand hygiene	CDC hand hygiene
Sedation holidays	2 percent chlorohexidine for skin prep	Fluids/vasopressors to maintain blood pressure	Sterile catheter insertion
PUD prophylaxis	Avoidance of groin lines	Timely blood cultures and antibiotics	Secure and maintain a closed system
DVT prophylaxis	Use of caps, face mask, gowns, drapes	Low-dose steroids	Perineal care
Constant assessment to extubate	Daily review of catheter need, and earliest removal	Tight glycemic control with insulin drips	Daily review of catheter need, and earliest removal

*Adapted from IHI # By the author

To prevent aviation disasters, pilots successfully use checklists to verify that several critical procedural elements are correctly accomplished. Borrowing from the airline industry, checklists can help decrease mortality from falls, pressure ulcers, wrong person, wrong site, and wrong procedure surgeries.

For example, patient falls are high-risk, high-volume, and carry a high mortality rate (hip fractures have 24 percent mortality within a year). A checklist in the form of an easy to remember mnemonic can serve as a successful mitigation strategy.

Use of the easy-to-remember "DON'T SPLAT" can help focus the falls assessment for vulnerable patients and initiate prevention steps. There are also similar mnemonics for wrong surgeries like "I AM FOR SAFETY" and decubitus prevention like "SAFE SKIN" (Table 4).

Adverse drug events

Per the Agency for Healthcare Research and Quality (AHRQ), over 770,000 people are injured or die each year in hospitals from adverse drug events (ADE), which cost up to $5.6 million each year per hospital.

This estimate does not include ADEs causing admissions, malpractice and litigation costs, or the costs of injuries to patients. National hospital expenses to treat patients who suffer ADEs are estimated at between $1.56 billion and $5.6 billion annually.

About 42 to 60 percent of ADEs are due to excessive drug dosage for the patient's age, weight, underlying condition, and renal function.[3] Further, ADEs can be prevented by identifying process gaps in the medication management system (Figure 6). These gaps could be present at computerized provider order entry (CPOE), automated dispensing cabinets (ADC), and coding or RFID (radio frequency identification).

A common technique that has been used to identify and prevent ADEs is triggers. Triggers are a list of metrics that can detect ADEs through medication interactions, incorrect medication dosages for the patient's age or weight, inappropriate dosage frequencies, and patient allergies.

Algorithms can be programmed within computer systems to cross-check databases containing patient information such as demographics, physicians' orders, drug allergies, as well as radiology and lab results. Computerized surveillance can prompt pharmacy to initiate interventions to mitigate and lessen the severity of any reactions.

In the absence of computerized scrutiny, a manual trigger can be used as an adaptable sampling technique as part of a retrospective tool to identify causes of drug reactions.[4] An example is the IHI trigger tool, which is a list of predetermined clues that can be applied to a random sample of hospital charts to review discharge summaries, physicians' orders, and laboratory values.

When a trigger is discovered, the pertinent part of the chart is explored to see if an ADE has occurred (Table 5).

Monitoring and managing

Following successful implementation of the strategy, all hospital mortalities should be reviewed from a systems perspective using the "failure tally." It should be performed as part of a root cause analysis to identify factors contributing to poor performance.

The review must focus on any of the causes ("failure to anticipate," "failure to activate," and "failure to resuscitate") that led to delayed, omitted, or inappropriate treatments (Table 6).

Any of the failures should be monitored through multidisciplinary rounds, informally called "huddles." These huddles translate into discussion of absence of important aspects of care for ICU patients with intensivists, social work-

ers, case managers, technicians, nurses, and senior leaders.

- Examples of "failure to anticipate" include failure to apply the protocols, prompters, bundles, and checklists in situations of high probability.
- Examples of "failure to activate" involve lack of utilization of the tools, even after a specific condition or diagnosis has been made.
- Examples of "failure to resuscitate" include lack of effective use of the tools when the required condition is present.

For avoidable mortality reduction to be sustainable, areas of noncompliance should be identified, rectified, and tracked as performance reports. Only then would the goal of zero preventable mortality become a reality.

Figure 5. Current Never Events

Surgical Events	Foreign object left in patient after surgery
	Surgery on wrong patient
	Surgery on wrong body part
	Wrong surgery on a patient
Product or Device Events	Death/diability associated with intravascular air embolisim
Care Management Events	Death/disability associated with incompatible blood
	Death/disability associated with hypoglycemia
	Stage 3 or 4 pressure ulcers after admission
Environment Events	Death/disability associated with electric shock
	Death/disability associated with a burn incurred within facility
	Death/disability associated with a fall within facility

Table 4. Checklists for Never Events

#FALLS "DON'T SPLAT"	*SAFE SURGERY"I AM FOR SAFETY"	#DECUBITUS"SAFE SKIN"
Diuretics use	Identifiers X 2	Skin inspection
Orient patient to setting	Allergies	Assess Braden scale
Non-skid footwear	Medication reconciliation	Friction reduction padding
Trauma alert-post falls signs	Fasting status	Educate patients and families
Side rails up	Oxygen pulse ox	Standardized beds, mattresses
Position change alarms	Risk of >500ml blood loss?	Keep pressure off prominence
Lowest bed position	Site markings	Incontinence care
Activate bed alarms	Anesthesia airway risk	Nutritional screen, prealbumin
Teach patients and families	Fluids and antibiotics started	
	Equipment available?	
	Timeout pause	
	Yield of final count, specimen	

*Adapted from WHO checklist #By the author

Figure 6. Components of a Medication System

Table 5. Trigger for ADE

TRIGGER	ADE	HARM	Description of Event
	Y/N		
Triggers:	1. Orders for antidotes (Benadryl, Narcan, Romazicon, Vitamin K, anti-emetics, anti-diarrheals) 2. Abnormal laboratory values (glucose <50, clostridium positive stool, PTT > 100, INR > 6, WBC < 3,000, platelet < 50, Digoxin > 2 3. Abrupt medication stop orders 4. Transfers to a higher acuity of care 5. Development of a rash		
Harm:	1. Temporary injury 2. Permanent injury 3. Death.		

Adapted from IHI

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Table 6. Failure Tally

Tool Involved	UNIT	SHIFT	CIRCUMTANCES Failure to Anticipate Failure to Activate Failure to Resuscitate
NPSG Protocol			
Core Measure Prompter			
Infections/Sepsis Bundle			
Never Event Checklist			
ADR Trigger			

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