

Fact Sheet on Inpatient Quality Indicators

What are the Inpatient Quality Indicators?

The Inpatient Quality Indicators (IQIs) include 28 provider-level indicators established by the Agency for Healthcare Research and Quality (AHRQ) that can be used with hospital inpatient discharge data to provide a perspective on quality. They are grouped into the following four sets:

- **Volume indicators** are proxy, or indirect, measures of quality based on counts of admissions during which certain intensive, high-technology, or highly complex procedures were performed. They are based on evidence suggesting that hospitals performing more of these procedures may have better outcomes.
- **Mortality indicators for inpatient procedures** include procedures for which mortality has been shown to vary across institutions and for which there is evidence that high mortality may be associated with poorer quality of care.
- **Mortality indicators for inpatient conditions** include conditions for which mortality has been shown to vary substantially across institutions and for which evidence suggests that high mortality may be associated with deficiencies in the quality of care.
- **Utilization indicators** examine procedures whose use varies significantly across hospitals and for which questions have been raised about overuse, underuse, or misuse.

Mortality for Selected Procedures and **Mortality for Selected Conditions** are composite measures that AHRQ established in 2008. Each composite is estimated as a weighted average, across a set of IQIs, of the ratio of a hospital's observed rate (OR) to its expected rate (ER), based on a reference population: OR/ER . The IQI-specific ratios are adjusted for reliability before they are averaged, to minimize the influence of ratios that are high or low at a specific hospital by chance. Users may select from among several weighting options. The composite indicators are intended to be used primarily to monitor performance in national and regional reporting, and also for comparative reporting and quality improvement at the provider level. They are not intended to reflect any broader construct of quality, beyond that reflected in the component indicators.

A Snapshot of the Indicators

The current provider-level IQIs are listed in Table 1, along with information on their annual rates of incidence and status regarding endorsement by the National Quality Forum. A detailed Guide to Inpatient Quality Indicators, software for calculating the measures, and software documentation are available on the AHRQ QI Web site: www.qualityindicators.ahrq.gov/modules/qi_resources.aspx. The guide includes a summary assessment for each of the individual indicators.

Each year, AHRQ updates the IQIs to reflect changes to the International Classification of Diseases, 9th Revision, Clinical Modification and Diagnosis-Related Group coding specifications, specifications of the indicators themselves, data elements reported in the Uniform Billing form, and other technical changes. Other revisions also are made to the indicators from time to time, as determined by continued analysis of the indicators and review by expert panels. All the changes made are described in an online change log on the AHRQ QI Web pages.

Table 1. The 2013 Provider-Level Inpatient Quality Indicators, With 2011 Rates and National Quality Forum Endorsement Status

IQI Indicator	Rate per 1,000	NQF Endorsement	
		ID	Year
Volume Indicators			
1 Esophageal resection	NA	0361	2008
2 Pancreatic resection	NA	0366	2008
4 Abdominal aortic aneurysm (AAA) repair	NA	0357	2008
5 Coronary artery bypass graft (CABG)	NA		
6 Percutaneous coronary intervention (PCI)	NA		
7 Carotid endarterectomy (CEA)	NA		
Mortality Rates for Inpatient Procedures			
8 Esophageal resection	46.76	0360	2008
9 Pancreatic resection	38.22	0365	2008
11 AAA repair	40.32	0359	2008
12 CABG	25.90		
13 Craniotomy	51.10		
14 Hip replacement	1.10		
30 PCI (not used in public reporting)	19.62		
31 CEA (not used in public reporting)	4.14		
Mortality Rates for Inpatient Conditions			
15 Acute myocardial infarction (AMI)	58.78	0730	2010
32 AMI, without transfer cases	61.28		
16 Heart failure (CHF)	31.98	0358	2008
17 Acute stroke	83.39	0467	2008
18 Gastrointestinal hemorrhage	22.41		
19 Hip fracture	26.92	0354	2008
20 Pneumonia	38.11	0231	2007
Utilization Rates			
21 Cesarean delivery, uncomplicated	300.97		
33 Primary cesarean delivery, uncomplicated	178.60		
22 Vaginal birth after cesarean (VBAC), uncomplicated	96.14		
34 VBAC, all	95.46		
23 Laparoscopic cholecystectomy	857.87		
24 Incidental appendectomy in the elderly	9.56		
25 Bilateral cardiac catheterization	13.70	0355	2008

Source: Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2011.

AHRQ Quality Indicators Software

AHRQ provides free software—in both SAS[®] and Windows—for organizations to apply the IQIs to their own data to assist quality improvement efforts in acute care hospital settings. Both versions contain all the AHRQ QI modules, including the IQIs. Both versions of the software include the IQI composites. Included in the software are data that allow hospitals to compare their measures to national benchmarks, based on data from the State Inpatient Databases (SID). The most recent release of the software uses the most current data available from the SID for computation of benchmarks, which is a change from previous versions that had used 3-year averages. The mortality indicators can be risk adjusted, but utilization and volume are not.

Fact Sheet on Patient Safety Indicators

What are the Patient Safety Indicators?

The Patient Safety Indicators (PSIs) include 18 provider-level indicators established by the Agency for Healthcare Research and Quality (AHRQ) that screen for adverse events that patients experience as a result of exposure to the health care system. These events may be amenable to prevention by changes at the system or provider level. PSIs are defined on two levels:

- **Provider-level indicators** capture potentially preventable complications for patients who received their initial care and the complication of care within the same hospitalization. Provider-level indicators include only those cases where a secondary diagnosis and/or procedure code flags a potentially preventable complication. These indicators can serve as a screening tool for hospitals to identify areas for further examination and improvement.
- **Area-level indicators** capture all cases of the potentially preventable complication that occur in a given population (e.g., metropolitan area, county, or health plan) either during hospitalization or in a subsequent hospitalization. Area-level indicators are specified to include principal diagnoses as well as secondary diagnoses, which adds cases involving a complication that occurred in a separate hospitalization.

Patient Safety for Selected Indicators is a new composite measure that AHRQ established in 2009. The composite is estimated as a weighted average, across 11 PSIs, of the ratio of a hospital's observed rate (OR) to its expected rate (ER), based on a reference population: OR/ER . The PSI-specific ratios are adjusted for reliability before they are averaged, to minimize the influence of ratios that are high or low at a specific hospital by chance. Users may select from among several weighting options, including National Quality Forum (NQF)-endorsed weights that omit three PSIs that have not been individually endorsed by NQF.

The composite indicator is intended to be used primarily to monitor performance in national and regional reporting, and also for comparative reporting and quality improvement at the provider level. It is not intended to reflect any broader construct of quality, beyond what is reflected in the component indicators themselves.

A Snapshot of the Indicators

The current provider-level PSIs are listed in Table 1, along with information on their annual rates of incidence and status regarding NQF endorsement. Some of the PSIs also have area-level versions, which are noted in the table.

A detailed Guide to Patient Safety Indicators, software for calculating the measures, and software documentation are available on the AHRQ Quality Indicators Web site: www.qualityindicators.ahrq.gov/modules/psi_resources.aspx. The Guide includes a summary assessment for each of the individual indicators.

Each year, AHRQ updates the PSIs to reflect changes made to the International Classification of Diseases, 9th Revision, Clinical Modification and diagnosis-related group (DRG) coding specifications, specifications of the indicators themselves, data elements reported in the Uniform

Billing form, and other technical changes. Other revisions also are made to the indicators from time to time, as determined by continued analysis of the indicators and review by expert panels. Changes made each year are reported in an online change log on the AHRQ QI Web pages.

Table 1. The 2013 Provider-Level Patient Safety Indicators, With 2011 Rates and National Quality Forum Endorsement Status

Indicator	Area-Level Indicator	Rate per 1,000	NQF Endorsement	
			ID	Year
2 Death in low-mortality DRGs		0.27	0347	2008
3 Pressure ulcer (formerly decubitus ulcer)		N/A		
4 Death among surgical inpatients		125.00	0351	2008
5 Retained Surgical Item or Unretrieved Device Fragment Count (formerly foreign body left during procedure)	X	N/A*	0363	2008
6 Iatrogenic pneumothorax	X	0.48	0346	2008
7 Central venous catheter-related bloodstream infection	X	0.75		
8 Postoperative hip fracture		0.17		
9 Perioperative hemorrhage or hematoma rate (formerly postoperative hemorrhage or hematoma)	X	2.55		
10 Postoperative physiologic and metabolic derangements		1.59		
11 Postoperative respiratory failure		10.74	0533	2009
12 Perioperative pulmonary embolism or deep vein thrombosis (formerly postoperative pulmonary embolism or deep vein thrombosis)		8.14	0450	2008
13 Postoperative sepsis		17.43		
14 Postoperative wound dehiscence	X	1.83		
15 Accidental puncture or laceration	X	2.60	0345	2008
16 Transfusion reaction	X	N/A	0349	2013
17 Birth trauma – injury to neonate		2.19		
18 Obstetric trauma – vaginal with instrument		133.93		
19 Obstetric trauma – vaginal without instrument		21.78		

Source: Nationwide Inpatient Sample, 2011; rates per 1,000.

*Please note that the provider-level PSI 5 is a count (i.e., has no denominator), but the area-level PSI 21 is a rate.

AHRQ Quality Indicators Software

AHRQ provides free software—in both SAS[®] and Windows—for organizations to apply the PSIs to their own data to assist quality improvement efforts in acute care hospital settings. Both versions of the software include all the AHRQ QI modules, including the PSIs. Both versions of the software include the PSI composite.

Included in the software are data that allow hospitals to compare their measures to national benchmarks, based on data from the State Inpatient Databases (SID). The most recent release of the software uses the most current data available from the SID for computation of benchmarks, which is a change from previous versions that had used 3-year averages.

Many of the PSIs are calculated using present on admission (POA) codes in the hospital discharge data. In the latest version of the software, the user has the option to choose whether to use actual or predicted data for POA. For users with POA data that choose to use it, PSIs are calculated based on that data element. For users without POA data or those who choose to use predicted data, the model incorporates the likelihood that the numerator event or the comorbidity was present on admission.

Rates for most PSIs can be risk adjusted except for PSI 17 (Birth Trauma - injury to neonate), PSI 18 (OB trauma – vaginal w/instrument) and PSI 19 (OB trauma – vaginal w/o instrument). These three PSIs are not risk-adjusted because materially important risk factors are not available in the State inpatient discharge data. Several other PSIs cannot be risk adjusted because they are very rare and/or treated as sentinel events (PSI 2, PSI 5, PSI 16).

INSTRUCTIONS

Instructions

Board/Staff PowerPoint Presentations on the Quality Indicators

What is this tool?

The purpose of the PowerPoint presentation for the board and staff is to help the board members and relevant staff understand the importance and financial and clinical implications of the AHRQ Quality Indicators.

Who are the target audiences?

The key users of this tool are the quality officers and senior management staff who are educating the hospital board and staff about the Quality Indicators.

How can the tool help you?

This tool can be a standalone educational resource or serve as a resource to condense key points for presentation to your quality and patient safety committees, boards, organizational leaders, medical and surgical committees and performance improvement teams.

How does this tool relate to others?

This tool is part of the Readiness To Change section in the Toolkit Roadmap. It can be related to the self-assessment tool by providing a rich knowledge base on the use of the AHRQ Quality Indicators to identify quality topics for monitoring and performance improvement. An organization needs a thorough understanding of these indicators and their impact to evaluate the organization's infrastructure to support improvement efforts.

Instruction Steps

Use and select the following slides to develop a presentation for your board/staff.

The Agency for Healthcare Research and Quality Quality Indicators Background for Hospital Boards

Date

Why are we here today?

The board needs to:

- Understand the importance of the AHRQ Quality Indicators (QIs)
- Understand the financial and clinical implications of the QIs for our organization
- Endorse the QIs as a tool for implementing and monitoring improvement
- Make the QIs a priority within our organization

Leadership is key to improvement

- Hospital boards are increasingly turning to the QIs as a tool for monitoring performance, particularly on patient safety
- To be successful, improvement efforts within hospitals need to have attention and active support from boards and senior hospital leadership
- Your active support will demonstrate that the hospital has made it a priority to improve quality and patient safety
- This support will help to motivate our staff to engage fully in improvement activities

What is AHRQ?

- The **Agency for Healthcare Research and Quality**:
 - Is part of the U.S. Department of Health and Human Services
 - Supports research designed to improve the outcomes and quality of health care, reduce its costs, address patient safety and medical errors, and broaden access to effective services
 - Sponsors, conducts, and disseminates research to help people make more informed decisions and improve the quality of health care services
 - Acts as the regulator for Patient Safety Organizations that are certified under the Patient Safety and Quality Improvement Act

Who developed the QIs?

- AHRQ contracted with an Evidence-based Practice Center (EPC) to develop the QIs
- The EPC team developed the QIs from 1998 to 2002:
 - Conducted a review of the evidence related to quality measurement based on administrative data
 - Identified candidate indicators using interviews, literature review, Web search and other sources
 - Conducted extensive tests of the validity and reliability of the measures
- Pediatric measures were developed later

General Questions About the AHRQ QIs. AHRQ Quality Indicators. July 2004. Agency for Healthcare Research and Quality, Rockville, MD. www.qualityindicators.ahrq.gov/FAQs_Support/default.aspx.

What are the Quality Indicators?

- The QIs identify quality topics for monitoring and performance improvement:
 - Use hospital administrative data
 - Highlight potential quality concerns
 - Identify areas that need further study and investigation
 - Track changes over time
- Because we cannot always measure “quality of care” per se, we use certain measures as an “indicator” of quality

General Questions About the AHRQ QIs. AHRQ Quality Indicators. July 2004. Agency for Healthcare Research and Quality, Rockville, MD.

www.qualityindicators.ahrq.gov/FAQs_Support/default.aspx.

Why were the QIs developed?

- Because safety is so important, AHRQ developed QIs to provide health care decisionmakers with user-friendly data and tools that will help them:
 - Assess the effects of health care program and policy choices
 - Guide future health care policymaking
 - Accurately measure outcomes, community access to care, and utilization

General Questions About the AHRQ QIs. AHRQ Quality Indicators. July 2004. Agency for Healthcare Research and Quality, Rockville, MD.

www.qualityindicators.ahrq.gov/FAQs_Support/default.aspx.

Why are the AHRQ QIs important?

- Some QIs will be publicly reported on CMS's* Hospital Compare
- CMS is no longer reimbursing hospitals for some hospital-acquired conditions and safety events measured by the QIs
- Fewer resources are available to collect data manually and develop customized quality metrics that may not be accepted by the rest of the field
- Sciences of quality and safety are maturing: payers and regulators are taking a lead in dictating project areas

* CMS = Centers for Medicare & Medicaid Services.

How are the AHRQ QIs structured?

- Definitions based on:
 - ICD-9-CM diagnosis and procedure codes
 - Often along with other measures (e.g., DRG, MDC, sex, age, procedure dates, admission type)
- Numerator = number of cases with the outcome of interest (e.g., cases with pneumonia)
- Denominator = population at risk (e.g., community population)
- Observed rate = numerator/denominator
- Some QIs measured as volume counts

ICD-9-CM = International Classification of Diseases, 9th Revision, Clinical Modification; DRG = diagnosis-related group; MDC = major diagnostic classification.

Source: www.qualityindicators.ahrq.gov/resources/Presentations.aspx.

Four Quality Indicator Modules

- **Patient Safety Indicators (PSIs)** reflect quality of care inside hospitals but focus on potentially avoidable complications and iatrogenic events
- **Inpatient QIs** reflect quality of care inside hospitals, including inpatient mortality for medical conditions and surgical procedures
- **Pediatric QIs** reflect quality of care inside hospitals and identify potentially avoidable hospitalizations among children
- **Prevention QIs** identify hospital admissions that evidence suggests could have been avoided, at least in part, through high-quality outpatient care

Source: www.qualityindicators.ahrq.gov/Default.aspx.

What are the Patient Safety Indicators?

- The PSIs are a set of indicators for adverse events that patients may experience as a result of exposure to the health care system
- A composite measure is also available
- These events are likely amenable to prevention by changes at the system or provider level
- PSIs are measured using hospital administrative data

Version 4.3 technical specifications. Agency for Healthcare Research and Quality, Rockville, MD.
www.qualityindicators.ahrq.gov/Modules/PSI_TechSpec.aspx.

A PSI Example: Pressure Ulcer (PSI 3)

- Numerator: Discharges with ICD-9-CM code of pressure ulcer stage III or IV in any secondary diagnosis field among cases meeting the inclusion and exclusion rules for the denominator.
- Denominator: All medical and surgical discharges age 18 years and older defined by specific DRGs or Medicare Severity DRGs.

Source:

<http://www.qualityindicators.ahrq.gov/Downloads/Modules/PSI/V45/TechSpecs/PSI%2003%20Pressure%20Ulcer%20Rate.pdf>

What are the Inpatient Quality Indicators?

- The Inpatient Quality Indicators (IQIs) are a set of 32 indicators of hospital quality of care
- The IQIs are measured using hospital administrative data
- The IQIs include:
 - Inpatient mortality for certain procedures and medical conditions
 - Utilization of procedures for which there are questions of overuse, underuse, and misuse
 - Volume of procedures for which there is some evidence that a higher volume is associated with lower mortality

Inpatient Quality Indicators Overview. AHRQ Quality Indicators. February 2006. Agency for Healthcare Research and Quality, Rockville, MD.

www.qualityindicators.ahrq.gov/modules/iqi_overview.aspx.

An IQI Example: Coronary Artery Bypass Graft Mortality Rate (IQI 12)

- Numerator: Number of deaths among cases meeting the inclusion and exclusion rules for the denominator.
- Denominator: Discharges, age 40 years and older, with ICD-9-CM CABG code in any procedure field.

Source:

<http://www.qualityindicators.ahrq.gov/Downloads/Modules/IQI/V45/TechSpecs/IQI%2012%20Coronary%20Artery%20Bypass%20Graft%20%28CABG%29%20Mortality%20Rate.pdf>.

How can the AHRQ QIs be used in quality assessment?

- QIs can be used to flag potential problems in quality of care
- QIs can be used to assess performance and compare against peer hospitals
- Examples of hospital use of QIs in the literature have examined the impact of:
 - Health information technology on quality of care
 - Hospital board quality committees on quality of care
 - Evaluation of effectiveness of nurse staffing and care delivered

Source: www.qualityindicators.ahrq.gov/Default.aspx and *AHRQ Quality Indicator Toolkit Literature Review*.

*If you already have your current
PSI/IQI data available: use slides 18-
19*

*If you do not have your PSI/IQI data
available: use slides 20-21.*

DELETE THIS SLIDE

Current performance on the AHRQ QIs

- *INSERT GRAPHS OR TEXT FROM YOUR HOSPITAL'S DATA HERE*

Example

Next Steps

1. Identify priorities for quality improvement
2. Establish goals and performance targets
3. Formulate an action plan to develop a multidisciplinary team for Quality Indicator work

An Example of a Report on Hospital Performance on the AHRQ QIs

UHC Quality and Safety Management Report												
Great State Medical Center											Hospital: GREATSTATE	
Quarters: 2014 Q1 | Population: All Conditions | Performance: All Metrics | Sort By: <input checked="" type="radio"/> Year <input type="radio"/> Quarter												
Jan - Mar 2014 (Q1)						Apr 2013 - Mar 2014 (recent year)						
Relative Performance	Denom	Observed	Target	UHC Median	Rank	Relative Performance	Denom	Observed	Target	UHC Median	Rank	
AHRQ Composites												
Score						Score						
x/n						x/n						
AHRQ Composites												
IQI90 AHRQ Inpatient Mortality for Selected Procedures Quality Indicator Composite - AHRQ		1.18	1.06	1.02	119/122		1.18	1.16	1.08	1.08	99/122	
IQI91 AHRQ Inpatient Mortality for Selected Conditions Quality Indicator Composite - AHRQ		1.06	1.05	0.99	99/122		1.10	1.08	0.98	0.98	98/122	
PDI99 AHRQ Pediatric Quality Indicator Composite - AHRQ		0.59	1.00	0.92	3/120		0.47	1.00	0.84	0.84	1/120	
PSI90 AHRQ Patient Safety Quality Indicator Composite - AHRQ		0.51	1.07	0.90	2/122		0.48	1.10	0.94	0.94	1/122	
Surgical Conditions												
N						N						
Percent						Percent						
x/n						x/n						
Post Procedure Mortality (%)												
IQI08 Esophageal resection - Adults - AHRQ	2	0.0		0.0		23	4.3	4.1	0.0	0.0	77/ 92	
IQI09 Pancreatic resection - Adults - AHRQ	8	12.5	3.1	0.0	92/ 98	64	3.1	2.7	2.0	2.0	90/115	
IQI09a Pancreatic resection with pancreatic cancer - Adults - AHRQ	5	0.0	3.1	0.0	43/ 79	38	2.6	3.0	0.0	0.0	83/110	

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Next Steps

1. Run a QI report with most recent quarter's data
2. Review QI report at next board meeting
3. Identify priorities for quality improvement
4. Establish goals and performance targets
5. Formulate an action plan to develop multidisciplinary team for QI work

INSTRUCTIONS

Board/Staff PowerPoint Presentations on the AHRQ Quality Indicators

What is this tool? The purpose of the PowerPoint presentation for the board and staff is to help the board members and relevant staff understand the importance and financial and clinical implications of the Agency for Healthcare Research and Quality (AHRQ) Quality Indicators.

Who are the target audiences? The key users of this tool are the quality officers and senior management staff who are educating the hospital board and staff about the Quality Indicators.

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- Pediatric measures were developed later
- All the indicators were updated annually

General Questions About the AHRQ QIs. AHRQ Quality Indicators. July 2004. Agency for Healthcare Research and Quality, Rockville, MD.

www.qualityindicators.ahrq.gov/FAQs_Support/default.aspx

Notes:

Additional background information at:

www.qualityindicators.ahrq.gov/Downloads/Resources/Presentations/2010/QI_101_2011-03-02-current.pdf

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- CMS is no longer reimbursing hospitals for some hospital-acquired conditions and safety events
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- Sciences of quality and safety are maturing: payers and regulators are taking a lead in dictating project areas

* CMS = Centers for Medicare & Medicaid Services.

How are the AHRQ QIs structured?

- Definitions based on:
 - ICD-9-CM diagnosis and procedure codes
 - Often along with other data elements (e.g., DRG, MDC, sex, age, procedure dates, admission type)
- Numerator = number of cases with the outcome of interest (e.g., cases with pneumonia)
- Denominator = population at risk (e.g., community population)
- Observed rate = numerator/denominator
- Some QIs measured as volume counts

ICD-9-CM = International Classification of Diseases, 9th Revision, Clinical Modification; DRG = diagnosis-related group; MDC = major diagnostic classification.

Source: www.qualityindicators.ahrq.gov/resources/Presentations.aspx.

Four Quality Indicator Modules

- **Patient Safety Indicators (PSIs)** reflect quality of care inside hospitals but focus on potentially avoidable complications and iatrogenic events
- **Inpatient QIs** reflect quality of care inside hospitals, including inpatient mortality for medical conditions and surgical procedures
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- **Prevention QIs** identify hospital admissions that evidence suggests could have been avoided, at least in part, through high-quality outpatient care

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- The PSIs are a set of indicators for adverse events that patients may experience as a result of exposure to the health care system
- A composite measure is also available
- These events are likely amenable to prevention by changes at the system or provider level
- PSIs are measured using hospital administrative data

Version 4.3 technical specifications. Agency for Healthcare Research and Quality, Rockville, MD. www.qualityindicators.ahrq.gov/Modules/PSI_TechSpec.aspx.

Notes:

List of PSIs:

PSI 02 Death in Low-mortality DRGs
PSI 03 Pressure Ulcer
PSI 04 Death among surgical inpatients
PSI 05 Foreign body left during procedure
PSI 06 Iatrogenic pneumothorax
PSI 07 Central venous catheter-related bloodstream infections
PSI 08 Postoperative hip fracture
PSI 09 Postoperative hemorrhage or hematoma
PSI 10 Postoperative physiologic and metabolic derangement

- PSI 11 Postoperative respiratory failure
- PSI 12 Postoperative pulmonary embolism or deep vein thrombosis
- PSI 13 Postoperative sepsis
- PSI 14 Postoperative wound dehiscence
- PSI 15 Accidental puncture or laceration
- PSI 16 Transfusion reaction
- PSI 17 Birth trauma-injury to neonate
- PSI 18 Obstetric trauma-vaginal delivery with instrument
- PSI 19 Obstetric trauma-vaginal delivery without instrument

The PSIs are divided into two different areas, provider and area level.

Provider-level indicators provide a measure of the potentially preventable complication for patients who received their initial care and the complication of care within the same hospitalization. Includes only those cases where a secondary diagnosis code flags a potentially preventable complication.

Area-level indicators capture all cases of the potentially preventable complication that occur in a given area (e.g., metropolitan area or county) either during hospitalization or resulting in subsequent hospitalization. They are specified to include principal diagnosis, as well as secondary diagnoses, for the complications of care. This specification adds cases where a patient's risk of the complication occurred in a separate hospitalization.

A PSI Example: Pressure Ulcer (PSI 3)

- Numerator: Discharges with ICD-9-CM code of pressure ulcer stage III or IV in any secondary diagnosis field among cases meeting the inclusion and exclusion rules for the denominator.
- Denominator: All medical and surgical discharges age 18 years and older defined by specific DRGs or Medicare Severity DRGs.

Source:

<http://www.qualityindicators.ahrq.gov/Downloads/Modules/PSI/V45/TechSpecs/PSI%2003%20Pressure%20Ulcer%20Rate.pdf>.

Notes

Exclude cases:

- With length of stay of less than 5 days
- With principal diagnosis of pressure ulcer or secondary diagnosis present on admission
- MDC 9 (Skin, Subcutaneous Tissue, and Breast)
- MDC 14 (Pregnancy, Childbirth, and Puerperium)
- With any diagnosis of hemiplegia, paraplegia, or quadriplegia
- With any diagnosis of spina bifida or anoxic brain damage
- With an ICD-9-CM procedure code for debridement or pedicle graft **before or on the same day as the major operating room procedure (surgical cases only)**
- With an ICD-9-CM procedure code for debridement or pedicle graft **as the only major operating room procedure (surgical cases only)**
- With any diagnosis of Stage I or Stage II pressure ulcer
- Transfer from a hospital (different facility)
- Transfer from a skilled nursing facility (SNF) or intermediate care facility (ICF)

- Transfer from another health care facility
- With missing gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing), or principal diagnosis (DX1=missing)

What are the Inpatient Quality Indicators?

- The IQIs are a set of 32 indicators of hospital quality of care
- The IQIs are measured using hospital administrative data
- The IQIs include:
 - Inpatient mortality for certain procedures and medical conditions
 - Utilization of procedures for which there are questions of overuse, underuse, and misuse
 - Volume of procedures for which there is some evidence that a higher volume is associated with lower mortality

Inpatient Quality Indicators Overview. AHRQ Quality Indicators. February 2006. Agency for Healthcare Research and Quality, Rockville, MD.
www.qualityindicators.ahrq.gov/modules/iqi_overview.aspx.

Notes

The IQIs are defined on five levels: mortality rates for medical conditions, mortality rates for surgical procedures, hospital-level utilization rates, area-level utilization rates, and volume of procedures. The IQIs include the following 32 measures:
Mortality Rates for Medical Conditions (7 Indicators)

- Acute myocardial infarction (AMI) (IQI 15)
- AMI, without transfer cases (IQI 32)
- Congestive heart failure (IQI 16)
- Stroke (IQI 17)
- Gastrointestinal hemorrhage (IQI 18)
- Hip fracture (IQI 19)
- Pneumonia (IQI 20)

Mortality Rates for Surgical Procedures (8 Indicators)

- Esophageal resection (IQI 8)
- Pancreatic resection (IQI 9)
- Abdominal aortic aneurysm repair (IQI 11)
- Coronary artery bypass graft (IQI 12)
- Percutaneous transluminal coronary angioplasty (IQI 30)
- Carotid endarterectomy (IQI 31)
- Craniotomy (IQI 13)
- Hip replacement (IQI 14)

Hospital-Level Procedure Utilization Rates (7 Indicators)

- Cesarean section delivery (IQI 21)
- Primary cesarean delivery (IQI 33)
- Vaginal birth after cesarean (VBAC), uncomplicated (IQI 22)
- VBAC, all (IQI 34)
- Laparoscopic cholecystectomy (IQI 23)
- Incidental appendectomy in the elderly (IQI 24)
- Bilateral cardiac catheterization (IQI 25)

Area-Level Utilization Rates (4 Indicators)

- Coronary artery bypass graft (IQI 26)
- Percutaneous transluminal coronary angioplasty (IQI 27)
- Hysterectomy (IQI 28)
- Laminectomy or spinal fusion (IQI 29)

Volume of Procedures (6 Indicators)

- Esophageal resection (IQI 1)
- Pancreatic resection (IQI 2)
- Abdominal aortic aneurysm repair (IQI 4)
- Coronary artery bypass graft (IQI 5)
- Percutaneous transluminal coronary angioplasty (IQI 6)
- Carotid endarterectomy (IQI 7)

An IQI Example: Coronary Artery Bypass Graft Mortality Rate (IQI 12)

- Numerator: Number of deaths among cases meeting the inclusion and exclusion rules for the denominator.
- Denominator: Discharges, age 40 years and older, with ICD-9-CM CABG code in any procedure field.

Source:

<http://www.qualityindicators.ahrq.gov/Downloads/Modules/IQI/V45/TechSpecs/IQI%2012%20Coronary%20Artery%20Bypass%20Graft%20%28CABG%29%20Mortality%20Rate.pdf>

Notes

No definition or summary given in the technical specifications.

Exclude cases:

- Missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing), or principal diagnosis (DX1=missing)
- Transferring to another short-term hospital (DISP=2)
- MDC 14 (Pregnancy, Childbirth, and Puerperium)

How can the AHRQ QIs be used in quality assessment?

- QIs can be used to flag potential problems in quality of care
- QIs can be used to assess performance and compare against peer hospitals
- Examples of hospital use of QIs in the literature have examined the impact of:
 - Health information technology on quality of care
 - Hospital board quality committees on quality of care
 - Evaluation of effectiveness of nurse staffing and care delivered

Source: www.qualityindicators.ahrq.gov/Default.aspx and AHRQ Quality Indicator Toolkit Literature Review.

*If you already have your current
PSI/IQI data available: use
slides 18-19*

*If you do not have your PSI/IQI
data available: use slides
20-21.*

DELETE THIS SLIDE

Current performance on the AHRQ QIs

- *INSERT GRAPHS OR TEXT FROM YOUR HOSPITAL'S DATA HERE*

Notes

Insert your current hospital performance on the PSIs/IQIs.

Next Steps

1. Identify priorities for quality improvement
2. Establish goals and performance targets
3. Formulate an action plan to develop a multidisciplinary team for Quality Indicator work

Notes

Instructions: Indicate here what the steps are that need to be completed in order to move your Quality Indicator improvement initiatives forward.

An Example of a Report on Hospital Performance on the AHRQ QIs

UHC Quality and Safety Management Report Report Resources

Great State Medical Center Hospital: GREATSTATE

Quarters: 2014 Q1 Population: All Conditions Performance: All Metrics Sort By: Year Quarter

f	Relative Performance	Jan - Mar 2014 (Q1)					Apr 2013 - Mar 2014 (recent year)					
		Denom	Observed	Target	UHC Median	Rank	Relative Performance	Denom	Observed	Target	UHC Median	Rank
AHRQ Composites												
		Score			x/n		Score			x/n		
AHRQ Composites												
IQ190 AHRQ Inpatient Mortality for Selected Procedures Quality Indicator Composite - AHRQ			1.18	1.06	1.02	119/122		1.18	1.16	1.08	99/122	
IQ191 AHRQ Inpatient Mortality for Selected Conditions Quality Indicator Composite - AHRQ			1.06	1.05	0.99	99/122		1.10	1.08	0.98	98/122	
PD199 AHRQ Pediatric Quality Indicator Composite - AHRQ			0.59	1.00	0.92	3/120		0.47	1.00	0.84	1/120	
PS190 AHRQ Patient Safety Quality Indicator Composite - AHRQ			0.51	1.07	0.90	2/122		0.48	1.10	0.94	1/122	
Surgical Conditions												
		N	Percent		x/n		N	Percent		x/n		
Post Procedure Mortality (%)												
IQ108 Esophageal resection - Adults - AHRQ		2	0.0		0.0		23	4.3	4.1	0.0	77/ 92	
IQ109 Pancreatic resection - Adults - AHRQ		8	12.5	3.1	0.0	92/ 98	64	3.1	2.7	2.0	90/115	
IQ109a Pancreatic resection with pancreatic cancer - Adults - AHRQ		5	0.0	3.1	0.0	43/ 79	38	2.6	3.0	0.0	83/110	

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Notes

Instructions: Include an example of a report that can be developed at your institution to review hospital performance on the PSIs/IQIs.

Next Steps

1. Run a QI report with most recent quarter's data
2. Review QI report at next board meeting
3. Identify priorities for quality improvement
4. Establish goals and performance targets
5. Formulate an action plan to develop multidisciplinary team for QI work

Notes

Instructions: Indicate here what the steps are that need to be completed in order to move your Quality Indicator improvement initiatives forward?

Consider running QIs on data from previous quarters as well to generate a trend line.

INSTRUCTIONS

Getting Ready for Change Self-Assessment

What is this tool? This tool can be used to assess your hospital's organizational infrastructure and its readiness to support effective implementation efforts. Using this checklist, you can highlight capabilities that should be in place within your hospital before implementing improvement efforts related to the AHRQ Quality Indicators (QIs). These capabilities are organized into two evidence-based domains:

1. **Infrastructure for Change Management**, to evaluate how ready your organizational infrastructure is to support quality improvement in general.
2. **Readiness To Work on the AHRQ Quality Indicators**, to evaluate your organization's readiness to improve its performance specifically on the AHRQ QIs.

Both domains are important to effectively implement change. Within each domain, we identify related dimensions that you should consider in assessing your hospital's status.

Who are the target audiences? Senior management can use this tool to identify barriers to quality improvement at the organizational level.

How can it help you? One of the first steps in successful change is to determine how ready the hospital is to undertake meaningful changes in the way it operates. Identifying and addressing barriers to change will improve your hospital's success in implementing successful performance improvements.

How does this tool relate to others? This tool helps you assess how prepared the hospital organization is to implement improvement initiatives for the AHRQ QIs, which is a factor to be considered in the *Gap Analysis* (Tool D.5). It also can guide your choice of other tools to address areas that you find need strengthening. Examples include *Applying the AHRQ Quality Indicators to Hospital Data* (Tools B.1, B.2, B3) and the *Prioritization Matrix* that is used to identify priorities for improvement actions (Tool C.1). While not part of this toolkit, AHRQ's Hospital Survey on Patient Safety Culture may be helpful in assessing your hospital's readiness for change (see www.ahrq.gov/qual/patientsafetyculture/hospindex.htm).

Who should use this tool? Have several senior executives review this tool independently. This includes, at a minimum, the chief medical officer, chief quality officer, nursing leadership, and members of your hospital's quality committee. It may also be helpful to have feedback on these items from trusted mid-level managers, since they may bring alternative viewpoints and may have better knowledge of operational issues.

What should each person do?

- For each key concept, each individual should rate the extent to which the statement characterizes your hospital: Not at all, to some extent, or to a great extent.
- Complete both section 1 (Infrastructure for Change Management) and section 2 (Readiness To Work on the AHRQ Quality Indicators).
- Note any particular concerns in each area to facilitate later discussion.

How do we review the results together? Once the individual reviews of the checklist are finished, schedule a meeting of the hospital's key leaders. The discussion at this meeting should focus on areas where your infrastructure needs strengthening or where there is a lack of consensus.

- For section 1, Infrastructure for Change Management, discuss the greatest vulnerabilities for your hospital, those that are most likely to cause quality improvement efforts to fail. Based on this discussion, identify an action plan with specific steps, individuals responsible for each step, and a timeline for revisiting progress.
- If your hospital does not use the AHRQ QIs, consider your experience with other quality metrics when reviewing section 2.

Section 1. Infrastructure for Change Management

This section will help you evaluate how ready your hospital is to support quality improvement actions.

To what extent does each statement characterize your hospital?	Not at all	To some extent	To a great extent
1a. Quality and safety as priorities			
• We have a shared sense of purpose that quality and safety are our highest priorities.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Quality and patient safety are included in our hospital's main goals or pillars of performance.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• The governing board is actively involved reviewing our hospital's performance on quality and patient safety measures.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• We have open communication among physicians, staff, and patients about quality and patient safety.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overall, our hospital's organizational structure places a high priority on quality and patient safety.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>My concerns in this area are:</i>			
<hr/>			
1b. Management processes			
• Our management processes emphasize meeting quality performance standards and provide the resources we need for supporting quality improvement.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• We have an anonymous, nonpunitive way of reporting events and errors.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Our leadership responds actively when patient safety issues are identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• We document patient safety standards in protocols and guidelines that are clear and easy to understand.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• We disseminate the protocols and guidelines widely within the hospital.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overall, our hospital's management processes are designed to place a high priority on quality and patient safety.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>My concerns in this area are:</i>			
<hr/>			
1c. Senior leadership			
• Everyday events are connected to our larger purpose through stories and rituals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Our governance structures and practices minimize conflict between our hospital's multiple missions and priorities.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Our hospital is led as an alliance between the executive leadership team and the clinical department chairs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overall, senior leaders within our hospital are passionate about service, quality, and safety and have an authentic, hands-on style.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>My concerns in this area are:</i>			
<hr/>			
1d. Training			
We provide ongoing training for staff that helps them build skills to improve quality and patient safety.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>My concerns in this area are:</i>			
<hr/>			

To what extent does each statement characterize your hospital?	Not at all	To some extent	To a great extent
1e. Accountability			
• Our hospital provides incentives or rewards (financial or nonfinancial) for high levels of patient safety.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Our medical leaders (such as department chairs or medical directors) accepts responsibility for quality and safety within their departments.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• We have accountability, innovation, and redundant processes to ensure quality at the unit level.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Our hospital has a policy of transparency, and information is shared at all levels (from top to bottom and vice versa)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overall, our hospital holds senior leaders accountable for service, quality, and safety (e.g., CEO, COO, CMO, CNO, CFO, CQO, CIO).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>My concerns in this area are:</i>			
<hr/>			
1f. Data systems			
Overall, we have effective data systems: they are functional and allow us to obtain data when we need them.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>My concerns in this area are:</i>			
<hr/>			
1g. Results focused			
• We continuously strive to improve and we benchmark our performance against external standards as a measure of success.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• In decisionmaking, we focus on the likely results to guide our choice of performance improvement approach, rather than always following a particular approach (such as Six Sigma).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• We emphasize human behavior and work redesign as the keys to improvement.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• We use technology as an accelerator and not as a substitute for work redesign.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overall, we are driven to focus on results.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>My concerns in this area are:</i>			
<hr/>			
1h. Collaboration			
• The relationships between administration, physicians, nurses, and other staff are typically collaborative in our hospital.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• We provide frequent recognition of employee contributions at every level.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Employees value each other's critical knowledge when problem solving.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• We have a sense that teamwork among staff is encouraged.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overall, we have a sense of collaboration among all staff to improve patient safety.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>My concerns in this area are:</i>			

Section 2. Readiness To Work on the Quality Indicators

This section will help you evaluate your organization’s readiness to improve its performance specifically on the AHRQ Quality Indicators. If your hospital does not currently use the AHRQ Quality Indicators, it may be helpful to consider your experience in working with and improving performance on other quality metrics.

To what extent does each statement characterize your hospital?	Not at all	To some extent	To a great extent
2a. AHRQ Quality Indicators as a priority			
• We have a shared sense of purpose to decrease mortality and reduce complications.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• We have open communication among physicians, staff, and patients about our work on the Quality Indicators.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Our hospital leadership responds actively when we identify issues related to the Quality Indicators.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Our hospital leaders emphasize the need for high performance on the Quality Indicators.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• We document safety standards related to the Quality Indicators in our protocols and guidelines.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• We continuously strive to improve our performance on the Quality Indicators.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overall, our hospital places a high priority on the AHRQ Quality Indicators.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>My concerns in this area are:</i>			
<hr/>			
2b. Experience with the AHRQ Quality Indicators			
• We include one or more of the Quality Indicators in our existing set of quality and safety performance measures.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• We review trend data on one or more of the Quality Indicators on a regular basis in the hospital’s performance monitoring process.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• We have undertaken quality improvement initiatives to address performance on one or more of the Quality Indicators.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• We review and analyze everyday events related to the Quality Indicators to identify areas where improvements are needed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overall, we have experience working with the AHRQ Quality Indicators.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>My concerns in this area are:</i>			
<hr/>			
2c. Accountability			
• Our hospital provides incentives or rewards (financial or nonfinancial) for performance on the Quality Indicators.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Our medical leaders (such as department chairs or medical directors) accept responsibility for the Quality Indicators within their departments.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overall, we hold ourselves accountable for performance on the AHRQ Quality Indicators.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>My concerns in this area are:</i>			

To what extent does each statement characterize your hospital?	Not at all	To some extent	To a great extent
2d. Data systems			
<ul style="list-style-type: none"> Our hospital maintains a database of discharge records using the Uniform Billing Code system, which can be used to track discharge records on each patient individually for the last 4 or 5 years. 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p>Overall, our data systems have the needed capability to support quarterly monitoring of AHRQ Quality Indicator performance, or we have the ability to obtain this Quality Indicator information from another source.</p> <p><i>My concerns in this area are:</i></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<hr/>			
2e. Training			
<p>We provide ongoing training for staff on the AHRQ Quality Indicators and what they mean.</p> <p><i>My concerns in this area are:</i></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<hr/>			

References

1. Farley DO, Tharp-Taylor S. Factors required for successful implementation of new practices or products. In preparation.
2. Keroack M A, Youngberg BJ, Cerese JL., et al. (2007). Organizational factors associated with high performance in quality and safety in academic medical centers. Acad Med 2007;82(12):1178-86.
3. Taylor SL, Ridgely MS, Greenberg MD, et al. Experiences of Agency for Healthcare Research and Quality-funded projects that implemented practices for safer patient care. Health Serv Res 2009;44:2 (Pt 2):665-83.

INSTRUCTIONS

Applying the AHRQ Quality Indicators to Hospital Data

What is this tool? This tool provides guidance on how to calculate your hospital's rates for the AHRQ Quality Indicators (QIs) and how to use those rates to assess the hospital's performance on the indicators. AHRQ has developed SAS programs and free QI software for Windows that you can use to calculate your QI rates. This tool provides the following information:

- Overview of the AHRQ QIs, data requirements, and issues involved in using them.
- Descriptions of the rates calculated for the QIs and how to work with them.
- An example of how to interpret a hospital's QI rates.
- Guidance for assessing performance on the QIs (trends and benchmarking).

Who are the target audiences? The primary audiences for this tool are two groups of hospital staff.

- Quality and safety staff, as well as clinical and other staff (e.g., quality and/or patient safety officer at the hospital) involved in quality improvement work, should be involved in assessing the hospital's performance on the QIs and making decisions on priorities for improvement.
- Statisticians, data analysts, and programmers can help to calculate the QIs using data available from the hospital and relevant information from other sources.

Whenever possible, this information is designed to be usable by the quality program staff. Some of the information is technical, however, and is intended for statistician or programmer audiences.

How can this tool help you? You can use this tool to help calculate and interpret the hospital rates for the Inpatient QIs (IQIs) and Patient Safety Indicators (PSIs) as part of your hospital's quality improvement work. The examples and guidance provided should help you understand the different types of QI rates generated by the AHRQ SAS program or QI Windows software and to assess your hospital's performance over time and in comparison to other hospitals.

How does this tool relate to others? This tool should be used together with the tool on *IQI and PSI Rates Generated by the AHRQ SAS Programs* (Tool B.2). That tool provides guidance on how to work with the SAS programs and QI Windows software used to calculate the IQIs and PSIs for your hospital and describes how to read and use the output from the programs. By guiding your calculation of the QI rates for your hospitals, this tool also is a resource for *PowerPoint and Excel Worksheets on Data, Trends, and Rates* (Tool B.3), which you can use to display your QI rates for presentations.

Working With the Quality Indicators

The AHRQ Quality Indicators (QIs) are developed to assess health care quality. The QIs consist of four modules measuring various aspects of quality—Inpatient Quality Indicators (IQIs), Patient Safety Indicators (PSIs), Pediatric Indicators (PDIs), and Prevention Quality Indicators (PQIs). This toolkit addresses the IQIs and the PSIs, which apply to the inpatient setting. Refer to the *IQI and PSI Fact Sheets* (Tools A.1) in this toolkit for summary descriptions of these two sets of indicators.

The AHRQ QIs are available for public use at no charge. Resource materials on the QIs can be downloaded at: www.qualityindicators.ahrq.gov/Default.aspx. Be sure to download three types of files for each of the IQI and PSI modules: (1) Technical_Specifications, which provides detailed information about definitions for the QIs, (2) the QI Software, which includes SAS programs or a free Windows application for calculating the QIs, and (3) the QI Software Instructions, which provide step-by-step instructions of how to run the software.

Types of Rates for Quality Indicators

The AHRQ QI software can generate four types of QI rates, which serve different purposes. These are the observed rates, expected rates, risk-adjusted rates, and smoothed rates. Three types of counts are involved in the calculation of each of these rates, which define either the numerator or denominator for a rate.

The definitions of the four rates and the counts used to calculate them are shown in the box below. Precise definitions with mathematical detail are presented in the appendix.

The **rates for each indicator** are calculated as follows:

Observed rate = **Observed events** / **Eligible population**

Expected rate = **Expected events** / **Eligible population**

Risk-adjusted rate = (**Observed events** / **Expected events**) * reference population rate

Smoothed rate = Risk-adjusted rate * weight – reference population rate * (1 – weight)

The **counts** that are used to calculate the rates of each indicator are determined as follows:

Eligible population = for each QI indicator, the total number of a hospital's discharges that qualified for the eligible population for that specific indicator

Observed events = for each QI indicator, the total sum of events that occurred in the eligible population for that specific indicator

Expected events = for each QI indicator, the total sum of events expected to occur for that specific indicator if the hospital had average performance comparable to the reference population, considering its case mix

Data Used in Calculating the QI Rates

Reference Population for the QIs. The expected, risk-adjusted, and smoothed rates for the hospital-level QIs are calculated using data for a reference population. AHRQ uses the Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID) as the reference population. The SID is a large database of hospital discharge data maintained by AHRQ. It contains data for all hospital discharges from 47 States, representing more than 95 percent of all U.S. hospital discharges (for more information, see www.hcup-us.ahrq.gov/sidoverview.jsp). Using this dataset, AHRQ performs statistical analyses to calculate reference-population QI rates and identify risk factors. These measures are

available as part of the AHRQ programs to calculate the QI rates; hospitals do not have to do these calculations themselves.

Weights for the Smoothed Rates. The smoothed rates are calculated using weights that reflect the stability of your hospital's QI rates, which are affected by the size of your hospital's patient population and the types of quality and safety events that occur in your hospital. When your hospital runs the QI software, weights are applied to the risk-adjusted rates for each QI. These weights "shrink" the hospital's risk-adjusted rate toward the overall mean from the SID. The shrinkage estimate is called a "reliability adjustment." For a hospital with less reliable QI rate estimates, its smoothed rates will shrink more toward the SID mean, compared to smoothed rates for a hospital with more reliable rates. The resulting rates will have smaller year-to-year fluctuations in performance, so they will appear "smoother" than the raw rates.

Explanations of the Four Types of QI Rates

Observed rate. The observed rate (also called the raw rate) is the actual rate at which events measured by the indicator occurred in your hospital. If the hospital's primary interest is to identify cases for further followup and quality improvement, then a review of the observed rates would be useful to identify QIs that may be of concern. However, the observed rates are primarily intended to provide context for the user.

The observed rate is usually not appropriate for comparison across hospitals or over time because hospitals' patient case mixes can vary. If the number of eligible discharges for a QI is small, the observed rate may appear to vary widely over time, even though the hospital's real performance on that indicator may not have changed. Therefore, to do other assessments, such as focusing on positive or negative performance, or comparisons with benchmarks, it is necessary to use the observed rate along with one of the other available rates.

Expected rate. The expected rate is the rate a hospital would have if it had performed the same as the reference population given the provider's actual case-mix (e.g., age, gender, diagnosis-related group [DRG], and comorbidity categories). The expected rate considers only the patient characteristics of a hospital's eligible discharges, not the actual observed events at the hospital.

Each eligible hospital stay is assigned an expected probability that a particular indicator event will occur based on the frequency with which the event occurred during similar stays in the reference population from the SID. The expected probabilities for the set of discharges are summed to obtain the number of expected events, which is then divided by your hospital's eligible population. The QI software contains the set of regression coefficients developed for each indicator from the SID, which the software uses to calculate and sum the probabilities to obtain the counts of expected events (see box above).

Another commonly used measure is:

$$\text{Observed to Expected (O/E) ratio} = \text{observed rate} / \text{expected rate.}$$

If a hospital's observed rate for an indicator is higher than its expected rate (an O/E ratio greater than 1), then the hospital performed worse than the reference population with an equivalent patient case mix. If the observed rate is lower than the expected rate (an O/E ratio less than 1), then the hospital performed better than the reference population for that indicator with an equivalent case mix.

Risk-adjusted rate. The risk-adjusted rate is an estimate of how a hospital would perform on an indicator for an average case mix of patients, rather than for its own case mix. In other words, the risk-adjusted rate is the rate the hospital would have if its case mix were the same as the case mix in the reference population. This is the rate that should be used for making comparisons across hospitals, or for comparisons within your hospital over time, because it adjusts for differences in the patient mix and allows you to examine real changes in performance.

The risk adjustments account for differences in the age, sex, modified DRG, and comorbidity between a particular hospital and the entire SID. (Different DRGs and comorbidities are relevant for different QIs.) To calculate a risk-adjusted rate, a hospital's observed rate is divided by its expected rate to obtain the O/E ratio. Then the O/E ratio is multiplied by the indicator rate for the reference population from the SID.

Smoothed rate. The smoothed rate is a weighted average of the hospital's risk-adjusted rate and the reference population rate, where the weight reflects the reliability of the hospital's risk-adjusted rate. The smoothed rate can be used to assess whether any difference between a hospital's risk-adjusted rate and the reference population rate is likely to remain in the next measurement period.

When the hospital runs the QI software, a shrinkage factor is applied to the risk-adjusted rate for each QI. The resulting rate will appear "smoother" than the observed rate, meaning that the smoothed rate will have smaller year-to-year fluctuations in performance. More information on interpreting smoothed rates can be found in the AHRQ publications *Guide to Inpatient Quality Indicators* and *Guide to Patient Safety Indicators*, both of which are available on the AHRQ Web site.

Your hospital can compare its smoothed rate for an indicator with its risk-adjusted rate by calculating the following ratio:

$$\text{Smoothed Rate Ratio} = \frac{\text{smoothed rate} - \text{reference population rate}}{\text{risk-adjusted rate} - \text{reference population rate}}$$

You can use this ratio to determine whether the difference between your hospital's risk-adjusted rate and the reference population rate is likely to remain in the next measurement period. The larger the ratio, the more similar the smoothed rate is to the risk-adjusted rate. AHRQ suggests that if the ratio is greater than 0.80, the difference is likely to persist (whether the difference is positive or negative). If the ratio is less than 0.80, a greater share of the difference may be due to random differences in patient characteristics (that are not controlled for in the risk-adjustment model) due to small numbers in the patient population.

If your hospital has a relatively small number of eligible discharges for a particular QI, it may not be possible to precisely estimate changes in rates for that QI over time. If the ratio indicates that the risk-adjusted rate is unlikely to persist over time, AHRQ suggests that you use the smoothed rate for comparison to benchmarks instead of the risk-adjusted rate and that you interpret these comparisons with caution. Alternatively, you might calculate the risk-adjusted rate using discharges from more than one year, which will make the rate more stable (reliable).

An Example That Illustrates Use of the QI Rates

In this example, two hypothetical hospitals (A and B) are assessing their performance on PSI 3, Pressure Ulcers. The rates calculated for each hospital are summarized here; these rates for the two hospitals are discussed below, including examples of how you should interpret the rate comparisons as you assess the performance of your hospital on these indicators.

<u>Rates for PSI 3</u>	<u>Hospital A</u>	<u>Hospital B</u>
Observed rate	0.02	0.06
Expected rate	0.04	0.10
Risk-adjusted rate	0.025	0.03
Smoothed rate	0.026	0.04

1. First, the two hospitals calculate their **observed rates** for PSI 3. Hospital A has an observed rate of 0.02 or 20/1,000, and Hospital B has an observed rate of 0.06 or 60/1,000. The national rate (from the SID) for PSI 3 is 0.05. It is not clear whether Hospital A or Hospital B has better or worse than average performance on PSI 3, compared to the SID rate, because they may have different case mixes than the SID population.
2. Hospital A has an **expected rate** of 0.04 for PSI 3. Since its expected rate is lower than the SID rate (0.05), its mix of patients is at *lower risk* for PSI 3 than the average case mix. Since its expected rate is higher than its observed rate, the hospital is performing better than expected on its case mix of patients. Hospital B has an expected rate of 0.10. Since its expected rate is higher than the SID rate (0.05), its mix of patients is at *higher risk* of PSI 3 than the average case mix. Since its expected rate is higher than its observed rate, the hospital also is performing better than expected on its case mix of patients.

3. Then the two hospitals calculate their **risk-adjusted rates** for PSI 3. Hospital A has a risk adjusted rate of $0.025 = (0.02/0.04) * 0.05$ and Hospital B has a risk adjusted rate of $0.03 = (0.06/0.10) * 0.05$. The rates are calculated by multiplying each hospital's ratio of observed to expected rate by the SID rate of 0.05. These risk-adjusted rates suggest that Hospital A is performing slightly better on PSI 3 than Hospital B, and both hospitals are performing better than average, as represented by the SID rate. (Note that a lower rate for a PSI signifies better performance because fewer adverse events have occurred, in this case fewer patients with pressure ulcers.)
4. Hospital A is a relatively large hospital and has a **smoothed rate** of 0.026 on PSI 3, which is only slightly more similar to the reference population (SID) rate than its risk-adjusted rate. The smoothed-rate ratio discussed above takes a value of 0.96, suggesting that Hospital A's strong performance on PSI 3 is likely to persist. Hospital B is a small hospital that sees a small number of patients who are eligible for PSI 3. Hospital B has a smoothed rate of 0.04 and the smoothed-rate ratio takes a value of 0.50, which suggests that Hospital B's apparent good performance may not persist over time; that is, it may not reflect real performance. Hospital B may want to consider using the smoothed rate in comparing its performance on PSI 3 to benchmarks, or it could recalculate the risk-adjusted rate for PSI 3 using 2 years of discharge data to gain more stability in its rates.

Preparing To Calculate the QI Rates

Hospital discharge data are required for using the AHRQ QIs. The needed data elements can be classified into the following categories:

- Hospital information, such as county.
- Patient demographics, such as age, gender, and race.
- Admission information, such as admission time (year, quarter), type (emergency vs. elective), admission source (from another hospital, emergency room in the same hospital).
- International Classification of Diseases, 9th Revision (ICD-9-CM) diagnosis and procedure codes, and classifications based on those codes, such as Medicare Severity diagnosis-related groups (MS-DRGs) and major diagnosis categories (MDCs).
- Discharge information, such as length of stay, payer for hospital charges, and disposition of patient (died vs. transferred to nursing home).

Detailed information about data elements, such as variable names, descriptions, and formats, is provided by AHRQ on its Web site (www.qualityindicators.ahrq.gov/modules/psi_resources.aspx).

AHRQ recommends that individual hospitals ensure that their datasets use the variable names and formats required by the SAS programs before applying the programs to their datasets. The data elements in the QIs are based on the coding specifications used in the HCUP SID. The SID coding specifications are similar to the Uniform Bill (UB-04) but not identical. For data elements used in the AHRQ QIs, crosswalks between the SID and UB-04 coding specifications are included in the SID documentation available at <http://hcup-us.ahrq.gov/db/state/siddbdocumentation.jsp>. You can use the crosswalks to ensure that your hospital's discharge data are consistent with the SID coding system.

Some coding and measurement issues involved in calculating the QIs are summarized here.

Use of E-Codes (external causes of injury codes). E-codes (ICD-9 codes for external cause of injury) are not always required by a State uniform billing committee or a Statewide data organization. Be sure you understand the E-code requirements in your State and practices regarding E-code usage in your hospital's data file. If E-codes are not available in a data file, the hospital's apparent rates of three PSIs (PSI 5, Retained surgical item or unretrieved device fragment count; PSI 15, Accidental puncture or laceration; and PSI 16, Transfusion reaction) may be slightly lower than the corresponding "true" rates if E-codes were available.

Treatment of Missing Values. The AHRQ QI software handles missing data by requiring confirmation for the assignment of a poor outcome or negative event. For example, to be assigned as a death, each case must actually be coded as a death; missing data are considered neutral. In addition, missing data for some elements results in the exclusion of that case from the denominator, whereas for a few other

elements, the case is retained. For details about the impact of missing data for each data element, see the AHRQ Web site (www.qualityindicators.ahrq.gov/modules/psi_resources.aspx).

Dealing With a Small Population at Risk. The QI software calculates the observed rates regardless of the size of the population at risk. However, QI rates based on only a few cases (i.e., a small population at risk) should be interpreted with caution. AHRQ recommends that, in some performance measurement work, rates be suppressed when fewer than 30 cases are in the denominator. This exclusion rule serves two purposes: (1) it eliminates unstable estimates based on too few cases; and (2) it helps protect the identities of patients.

Where To Turn for Help

Some hospitals may rely on an outside agency, such as the State hospital association, a parent organization, or the University HealthSystem Consortium to analyze their data and produce their QIs. For assistance in obtaining these measures, you should contact these organizations.

Appendix. Formulas and Uses for the Four Types of QI Rates

Type of Rate	Brief Description	Way To Use It
Observed Rate	<p>Raw rate generated by the QI software using a hospital's discharge data</p> $\text{Formula: } R^k = \frac{\sum_j Y_j^k}{\sum_j D_j^k}$ <p>where k indexes the QIs, j indexes the hospital's annual discharges, Y_j^k is a 0/1 variable taking the value 1 if discharge j meets the criteria for QI k, and D_j^k is a 0/1 variable taking the value 1 if discharge j is eligible for QI k.</p>	<p>Used to identify QI areas of strength and those needing improvement; and for comparison with expected rates to identify QI areas of strength and need for improvement.</p>
Expected rate	<p>Rate the hospital would have if it had performed the same as the reference population given the provider's actual case mix (e.g., age, gender, DRG, and comorbidity categories)</p> $\text{Formula: } E^k = \frac{\sum_j \hat{e}_j^k}{\sum_j D_j^k}$ <p>where in addition to the symbols defined above, $\hat{e}_j^k = \hat{\beta}^k X_j^k$ the predicted probability of QI k occurring on discharge j given the risks (X_j^k) present in discharge j where $\hat{\beta}^k$ is a vector of parameter estimates from a regression of the risks on occurrences of QI k in the SID.</p>	<p>Used for comparison with the observed rate within the same hospital to identify QI areas of strength and need for improvement.</p>
Risk-adjusted rate	<p>Rate the hospital would have if it had the same case mix as the SID given the hospital's actual performance.</p> $\text{Formula: } A^k = \frac{\sum_j Y_j^k}{\sum_j \hat{e}_j^k} * (R_{SID}^k)$ <p>where in addition to the symbols defined above, R_{SID}^k is the raw rate for QI k in the entire SID.</p>	<p>Used for comparison to benchmarks (other hospitals or sets of hospitals) to assess performance relative to others.</p>
Smoothed rate	<p>Weighted average of the hospital's risk-adjusted rate and the reference population rate, where the weight reflects the reliability of the hospital's risk-adjusted rate (a function of the number of eligible discharges).</p> $\text{Formula: } S^k = w^k * A^k + (1 - w^k) * R_{SID}^k$ <p>where in addition to the symbols defined above, w^k is a measure of the reliability of the hospital's risk-adjusted rate.</p>	<p>Used for comparison with the risk-adjusted rate within the same hospital to determine the reliability of the risk-adjusted rate over time. Also used instead of the risk-adjusted rate for comparing to benchmarks if the risk-adjusted rate is not reliable over time.</p>

INSTRUCTIONS

IQI AND PSI RATES GENERATED BY THE AHRQ SAS PROGRAMS

Guidance for Using the SAS Programs and an Example of Output for One Hospital

What is this tool? To work with the Inpatient Quality Indicators (IQIs) and Patient Safety Indicators (PSIs) for assessing its own performance, a hospital needs to calculate rates for these Indicators, using the SAS programs provided by the Agency for Healthcare Research and Quality (AHRQ). This tool provides three sets of information to help you work with the SAS programs to calculate rates for your hospital and use the output from those programs:

- An outline of the steps and programs used to calculate rates for the IQIs and PSIs.
- Notes for analysts and programmers on issues to manage in working with the SAS programs.
- An example of the output from the SAS programs for one hospital.

Who are the target audiences? The primary audience for this tool is the programmers or analysts who will perform the calculations of rates for the IQIs and PSIs.

How can the tool help you? The examples and guidance provided by this tool should help you work more easily with the SAS programs used to calculate the IQIs and PSIs for your hospital, and to read and use the output from the programs.

How does this tool relate to others? This tool should be used together with the B.1 tool on *Applying the Quality Indicators to Hospital Data*, which explains the different types of rates calculated for the IQIs and PSIs..

Indicator Data Generated by the SAS Programs

The following steps are taken to produce the rates for both the IQIs and PSIs:

1. Identify outcomes in inpatient records.
2. Identify populations at risk.
3. Calculate observed (raw) indicator rates.
4. Risk adjust the indicator rates (where applicable).
5. Create smoothed rates using multivariate signal extraction (where applicable).

The SAS programs provided by AHRQ for calculation of the IQIs and PSIs, as well as documentation on how to use the programs, can be found in zip files on the AHRQ QI Web site:

www.qualityindicators.ahrq.gov/software/SAS.aspx and
www.qualityindicators.ahrq.gov/Downloads/Software/SAS/V45/Software_Instructions_SAS_V4.5.pdf.

The documentation is provided in separate software documentation guides for the IQIs and PSIs. Each guide includes instructions for variable definitions and for calculating observed, expected, risk-adjusted, and smoothed rates for the indicators.

Rates for the IQIs and PSIs are calculated using the same six programming steps, each of which uses a separate SAS program. The names and descriptions of the SAS programs involved are summarized in the following table.

IQI Programs	PSI Programs	Program Description
CONTROL_IQI.SAS	CONTROL_PSI.SAS	Contains SAS statements that run the remaining programs
IQFMTS	PSFMTS	Defines a format library that contains the diagnosis and procedure screens necessary for assigning outcomes for each Indicator
IQSAS1	PSSAS1	Processes hospital discharge abstract data and flags records if they contain the outcomes of interest for each Indicator
IQSASP2	PSSASP2	Calculates the observed (raw) rates for the Indicators
IQSASP3	PSSASP3	Calculates expected rates, risk-adjusted rates, and smoothed rates for each Indicator
IQI_COMPOSITE.SAS	PSI_COMPOSITE.SAS	Calculates the composite rate for the set of indicators (PSIs or mortality IQIs)

PSI #17 Birth Trauma Rate – Injury to Neonate is calculated within the PDI module because it is based on the number of births. However, a standalone module was introduced with SAS QI v4.5. PSI #17 Standalone Module calculates this indicator without the need to run the entire PDI module. It is available as a separate download from the same Web page as the other software. The standalone module includes the same processing steps as the provider-level PDI module for PSI #17.

Notes for Analysts and Programmers

The documentation provides guidance on how to set up the files and run the programs. However, as is usually the case when applying new programs to a data file, several issues have been identified that you will need to manage as you work with the AHRQ SAS programs. The identified issues are discussed here to help ease your first application of the programs to your data. Once you have run the programs successfully, any use of them on subsequent data should proceed smoothly.

One issue that affects the ability to begin to use the programs is the need to obtain a file that is not included in the zip files with the other AHRQ QI SAS programs. This is the population file, POPFILE

(pop95t13.txt), which is located in a compressed folder (1995-2013 Population Files_V4.5.zip) on the AHRQ QI Web site: www.qualityindicators.ahrq.gov/software/SAS.aspx.

Getting Your Data Ready

When preparing data for the SAS PSI and IQI software programs, you should be aware that a few steps are essential for running the programs without errors.

1. Format and structure your dataset so that it matches the structure specified in the documentation. If you try to run the program without first structuring and formatting the data to the exact specifications listed, the program will not run properly. All numeric variables must be specified as numeric, and all character variables must be specified as character.
2. In some cases, you may not have a variable in your dataset that is required by the program. If it is not essential for calculating the rates, you may create an empty variable so that the program will run (e.g., AGEDAY, DQTR, and PAY2 may be created and set to missing).
3. The KEY variable is the unique case identifier. It is important that this variable be a unique numeric identifier for each record. You may create this variable in SAS using the built-in case counter (KEY = _n_;
4. For the IQI programs, to obtain risk-adjusted rates, you must run APR-DRG software first and indicate this with the flag variables APR_DRG, APRDRG_RISK_MORTALITY, and XPRDRG_RISK_MORTALITY. If you are not interested in obtaining risk-adjusted rates, you may adjust these variables so that the program will still run without errors. Specific directions are listed in the IQI documentation (Section 5.3).

Modifying the AHRQ SAS Programs

The control files used to specify the programs' parameters are CONTROL_PSI.SAS and CONTROL_IQI.SAS. Each command in this file is preceded by a comment and brief instructions. For some of the commands, the control file states that the user "MUST modify" the code. In other cases, the control file states that the user "MAY modify" the code. However, depending on the structure of your data, sometimes you *must* address these seemingly optional modifications. This is not clearly explained in the code.

For example, the number of diagnosis codes (Dx) or procedures *must* be changed if it does not match your data exactly. If you have 20 diagnosis code variables, the default number of diagnosis codes (30) must be changed or the program will not run properly.

Errors may not appear until you run the PSSAS1.SAS or IQSAS1.SAS files. When troubleshooting, check the structure of the data and the control file first.

Example of SAS Program Output

An example of the output from the SAS programs for the PSI rates is provided on the following pages. This output was generated from a run of the programs on the data for one large hospital, which had a large set of discharge records that would have the best chance of finding events for the numerators in the observed rates. Even in this case, however, you will see that zero events were found for some of the Indicators.

NOTE: Refer to tool B.1, Applying the AHRQ QIs to Hospital Data, for definitions of the four types of rates.

This output consists of three tables, each of which was generated by one of the following SAS programs: PSSASP2, PSSASP3, and PSI_COMPOSITE.SAS. In each table, the first line of output for each set of measures involved is highlighted in light gray, to assist you in navigating the table. For example, the line in the first table for TPPS02 DEATH IN LOW MORTALITY DRGS (numerator) is highlighted; this line is followed by additional numerator data for all the other PSIs. Then the line for the population (denominator) for this indicator is highlighted, again followed by data for the remaining PSIs.

The output from PSSASP3, which calculates the expected, risk-adjusted, and smoothed rates, first lists the numerators, denominators, and observed rates for the Indicators. This replicates the output from PSSASP2 (Note: When running the 4.5 version of the software, some indicators did not have the same numerator, denominator, and rates in PSSASP2 and PSSASP3. Some observations were dropped in P3.

The AHRQ QI team has been notified of this issue and it should be resolved in future releases of the software). Then the other rates are presented in a group for each indicator in turn.

The values reported on each line are the minimum, maximum, mean, and sum for each measure (numerator, population, rate). Because this output is for one hospital, all the values on each line are the same. If the programs had been run for a group of hospitals, these values would differ because the results would be for a distribution of results across hospitals.

In the example below:

TPPS = number of events for a given indicator (identified by the PSI number)

PPPS = the number of individuals in the population at risk for the event

OPSS = the observed rate of a given event

EPPS = the expected rate of a given event

RPPS = the risk-adjusted rate of a given event

VPPS = the variance for the risk-adjusted rate of a given event

SPPS = the smoothed rate of a given event

XPPS = the standard error of the smoothed rate of a given event

LPPS = the lower confidence interval for the smoothed rate

UPPS = the upper confidence interval for the smoothed rate

PSSASP2.SAS

PROGRAM: P2
 AHRQ PATIENT SAFETY INDICATORS: CALCULATE OBSERVED PROVIDER RATES
 SUMMARY OF PROVIDER-LEVEL RATES (_TYPE_=16)

The MEANS Procedure

Variable	N	N Miss	Minimum	Maximum	Mean	Sum
hospid	1	0	1	1	1	1
AGECAT	0	1	.	.	.	.
SEXCAT	0	1	.	.	.	.
PAYCAT	0	1	.	.	.	.
RACECAT	0	1	.	.	.	.
TYPE	1	0	16	16	16	16
TPPS02	1	0	8	8	8	8
TPPS03	1	0	5	5	5	5
TPPS04	1	0	3	3	3	3
TPPS04A	1	0	0	0	0	0
TPPS04B	1	0	0	0	0	0
TPPS04C	1	0	1	1	1	1
TPPS04D	0	1	.	.	.	.
TPPS04E	1	0	1	1	1	1
TPPS05	0	1	.	.	.	.
TPPS06	1	0	0	0	0	0
TPPS07	1	0	9	9	9	9
TPPS08	1	0	0	0	0	0
TPPS09	1	0	2	2	2	2
TPPS10	0	1	.	.	.	.
TPPS11	0	1	.	.	.	.
TPPS12	1	0	3	3	3	3
TPPS13	0	1	.	.	.	.
TPPS14	1	0	0	0	0	0

TPPS15	1	0	6	6	6	6
TPPS16	0	1	.	.	.	.
TPPS18	0	1	.	.	.	.
TPPS19	0	1	.	.	.	.
PPPS02	1	0	132	132	132	132
PPPS03	1	0	1147	1147	1147	1147
PPPS04	1	0	18	18	18	18
PPPS04A	1	0	4	4	4	4
PPPS04B	1	0	8	8	8	8
PPPS04C	1	0	4	4	4	4
PPPS04D	0	1	.	.	.	.
PPPS04E	1	0	2	2	2	2
PPPS05	0	1	.	.	.	.
PPPS06	1	0	4777	4777	4777	4777
PPPS07	1	0	7007	7007	7007	7007
PPPS08	1	0	425	425	425	425
PPPS09	1	0	750	750	750	750
PPPS10	0	1	.	.	.	.
PPPS11	0	1	.	.	.	.
PPPS12	1	0	785	785	785	785
PPPS13	0	1	.	.	.	.
PPPS14	1	0	346	346	346	346
PPPS15	1	0	5071	5071	5071	5071
PPPS16	0	1	.	.	.	.
PPPS18	0	1	.	.	.	.
PPPS19	0	1	.	.	.	.
OPPS02	1	0	0.060606	0.060606	0.060606	0.060606
OPPS03	1	0	0.004359	0.004359	0.004359	0.004359
OPPS04	1	0	0.166667	0.166667	0.166667	0.166667
OPPS04A	1	0	0	0	0	0
OPPS04B	1	0	0	0	0	0

OPPS04C	1	0	0.25	0.25	0.25	0.25
OPPS04D	0	1	.	.	.	.
OPPS04E	1	0	0.5	0.5	0.5	0.5
OPPS05	0	1	.	.	.	.
OPPS06	1	0	0	0	0	0
OPPS07	1	0	0.001284	0.001284	0.001284	0.001284
OPPS08	1	0	0	0	0	0
OPPS09	1	0	0.002667	0.002667	0.002667	0.002667
OPPS10	0	1	.	.	.	.
OPPS11	0	1	.	.	.	.
OPPS12	1	0	0.003822	0.003822	0.003822	0.003822
OPPS13	0	1	.	.	.	.
OPPS14	1	0	0	0	0	0
OPPS15	1	0	0.001183	0.001183	0.001183	0.001183
OPPS16	0	1	.	.	.	.
OPPS18	0	1	.	.	.	.
OPPS19	0	1	.	.	.	.

PSSASP3.SAS

PROGRAM P3 PART II
 AHRQ PATIENT SAFETY INDICATORS: PROVIDER-LEVEL MERGED FILES
 SUMMARY OF PROVIDER-LEVEL RATES (_TYPE_=16)

The MEANS Procedure

Variable	N	N Miss	Minimum	Maximum	Mean	Sum
hospid	1	0	1	1	1	1
AGECAT	0	1	.	.	.	.
SEXCAT	0	1	.	.	.	.

PAYCAT	0	1	.	.	.	.
RACECAT	0	1	.	.	.	.
TYPE	1	0	16	16	16	16
TPPS05	0	1	.	.	.	.
TPPS16	0	1	.	.	.	.
TPPS18	0	1	.	.	.	.
TPPS19	0	1	.	.	.	.
PPPS18	0	1	.	.	.	.
PPPS19	0	1	.	.	.	.
OPPS18	0	1	.	.	.	.
OPPS19	0	1	.	.	.	.
TPPS02	1	0	8	8	8	8
PPPS02	1	0	132	132	132	132
EPPS02	1	0	0.002049	0.002049	0.002049	0.002049
OPPS02	1	0	0.060606	0.060606	0.060606	0.060606
RPPS02	1	0	0.008342	0.008342	0.008342	0.008342
VPPS02	1	0	2.91E-07	2.91E-07	2.91E-07	2.91E-07
SPPS02	1	0	0.005319	0.005319	0.005319	0.005319
XPPS02	1	0	0.000427	0.000427	0.000427	0.000427
LPPS02	1	0	0.007285	0.007285	0.007285	0.007285
UPPS02	1	0	0.0094	0.0094	0.0094	0.0094
TPPS03	1	0	5	5	5	5
PPPS03	1	0	1147	1147	1147	1147
EPPS03	1	0	0.000384	0.000384	0.000384	0.000384
OPPS03	1	0	0.004359	0.004359	0.004359	0.004359
RPPS03	1	0	0.0046	0.0046	0.0046	0.0046
VPPS03	1	0	3.73E-07	3.73E-07	3.73E-07	3.73E-07
SPPS03	1	0	0.002272	0.002272	0.002272	0.002272
XPPS03	1	0	0.000407	0.000407	0.000407	0.000407
LPPS03	1	0	0.003404	0.003404	0.003404	0.003404
UPPS03	1	0	0.005796	0.005796	0.005796	0.005796

TPPS04	1	0	3	3	3	3
PPPS04	1	0	18	18	18	18
EPPS04	1	0	0.080796	0.080796	0.080796	0.080796
OPPS04	1	0	0.166667	0.166667	0.166667	0.166667
RPPS04	1	0	0.242115	0.242115	0.242115	0.242115
VPPS04	1	0	0.008283	0.008283	0.008283	0.008283
SPPS04	1	0	0.129034	0.129034	0.129034	0.129034
XPPS04	1	0	0.027828	0.027828	0.027828	0.027828
LPPS04	1	0	0.063734	0.063734	0.063734	0.063734
UPPS04	1	0	0.420495	0.420495	0.420495	0.420495
TPPS04A	1	0	0	0	0	0
PPPS04A	1	0	4	4	4	4
EPPS04A	1	0	0.064225	0.064225	0.064225	0.064225
OPPS04A	1	0	0	0	0	0
RPPS04A	1	0	0	0	0	0
VPPS04A	1	0	0.02287	0.02287	0.02287	0.02287
SPPS04A	0	1	.	.	.	.
XPPS04A	0	1	.	.	.	.
LPPS04A	1	0	0	0	0	0
UPPS04A	1	0	0.296409	0.296409	0.296409	0.296409
TPPS04B	1	0	0	0	0	0
PPPS04B	1	0	8	8	8	8
EPPS04B	1	0	0.036189	0.036189	0.036189	0.036189
OPPS04B	1	0	0	0	0	0
RPPS04B	1	0	0	0	0	0
VPPS04B	1	0	0.034404	0.034404	0.034404	0.034404
SPPS04B	0	1	.	.	.	.
XPPS04B	0	1	.	.	.	.
LPPS04B	1	0	0	0	0	0
UPPS04B	1	0	0.363544	0.363544	0.363544	0.363544
TPPS04C	1	0	1	1	1	1

PPPS04C	1	0	4	4	4	4
EPPS04C	1	0	0.105699	0.105699	0.105699	0.105699
OPPS04C	1	0	0.25	0.25	0.25	0.25
RPPS04C	1	0	0.559157	0.559157	0.559157	0.559157
VPPS04C	1	0	0.11461	0.11461	0.11461	0.11461
SPPS04C	0	1	.	.	.	.
XPPS04C	0	1	.	.	.	.
LPPS04C	1	0	0	0	0	0
UPPS04C	1	0	1	1	1	1
EPPS04D	0	1	.	.	.	.
RPPS04D	0	1	.	.	.	.
LPPS04D	0	1	.	.	.	.
UPPS04D	0	1	.	.	.	.
PPPS04D	0	1	.	.	.	.
SPPS04D	0	1	.	.	.	.
XPPS04D	0	1	.	.	.	.
VPPS04D	0	1	.	.	.	.
TPPS04D	0	1	.	.	.	.
OPPS04D	0	1	.	.	.	.
TPPS04E	1	0	1	1	1	1
PPPS04E	1	0	2	2	2	2
EPPS04E	0	1	.	.	.	.
OPPS04E	1	0	0.5	0.5	0.5	0.5
RPPS04E	0	1	.	.	.	.
VPPS04E	0	1	.	.	.	.
SPPS04E	0	1	.	.	.	.
XPPS04E	0	1	.	.	.	.
LPPS04E	0	1	.	.	.	.
UPPS04E	0	1	.	.	.	.
TPPS06	1	0	0	0	0	0
PPPS06	1	0	72	72	72	72

EPPS06	1	0	0.003013	0.003013	0.003013	0.003013
OPPS06	1	0	0	0	0	0
RPPS06	1	0	0	0	0	0
VPPS06	1	0	8.80E-07	8.80E-07	8.80E-07	8.80E-07
SPPS06	1	0	0.000427	0.000427	0.000427	0.000427
XPPS06	1	0	0.000152	0.000152	0.000152	0.000152
LPPS06	1	0	0	0	0	0
UPPS06	1	0	0.001839	0.001839	0.001839	0.001839
TPPS07	1	0	9	9	9	9
PPPS07	1	0	7007	7007	7007	7007
EPPS07	1	0	0.002858	0.002858	0.002858	0.002858
OPPS07	1	0	0.001284	0.001284	0.001284	0.001284
RPPS07	1	0	0.000184	0.000184	0.000184	0.000184
VPPS07	1	0	8.31E-09	8.31E-09	8.31E-09	8.31E-09
SPPS07	1	0	0.00019	0.00019	0.00019	0.00019
XPPS07	1	0	8.99E-05	8.99E-05	8.99E-05	8.99E-05
LPPS07	1	0	5.15E-06	5.15E-06	5.15E-06	5.15E-06
UPPS07	1	0	0.000362	0.000362	0.000362	0.000362
EPPS08	0	1	.	.	.	.
RPPS08	0	1	.	.	.	.
LPPS08	0	1	.	.	.	.
UPPS08	0	1	.	.	.	.
PPPS08	0	1	.	.	.	.
SPPS08	0	1	.	.	.	.
XPPS08	0	1	.	.	.	.
VPPS08	0	1	.	.	.	.
TPPS08	0	1	.	.	.	.
OPPS08	0	1	.	.	.	.
TPPS09	1	0	2	2	2	2
PPPS09	1	0	750	750	750	750
EPPS09	1	0	0.015777	0.015777	0.015777	0.015777

OPPS09	1	0	0.002667	0.002667	0.002667	0.002667
RPPS09	1	0	0.00097	0.00097	0.00097	0.00097
VPPS09	1	0	2.71E-06	2.71E-06	2.71E-06	2.71E-06
SPPS09	1	0	0.003287	0.003287	0.003287	0.003287
XPPS09	1	0	0.001181	0.001181	0.001181	0.001181
LPPS09	1	0	0	0	0	0
UPPS09	1	0	0.004198	0.004198	0.004198	0.004198
EPPS10	0	1	.	.	.	.
RPPS10	0	1	.	.	.	.
LPPS10	0	1	.	.	.	.
UPPS10	0	1	.	.	.	.
PPPS10	0	1	.	.	.	.
SPPS10	0	1	.	.	.	.
XPPS10	0	1	.	.	.	.
VPPS10	0	1	.	.	.	.
TPPS10	0	1	.	.	.	.
OPPS10	0	1	.	.	.	.
EPPS11	0	1	.	.	.	.
RPPS11	0	1	.	.	.	.
LPPS11	0	1	.	.	.	.
UPPS11	0	1	.	.	.	.
PPPS11	0	1	.	.	.	.
SPPS11	0	1	.	.	.	.
XPPS11	0	1	.	.	.	.
VPPS11	0	1	.	.	.	.
TPPS11	0	1	.	.	.	.
OPPS11	0	1	.	.	.	.
TPPS12	1	0	3	3	3	3
PPPS12	1	0	785	785	785	785
EPPS12	1	0	0.005542	0.005542	0.005542	0.005542
OPPS12	1	0	0.003822	0.003822	0.003822	0.003822

RPPS12	1	0	0.003014	0.003014	0.003014	0.003014
VPPS12	1	0	4.34E-06	4.34E-06	4.34E-06	4.34E-06
SPPS12	1	0	0.003637	0.003637	0.003637	0.003637
XPPS12	1	0	0.001532	0.001532	0.001532	0.001532
LPPS12	1	0	0	0	0	0
UPPS12	1	0	0.007095	0.007095	0.007095	0.007095
EPPS13	0	1	.	.	.	.
RPPS13	0	1	.	.	.	.
LPPS13	0	1	.	.	.	.
UPPS13	0	1	.	.	.	.
PPPS13	0	1	.	.	.	.
SPPS13	0	1	.	.	.	.
XPPS13	0	1	.	.	.	.
VPPS13	0	1	.	.	.	.
TPPS13	0	1	.	.	.	.
OPPS13	0	1	.	.	.	.
TPPS14	1	0	0	0	0	0
PPPS14	1	0	23	23	23	23
EPPS14	1	0	0.001373	0.001373	0.001373	0.001373
OPPS14	1	0	0	0	0	0
RPPS14	1	0	0	0	0	0
VPPS14	1	0	0.00011	0.00011	0.00011	0.00011
SPPS14	1	0	0.001852	0.001852	0.001852	0.001852
XPPS14	1	0	0.000982	0.000982	0.000982	0.000982
LPPS14	1	0	0	0	0	0
UPPS14	1	0	0.020589	0.020589	0.020589	0.020589
TPPS15	1	0	6	6	6	6
PPPS15	1	0	5071	5071	5071	5071
EPPS15	1	0	0.004709	0.004709	0.004709	0.004709
OPPS15	1	0	0.001183	0.001183	0.001183	0.001183
RPPS15	1	0	0.00061	0.00061	0.00061	0.00061

VPPS15	1	0	2.42E-07	2.42E-07	2.42E-07	2.42E-07
SPPS15	1	0	0.000904	0.000904	0.000904	0.000904
XPPS15	1	0	0.000451	0.000451	0.000451	0.000451
LPPS15	1	0	0	0	0	0
UPPS15	1	0	0.001575	0.001575	0.001575	0.001575
EPPS18	0	1	.	.	.	.
EPPS19	0	1	.	.	.	.
RPPS18	0	1	.	.	.	.
RPPS19	0	1	.	.	.	.
SEPS18	0	1	.	.	.	.
SEPS19	0	1	.	.	.	.
VPPS18	0	1	.	.	.	.
VPPS19	0	1	.	.	.	.
SNPS18	0	1	.	.	.	.
SNPS19	0	1	.	.	.	.
SPPS18	0	1	.	.	.	.
SPPS19	0	1	.	.	.	.
XPPS18	0	1	.	.	.	.
XPPS19	0	1	.	.	.	.
LPPS18	0	1	.	.	.	.
LPPS19	0	1	.	.	.	.
UPPS18	0	1	.	.	.	.
UPPS19	0	1	.	.	.	.

PATIENT SAFETY INDICATOR COMPOSITE

The MEANS Procedure

Variable	Label	N	Mean
COMP1	PSI #90 Patient Safety for Selected Indicators	2	0.7152431
COMP1VAR	PSI #90 Patient Safety for Selected Indicators (Variance)	2	0.0191418
COMP1SE	PSI #90 Patient Safety for Selected Indicators (SE)	2	0.1383537
COMP1WHT	PSI #90 Patient Safety for Selected Indicators (Weighted Denominator)	2	3184.12

INSTRUCTIONS

IQI AND PSI RATES GENERATED BY THE AHRQ *WINDOWS QI* SOFTWARE

Guidance for Using the *Windows QI* Software and an Example of Output for One Hospital

What is this tool? To work with the Inpatient Quality Indicators (IQIs) and Patient Safety Indicators (PSIs) for assessing its own performance, a hospital needs to calculate rates for these indicators, using the *Windows* software provided by the Agency for Healthcare Research and Quality (AHRQ). This tool provides three sets of information to help you work with the *Windows* software to calculate rates for your hospital and use the output from the software:

- An outline of the steps used to calculate rates for the IQIs and PSIs.
- Notes for analysts and programmers on issues to manage in working with the *Windows* software.
- An example of the output from the *Windows* Software for one hospital.

Who are the target audiences? The primary audience for this tool is the programmers or analysts who will perform the calculations of rates for the IQIs and PSIs.

How can the tool help you? The examples and guidance provided by this tool should help you work more easily with the *Windows* software used to calculate the IQIs and PSIs for your hospital, and to read and use the output from the software.

How does this tool relate to others? This tool should be used together with the B.1 tool on *Applying the Quality Indicators to Hospital Data*, which explains the different types of rates calculated for the IQIs and PSIs.

Software Installation

Before installing and running the Windows QI software, you must first determine whether you have the requisite programs and permissions.

Installation instructions are available on the AHRQ QI Web site:

[http://www.qualityindicators.ahrq.gov/Downloads/Software/WinQI/V45/Software%20Instructions%20\(WinQI\)%20V4.5.pdf](http://www.qualityindicators.ahrq.gov/Downloads/Software/WinQI/V45/Software%20Instructions%20(WinQI)%20V4.5.pdf)

Reading this file and following the steps listed will address issues related to the installation of the software.

Make sure your Windows OS has the latest Service Pack and updates applied. The Windows QI software has been tested on the following configurations: Microsoft SQL Server 2005 or 2008 (if the dataset contains more than about 4.5 million discharge records, then 2008 is required).

Your information technology (IT) department's policies pertaining to SQL servers may affect your ability to install and use the Windows software. If so, you will need to contact your IT department's personnel for help accessing the server. Because each hospital's IT department's policies differ, we cannot effectively address all the issues that arise during this process.

Indicator Data Generated by the Windows Software

The Windows software provided by AHRQ for calculation of the IQIs and PSIs, as well as documentation on how to use the software, can be found on the AHRQ QI Web site:

www.qualityindicators.ahrq.gov/Software/WinQI.aspx

Once the software is installed, it will guide you through the following steps to produce the rates for both the IQIs and PSIs:

1. Identify outcomes in inpatient records.
2. Identify populations at risk.
3. Calculate observed (raw) indicator rates.
4. Risk adjust the indicator rates (where applicable).
5. Create smoothed rates using multivariate signal extraction (where applicable).

Notes for Analysts and Programmers

The documentation provides guidance on how to set up your file and run the software. However, as is usually the case when applying new software to a data file, several issues have been identified that you will need to manage as you work with the AHRQ Windows QI software. The identified issues are discussed here, to help ease your first application of the software to your data. Once you have run the software successfully, any use of them on subsequent data should proceed smoothly.

Getting Your Data Ready

When preparing data for the Windows QI software program, you should be aware that a few steps are essential for running the program correctly.

1. Format and structure your dataset so that it matches the structure specified in the documentation. If you try to run the program without first structuring and formatting the data to the exact specifications listed, the program will not run properly. All numeric variables must be specified as numeric, and all character variables must be specified as character (string). Diagnosis codes should not have a decimal point (and they will need to be removed prior to importing). Variable names do NOT need to match those in the table.
2. The KEY variable is the unique case identifier. This variable is not required by the software but is useful for merging discharge records in the patient-level report with the input data.
3. Not all variables are required to determine your rates, but some are necessary for stratification and other analyses. See Appendix A to determine whether you have the necessary variables for your intended analyses.

4. Some users found that their datasets were too large to use with the software and their available computing capacity. These individuals found it necessary to use only a subset of their data at a time in order to run the program.
5. An APR-DRG Grouper is built in to the software if your data lack APR-DRG values. Use of this grouper is optional. You may use your institution's APR-DRG values if they are available and you choose to do so.

Running the Software

If you are running the software using the Windows 7 operating system, it is important to install and run the software as an administrator. Failing to do so will result in errors.

Once your data are ready, there is an Import Wizard that will allow you to map your variables with those required by the software. This map can be saved so that you do not need to repeat this step the next time you run the program.

There is an option to check the readability of your data to ensure that every row can be read and that every row has the same number of columns.

Rows with missing data for required variables will not be included in the analysis.

Once the variables have been identified and the data have been verified, indicator flags are created by the software. Data can then be saved as a CSV file if desired and will remain until new data are uploaded. Mapping files can also be saved at this time.

The user can then use the toolbar on the left side of the screen to generate reports and rates. Below are examples of two tables that can be created. Many other report options are available in the software that your hospital may find useful, but we only illustrate two basic examples here.

Example of Windows Software Output

An example of the output from the Windows software is provided on the following pages. This output was generated from a run of the program on the data for one large hospital, which had a large set of discharge records that would have the best chance of finding events for the numerators in the observed rates. Even in this case, however, you will see that zero events were found for some of the indicators.

NOTE: Refer to Tool B.1, Applying the AHRQ Quality Indicators to Hospital Data, for definitions of the four types of rates.

This output consists of three tables: Quick Report provider level, Quick Report area level, and Provider Report. The Quick Report provides a summary of the numerators, denominators, and observed rates for the uploaded data. This report is generated by the software and can be saved in rich text format (RTF).

The user may customize the Provider Report to include any number of indicators (including Experimental Quality Indicators, Inpatient Quality Indicators, Neonatal Quality Indicators, Pediatric Quality Indicators, and Patient Safety Indicators). Users may also choose to stratify based on a number of variables, including hospital, age category, sex, year, quarter, payer, race, or any other custom indicator they have in their dataset. This sample Provider Report gives the observed numerator, observed denominator, observed rate, expected rate, risk-adjusted rate, and smoothed rate for the PSIs without any stratification. Data and rates generated using the Provider Report option can be saved in comma separated value (CSV) format.

Quick Report

This is a summary of the numerators, denominators, and observed rates for your currently loaded data.

Num. (numerator) refers to the number of events. Den. (denominator) refers to the number of individuals in the population at risk for the event. The rate refers to the observed rate. Pop. (population) rate refers to the population rate that is used for risk adjustment.

Filename: C:\Users\Desktop\AHRQinputFile.csv
 Number of records: 11246
 Has POA Flags: Y

Provider Level Indicators

Indicator	Name	Num.	Den.	Rate	Pop. Rate
EXP1	EXP #1 Rate of Complications of Anesthesia	0	0	-	0.00083441
EXP2	EXP #2 Obstetric Trauma Rate - Cesarean Delivery	-	0	-	-
IQI8	IQI #8 Esophageal Resection Mortality Rate	0	0	-	0.05005828
IQI9	IQI #9 Pancreatic Resection Mortality Rate	1	2	0.5	0.03403043
IQI11	IQI #11 Abdominal Aortic Aneurysm (AAA) Repair Mortality Rate	0	1	0	0.0412298
IQI12	IQI #12 Coronary Artery Bypass Graft (CABG) Mortality Rate	0	0	-	0.02580359
IQI13	IQI #13 Craniotomy Mortality Rate	3	54	0.05555556	0.05701075
IQI14	IQI #14 Hip Replacement Mortality Rate	0	17	0	0.00094701
IQI15	IQI #15 Acute Myocardial Infarction (AMI) Mortality Rate	6	52	0.11538462	0.06068963
IQI16	IQI #16 Heart Failure Mortality Rate	6	454	0.01321586	0.03330349
IQI17	IQI #17 Acute Stroke Mortality Rate	24	180	0.13333333	0.09130635
IQI18	IQI #18 Gastrointestinal Hemorrhage Mortality Rate	1	165	0.00606061	0.02411881
IQI19	IQI #19 Hip Fracture Mortality Rate	0	32	0	0.02780279
IQI20	IQI #20 Pneumonia Mortality Rate	7	175	0.04	0.04021573
IQI21	IQI #21 Cesarean Delivery Rate, Uncomplicated	0	0	-	0.30005932
IQI22	IQI #22 Vaginal Birth After Cesarean Delivery Rate, Uncomplicated	0	0	-	0.09056967
IQI23	IQI #23 Laparoscopic Cholecystectomy Rate	112	130	0.86153846	0.84380955
IQI24	IQI #24 Incidental Appendectomy in the Elderly Rate	0	55	0	0.01093251
IQI25	IQI #25 Bilateral Cardiac Catheterization Rate	0	0	-	0.0141224
IQI30	IQI #30 Percutaneous Coronary Intervention (PCI) Mortality Rate	0	0	-	0.01733385
IQI31	IQI #31 Carotid Endarterectomy Mortality Rate	0	1	0	0.00401436
IQI32	IQI #32 AMI Mortality Rate, Without Transfer Cases	4	43	0.09302326	0.06394743
IQI33	IQI #33 Primary Cesarean Delivery Rate, Uncomplicated	0	0	-	0.17947409
IQI34	IQI #34 Vaginal Birth After Cesarean (VBAC) Rate, All	0	0	-	0.08994985
IQI1	IQI #1 Esophageal Resection Volume	0	-	-	-
IQI2	IQI #2 Pancreatic Resection Volume	2	-	-	-

IQI4	IQI #4 Abdominal Aortic Aneurysm (AAA) Repair Volume	1	-	-	-
IQI5	IQI #5 Coronary Artery Bypass Graft (CABG) Volume	0	-	-	-
IQI6	IQI #6 Percutaneous Coronary Intervention (PCI) Volume	0	-	-	-
IQI7	IQI #7 Carotid Endarterectomy Volume	1	-	-	-
NQI2	NQI #2 Neonatal Mortality Rate	0	0	-	0.00214117
NQI3	NQI #3 Neonatal Blood Stream Infection Rate	0	0	-	0.02316064
NQI1	NQI #1 Neonatal Iatrogenic Pneumothorax Rate	0	0	-	0.00019247
PDI5	PDI #5 Iatrogenic Pneumothorax Rate	0	0	-	0.00013748
PDI6	PDI #6 RACHS-1 Pediatric Heart Surgery Mortality Rate	0	0	-	0.03771004
PDI8	PDI #8 Perioperative Hemorrhage or Hematoma Rate	0	0	-	0.00462178
PDI9	PDI #9 Postoperative Respiratory Failure Rate	0	0	-	0.01018098
PDI10	PDI #10 Postoperative Sepsis Rate	0	0	-	0.01602384
PDI11	PDI #11 Postoperative Wound Dehiscence Rate	0	0	-	0.00105441
PDI12	PDI #12 Central Venous Catheter-Related BSI Rate	0	0	-	0.0006572
PDI1	PDI #1 Accidental Puncture or Laceration Rate	0	0	-	0.00053522
PDI2	PDI #2 Pressure Ulcer Rate	0	0	-	0.00013297
PDI3	PDI #3 Retained Surgical Item/Unretrieved Device Fragment Count	0	-	-	-
PDI7	PDI #7 RACHS-1 Pediatric Heart Surgery Volume	0	-	-	-
PDI13	PDI #13 Transfusion Reaction Count	0	-	-	-
PSI2	PSI #2 Death Rate in Low-Mortality DRGs	8	132	0.06060606	0.00028197
PSI3	PSI #3 Pressure Ulcer Rate	0	47	0	0.00040548
PSI4	PSI #4 DeathRateSurgInpatientswSeriousTreatableComplications	0	0	-	0.11737129
PSI6	PSI #6 Iatrogenic Pneumothorax Rate	0	207	0	0.00043869
PSI7	PSI #7 Central Venous Catheter-Related BSI Rate	0	140	0	0.00040896
PSI8	PSI #8 Postoperative Hip Fracture Rate	0	0	-	0.00003151
PSI9	PSI #9 Perioperative Hemorrhage or Hematoma Rate	0	0	-	0.00573977
PSI10	PSI #10 Postop Physiologic and Metabolic Derangement Rate	0	0	-	0.00046997
PSI11	PSI #11 Postop Respiratory Failure Rate	0	0	-	0.0083228
PSI12	PSI #12 Periop Pulmonary Embolism or DVT Rate	0	0	-	0.00437031
PSI13	PSI #13 Postoperative Sepsis Rate	0	0	-	0.01180386
PSI14	PSI #14 Postoperative Wound Dehiscence Rate	0	346	0	0.00186825
PSI15	PSI #15 Accidental Puncture or Laceration Rate	0	211	0	0.00242796
PSI17	PSI #17 Birth Trauma Rate - Injury to Neonate	0	0	-	0.00210694
PSI18	PSI #18 Obstetric Trauma Rate - Vaginal Delivery With Instrument	0	0	-	0.13992235
PSI19	PSI #19 Obstetric Trauma Rate - Vaginal Delivery WO Instrument	0	0	-	0.02254185
PSI5	PSI #5 Retained Surgical Item/Unretrieved Device Fragment Count	0	-	-	-
PSI16	PSI #16 Transfusion Reaction Count	0	-	-	-

Provider indicator population rates used in risk adjustment are based on the pooled discharges from the 2010 SID database. Population rates are only included for those indicators that use these rates in risk adjustment. One year empirical rates for indicators that are not risk adjusted may be found in the QI documentation.

Area Level Indicators

Indicator	Name	Num.	Pop. Rate
IQI26	IQI #26 Coronary Artery Bypass Graft (CABG) Rate	0	0.00152831942
IQI27	IQI #27 Percutaneous Coronary Intervention (PCI) Rate	0	0.00407135623
IQI28	IQI #28 Hysterectomy Rate	64	0.00300267371
IQI29	IQI #29 Laminectomy or Spinal Fusion Rate	11	0.0025957707
PDI14	PDI #14 Asthma Admission Rate	0	0.00123957363
PDI15	PDI #15 Diabetes Short-Term Complications Admission Rate	0	0.00026405267
PDI16	PDI #16 Gastroenteritis Admission Rate	0	0.00065731304
PDI17	PDI #17 Perforated Appendix Admission Rate	0	0.30621781707
PDI18	PDI #18 Urinary Tract Infection Admission Rate	0	0.00037248541
PDI90	PDI #90 Pediatric Quality Overall Composite	0	0.00160807621
PDI91	PDI #91 Pediatric Quality Acute Composite	0	0.00051610106
PDI92	PDI #92 Pediatric Quality Chronic Composite	0	0.00109197514
PQI1	PQI #1 Diabetes Short-Term Complications Admission Rate	77	0.00062060368
PQI2	PQI #2 Perforated Appendix Admission Rate	27	0.29773959496
PQI3	PQI #3 Diabetes Long-Term Complications Admission Rate	99	0.0011595108
PQI5	PQI #5 COPD or Asthma in Older Adults Admission Rate	176	0.00496390238
PQI7	PQI #7 Hypertension Admission Rate	21	0.0005913537
PQI8	PQI #8 Heart Failure Admission Rate	373	0.00342729734
PQI9	PQI #9 Low Birth Weight Rate	0	0.0623977499
PQI10	PQI #10 Dehydration Admission Rate	49	0.00121113493
PQI11	PQI #11 Bacterial Pneumonia Admission Rate	117	0.00296807473
PQI12	PQI #12 Urinary Tract Infection Admission Rate	98	0.00189089735
PQI13	PQI #13 Angina Without Procedure Admission Rate	19	0.00018884478
PQI14	PQI #14 Uncontrolled Diabetes Admission Rate	3	0.00018757573
PQI15	PQI #15 Asthma in Younger Adults Admission Rate	21	0.00052645244
PQI16	PQI #16 Lower-Extremity Amputation - Patients With Diabetes Rate	14	0.00015702575
PQI90	PQI #90 Prevention Quality Overall Composite	1059	0.01556071253
PQI91	PQI #91 Prevention Quality Acute Composite	264	0.00607010637
PQI92	PQI #92 Prevention Quality Chronic Composite	795	0.00949090839
PSI21	PSI #21 Retained Surgical Item/Unretrieved Device Fragment Rate	0	-
PSI22	PSI #22 Iatrogenic Pneumothorax Rate	0	-
PSI23	PSI #23 Central Venous Catheter-Related BSI Rate	0	-
PSI24	PSI #24 Postoperative Wound Dehiscence Rate	0	-
PSI25	PSI #25 Accidental Puncture or Laceration Rate	0	-
PSI26	PSI #26 Transfusion Reaction Rate	0	-
PSI27	PSI #27 Perioperative Hemorrhage or Hematoma Rate	13	-

Area indicator population rates used in risk adjustment are based on the pooled discharges from the 2007 SID database. Population rates are only provided for those indicators that use these rates for risk adjustment. One year empirical rates for indicators that are not risk adjusted may be found in the QI documentation. The rates displayed are without SES decile adjustment.

You may view observed rates for Area-level indicators by selecting the appropriate population and stratification options in the Report Wizard.

Provider Level Report

Report from 11/25/2013 11:21:59 AM

Provider report created 11/25/2013 11:22:21 AM

Report from 11/25/2013 11:21:59 AM

Rates Per case

NOTE: Refer to Tool B.1, Applying the AHRQ Quality Indicators to Hospital Data, for definitions of the different types of rates.

Name	Observed Numerator	Observed Denominator	Observed Rate	Expected Rate	O-E Ratio	Reference Population Rate	Risk Adjusted Rate	Smoothed Rate
PSI #2 Death Rate in Low-Mortality Diagnosis Related Groups (DRGs)	8	132	0.0606	0.001046	57.95983	0.000282	0.016343	0.007641
PSI #3 Pressure Ulcer Rate	0	47	0	0.000832	0	0.000405	0	0.000379
PSI #4 Death Rate among Surgical Inpatients with Serious Treatable Complications						0.117371		
PSI #5 Retained Surgical Item or Unretrieved Device Fragment Count								
PSI #6 Iatrogenic Pneumothorax Rate	0	207	0	0.000251	0	0.000439	0	0.000436
PSI #7 Central Venous Catheter-Related Blood Stream Infection Rate	0	140	0	0.000743	0	0.000409	0	0.000347
PSI #8 Postoperative						3.15E-		

Hip Fracture Rate						05		
PSI #9 Perioperative Hemorrhage or Hematoma Rate						0.0057		
						4		
PSI #10 Postoperative Physiologic and Metabolic Derangement Rate						0.0004		
						7		
PSI #11 Postoperative Respiratory Failure Rate						0.0083		
						23		
PSI #12 Perioperative Pulmonary Embolism or Deep Vein Thrombosis Rate						0.0043		
						7		
PSI #13 Postoperative Sepsis Rate						0.0118		
						04		
PSI #14 Postoperative Wound Dehiscence Rate	0	346	0	0.001	265	0	0.0018	0.0016
						68	0	65
PSI #15 Accidental Puncture or Laceration Rate	0	211	0	0.001	144	0	0.0024	0.0023
						28	0	09
PSI #16 Transfusion Reaction Count								
PSI #17 Birth Trauma Rate - Injury to Neonate						0.0021		
						07		
PSI #18 Obstetric Trauma Rate - Vaginal Delivery With						0.1399		
						22		

Instrument

PSI #19 Obstetric
Trauma Rate - Vaginal
Delivery Without
Instrument

0.0225
42

The risk-adjusted rate is the estimate of how a hospital would perform on an indicator for an average case mix of patients, rather than its own case mix. This rate can be found in the provider-level reports from the Windows or SAS QI programs. See the other B tools for more information (B1 explains what the rates mean; B2a and B2b show how to use the software with your data and obtain these rates).

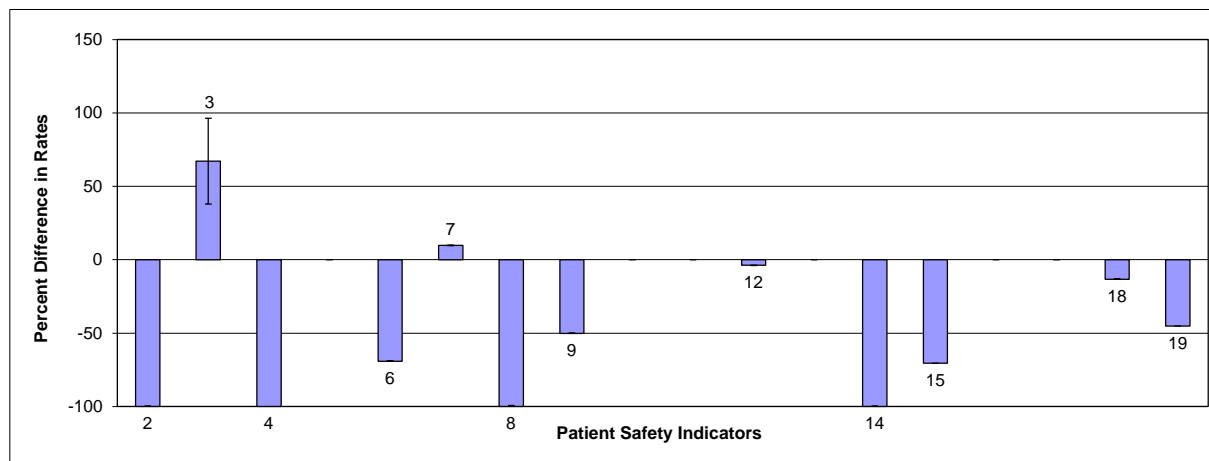
The confidence interval of the risk-adjusted rate is identified in the SAS output as the lower CL (lower confidence limit) and upper CL (upper confidence limit). When creating provider-level reports using the Windows QI software, the user must specify that the confidence levels be included in the report. See Tools B2a and B2b for more information.

The benchmark is the rate used as a comparison point. You may choose your State's rate, the national rate, or any other rate that you may wish to use as a comparison. See Tool B5 for more information about benchmarking.

Indicator	Enter your data here.				These calculate automatically.				
	Risk-Adjusted Rate	Risk-Adjusted (Lower Confidence Interval Bound)	Risk-Adjusted (Upper Confidence Interval Bound)	Benchmark	Percent Difference in Rates	Percent Difference in Rates (Lower Bound)	Percent Difference in Rates (Upper Bound)	Chart Label	How does your hospital compare to benchmark?
2 Death in low-mortality DRGs	0	0	0.000717	0.265	-100	0	0.27056604	2	Statistically Lower
3 Pressure ulcer	0.042752	0.03529	0.050213	0.025572	67.182856	29.1803535	29.176443	3	Statistically Higher
4 Death among surgical inpatients	0	0	0.094956	124.996	-100	0	0.07596723	4	Statistically Lower
5 Retained surgical item or unretrieved device fragment count				0.000086					
6 Iatrogenic pneumothorax	0.000187	0	0.000769	0.484	-99.961364	0.03863636	0.12024793	6	Statistically Lower
7 Central venous catheter-related bloodstream infections	0.002408	0.00139	0.003477	0.752	-99.679787	0.13537234	0.14215426	7	Statistically Lower
8 Postoperative hip fracture	0	0	0.001185	0.172	-100	0	0.68895349	8	Statistically Lower
9 Perioperative hemorrhage or hematoma	0.001197	0	0.004631	2.553	-99.953114	0.04688602	0.13450842	9	Statistically Lower
10 Postoperative physiologic and metabolic derangements				1.59					
11 Postoperative respiratory failure				10.74					
12 Perioperative pulmonary embolism or deep vein thrombosis	0.010752	0.009533	0.022906	8.138	-99.867879	0.01497911	0.14934873	12	Statistically Lower
13 Postoperative sepsis				17.433					
14 Postoperative wound dehiscence	0	0	0.007122	1.833	-100	0	0.38854337	14	Statistically Lower
15 Accidental puncture or laceration	0.001349	0	0.003125	2.598	-99.948075	0.05192456	0.06836028	15	Statistically Lower
16 Transfusion reaction				0.000004					
17 Birth trauma - injury to neonate				2.188					
18 Obstetric trauma - vaginal with instrument	0.139241	0.062898	0.215583	133.928	-99.896033	0.05700302	0.05700227	18	Statistically Lower
19 Obstetric trauma - vaginal without instrument	0.019846	0.013427	0.0262639	21.782	-99.908888	0.02946929	0.02946424	19	Statistically Lower

Note: Rates provided are per 1,000 cases.

Your Hospital's Performance Relative to National Benchmarks



The risk-adjusted rate is the estimate of how a hospital would perform on an indicator for an average case mix of patients, rather than its own case mix. This rate can be found in the provider-level reports from the Windows or SAS QI programs. See the other B tools for more information (B1 explains what the rates mean; B2a and B2b show how to use the software with your data and obtain these rates).

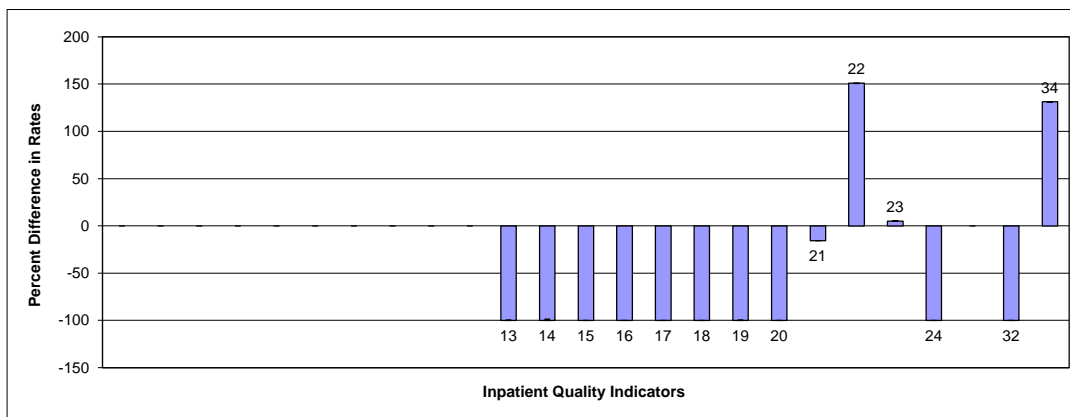
The confidence interval of the risk-adjusted rate is identified in the SAS output as the lower CL (lower confidence limit) and upper CL (upper confidence limit). When creating provider-level reports using the Windows QI software, the user must specify that the confidence levels be included in the report. See Tools B2a and B2b for more information.

The benchmark is the rate used as a comparison point. You may choose your State's rate, the national rate, or any other rate that you may wish to use as a comparison. See Tool B5 for more information about benchmarking.

Indicator	Enter your data here.				These calculate automatically.				
	Risk-Adjusted Rate	Risk-Adjusted (Lower Confidence Interval Bound)	Risk-Adjusted (Upper Confidence Interval Bound)	Benchmark	Percent Difference in Rates	Percent Difference in Rates (Lower Bound)	Percent Difference in Rates (Upper Bound)	Chart Label	How does your hospital compare to benchmark on this indicator?
1 Esophageal resection volume									
2 Pancreatic resection volume									
4 Abdominal aortic aneurysm (AAA) repair volume									
5 Coronary artery bypass graft (CABG) volume				0.224827					
6 Percutaneous coronary intervention (PCI) volume				0.661808					
7 Carotid endarterectomy mortality									
8 Esophageal resection mortality				46.756					
9 Pancreatic resection mortality				38.215					
11 Abdominal aortic aneurysm (AAA) repair mortality				40.321					
12 Coronary artery bypass graft (CABG) mortality				25.9					
13 Craniotomy mortality	0	0	0.217772	51.103	-100	0	0.42614328	13	Significantly Lower
14 Hip replacement mortality	0	0	0.0148536	1.098	-100	0	1.35278689	14	Significantly Lower
15 Acute myocardial infarction (AMI) mortality	0	0	0.0611616	58.783	-100	0	0.10404641	15	Significantly Lower
16 Heart failure mortality	0	0	0.0173928	31.98	-100	0	0.05438649	16	Significantly Lower
17 Acute stroke mortality	0	0	0.0601213	83.392	-100	0	0.07209481	17	Significantly Lower
18 Gastrointestinal (GI) hemorrhage mortality	0	0	0.0312235	22.413	-100	0	0.13930978	18	Significantly Lower
19 Hip fracture mortality	0	0	0.0637962	26.921	-100	0	0.2369756	19	Significantly Lower
20 Pneumonia mortality	0	0	0.0313046	38.107	-100	0	0.08214921	20	Significantly Lower
21 Cesarean delivery rate	0.238506	0.2209536	0.2561676	300.974	-99.920755	0.00583187	0.00586815	21	Significantly Lower
22 Vaginal birth after C-section (VBAC) rate, uncomplicated	0.2464589	0.2015022	0.2914156	96.143	-99.743654	0.04676024	0.04676024	22	Significantly Lower
23 Laparoscopic cholecystectomy rate	0.8493151	0.7672489	0.9313812	857.874	-99.900998	0.00956623	0.00956622	23	Significantly Lower
24 Incidental appendectomy rate among elderly	0	0	0	9.555	-100	0	0	24	Significantly Lower
25 Bilateral cardiac catheterization rate				13.697					
32 AMI mortality without transfer	0	0	0.0674293	61.276	-100	0	0.11004194	32	Significantly Lower
34 VBAC_all	0.2237443	0.1847144	0.2627742	95.456	-99.765605	0.04088784	0.04088784	34	Significantly Lower

Note: Rates provided are per 1,000 cases.

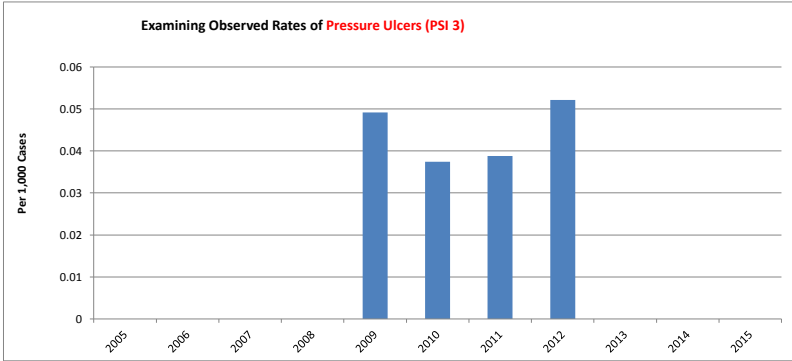
Your Hospital's Performance Relative to National Benchmarks



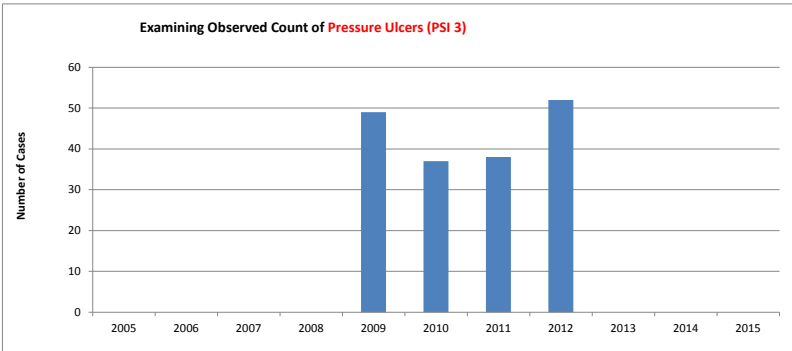
Enter Your Data Here		
Year	Observed Rate	Observed Count
2005		
2006		
2007		
2008		
2009	0.0491368	49
2010	0.0374269	37
2011	0.0387779	38
2012	0.0521654	52
2013		
2014		
2015		

The **observed rate** is the actual rate at which events measured by the indicator occurred in your hospital. This can be acquired from the SAS output, or the Windows QI output from the Quick Report. If another organization provides these data for you, you may also obtain it from them.

See the other B tools for more information (B1 explains what the rates mean; B2a and B2b show how to use the software with your data and obtain these rates).



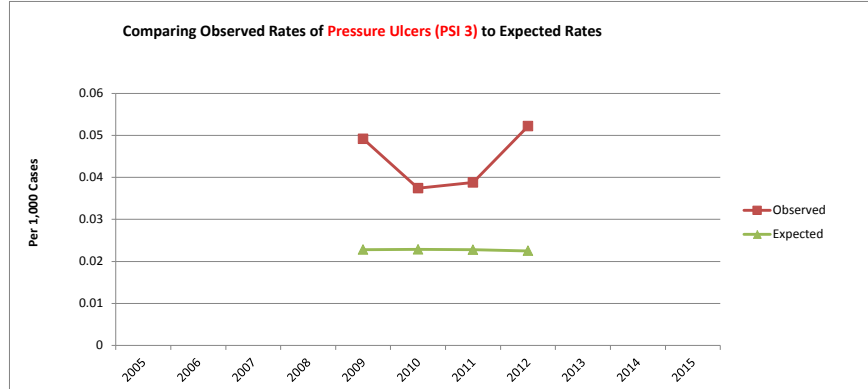
Directions: Add your data into the yellow cells beside the relevant year. Remove the "Pressure Ulcers" part of the title and revise it to reflect your PSI or IQI of interest.



The **observed rate** is the actual rate at which events measured by the indicator occurred in your hospital. This can be acquired from the SAS output, or the Windows QI output from the Quick Report. If another organization provides these data for you, you may also obtain it from them.

Enter Your Data Here		
Year	Observed	Expected
2005		
2006		
2007		
2008		
2009	0.0491368	0.0228119
2010	0.0374269	0.02283
2011	0.0387779	0.0227609
2012	0.0521654	0.02251
2013		
2014		
2015		

The **expected rate** is the rate a hospital would have if it had average performance on a QI, as calculated in a reference population but accounting for the hospital's actual case mix. This can be acquired from the SAS output or the Windows QI output from the Provider Report. See the other B tools for more information (B1 explains what the rates mean; B2a and B2b show how to use the software with your data and obtain these rates).



Directions: Add your data into the yellow cells beside the relevant year. Remove the "Pressure Ulcers" part of the title and revise it to reflect your PSI or IQI of interest.

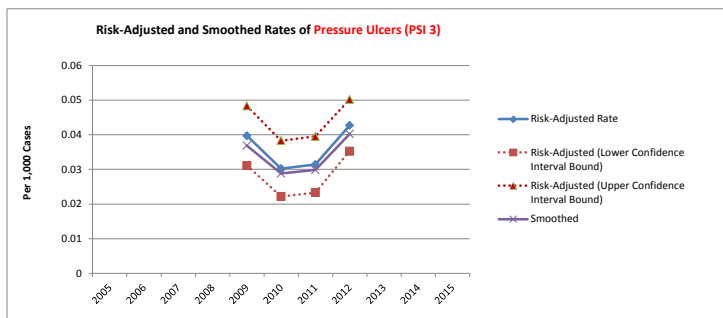
The **risk-adjusted** rate is the estimate of how a hospital would perform on an indicator for an average case mix of patients, rather than its own case mix. This rate can be found in the provider-level reports from the Windows or SAS QI programs.

The **confidence interval of the risk-adjusted rate** is identified in the SAS output as the lower CL (lower confidence limit) and upper CL (upper confidence limit). When creating provider-level reports using the Windows QI software, the user must specify that the confidence levels be included in the report.

The **smoothed rate** is a weighted average of the hospital's risk-adjusted rate and the reference population rate, where the weight reflects the reliability of the hospital's risk-adjusted rate. This can be found in the SAS output or the Windows QI Provider Report.

See the other B tools for more information (B1 explains what the rates mean; B2a and B2b show how to use the software with your data and obtain these rates).

Enter Your Data Here				
Year	Risk-Adjusted Rate	Risk-Adjusted (Lower Confidence Interval Bound)	Risk-Adjusted (Upper Confidence Interval Bound)	Smoothed
2005				
2006				
2007				
2008				
2009	0.0397357	0.0311275	0.0483439	0.03688993
2010	0.0302422	0.0221701	0.0383142	0.0288377
2011	0.031429	0.023324	0.039534	0.0298721
2012	0.042752	0.03529	0.050213	0.040235
2013				
2014				
2015				



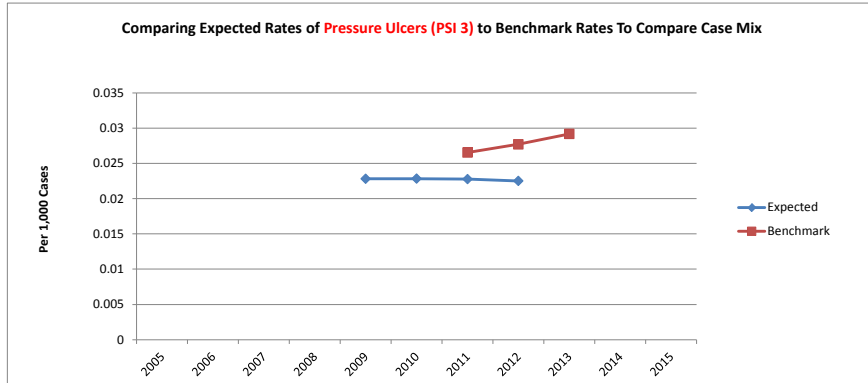
Directions: Add your data into the yellow cells beside the relevant year. Remove the "Pressure Ulcers" part of the title and revise it to reflect your PSI or IQI of interest.

The **expected rate** is the rate a hospital would have if it had average performance on a QI, as calculated in a reference population but accounting for the hospital's actual case mix. This can be acquired from the SAS output or the Windows QI output from the Provider Report.

The **benchmark** is the rate used as a comparison point. You may choose your State's rate, the national rate, or any other rate that you may wish to use as a comparison.

See the other B tools for more information (B1 explains what the rates mean; B2a and B2b show how to use the software with your data and obtain these rates; B5 explains how to use benchmarks).

Enter Your Data Here		
Year	Expected	Benchmark
2005		
2006		
2007		
2008		
2009	0.0228119	
2010	0.02283	
2011	0.0227609	0.02653
2012	0.02251	0.02771
2013		0.02918
2014		
2015		



Directions: Add your data into the yellow cells beside the relevant year. Remove the "Pressure Ulcers" part of the title and revise it to reflect your PSI or IQI of interest.

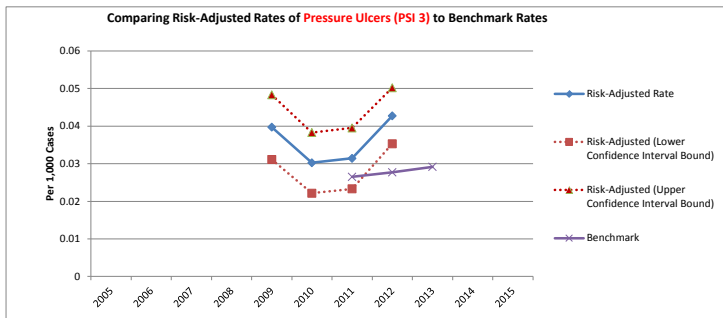
The **risk-adjusted** rate is the estimate of how a hospital would perform on an indicator for an average case mix of patients, rather than its own case mix. This rate can be found in the provider-level reports from the Windows or SAS QI programs.

The **confidence interval of the risk-adjusted rate** is identified in the SAS output as the lower CL (lower confidence limit) and upper CL (upper confidence limit). When creating provider-level reports using the Windows QI software, the user must specify that the confidence levels be included in the report.

The **benchmark** is the rate used as a comparison point. You may choose your State's rate, the national rate, or any other rate that you may wish to use as a comparison.

See the other B tools for more information (B1 explains what the rates mean; B2a and B2b show how to use the software with your data and obtain these rates; B5 explains how to use benchmarks).

Enter Your Data Here				
Year	Risk-Adjusted Rate	Risk-Adjusted (Lower Confidence Interval Bound)	Risk-Adjusted (Upper Confidence Interval Bound)	Benchmark
2005				
2006				
2007				
2008				
2009	0.0397357	0.0311275	0.0483439	
2010	0.0302422	0.0221701	0.0383142	
2011	0.031429	0.023324	0.039534	0.02653
2012	0.042752	0.03529	0.050213	0.02771
2013				0.02918
2014				
2015				



Directions: Add your data into the yellow cells beside the relevant year. Remove the "Pressure Ulcers" part of the title and revise it to reflect your PSI or IQI of interest.

EXCEL WORKSHEETS FOR CHARTS ON DATA, TRENDS, AND RATES TO POPULATE THE POWERPOINT PRESENTATION

Instructions

What is this tool? This tool takes the rates you have calculated about your hospital's performance on the AHRQ Quality Indicators (QIs) and displays the information graphically.

Who are the target audiences? The key users of this tool are the quality officers, quantitative analysts, and programmers involved in calculating the rates.

How can it help you? This tool helps you easily create graphs that display your hospital's results on the AHRQ QIs and how they compare to national benchmarks.

How does this tool relate to others? B2a (sample SAS program output) provides information on how to calculate the rates requested in this tool. Copy and paste the graphs produced by this tool into B3b (display QI results), which provides a PowerPoint template for presenting the results of your analysis.

Instructions

1. Determine which benchmark comparisons and/or trend analyses you would like to perform (see Tool B1).
 - a. Worksheets "compare-PSI-rates-benchmark" and "compare-IQI-rates-benchmark" can be used to get an overall picture of the hospital's overall patient safety or inpatient quality performance relative to a national sample of hospitals.
 - b. The "trend-observed," "trend-observed-expected," and "trend-risk-adjusted-smoothed" worksheets can be used to compare performance for a single indicator over time. The "trend-observed" sheet also has a place to enter count data and a chart for monitoring changes in counts over time.
 - c. The "trend-risk-adjusted-smoothed" worksheet can be used to compare the risk-adjusted rate and smoothed rate for a single indicator over time.
 - d. The "trend-expected-benchmark" worksheet can be used to track how expected performance on a single indicator (based on case mix) relative to national benchmark performance fluctuates over time.
 - e. The "trend-risk-adjusted-benchmark" worksheet can be used to track how a hospital's performance on an indicator and the national benchmark performance for that indicator fluctuate over time.
2. Obtain your rates using the QI software for SAS or Windows (see Tool B2).
3. Erase the sample data and enter your data in the yellow cells.

See the other B tools for more information (B1 explains what the rates mean; B2a and B2b show how to use the software with your data and obtain these rates).

The **observed rate** is the actual rate at which events measured by the indicator occurred in your hospital. This can be acquired from the SAS output or the Windows QI output from the

Quick Report. If another organization provides these data for you, you may also obtain it from them.

The **expected rate** is the rate a hospital would have if it had performed the same as the reference population given the hospital's actual case mix. This can be acquired from the SAS output or the Windows QI output from the Provider Report.

The **risk-adjusted rate** is the estimate of how a hospital would perform on an indicator for an average case mix of patients, rather than its own case mix. This rate can be found in the provider-level reports from the Windows or SAS QI programs.

The **confidence interval of the risk-adjusted rate** is identified in the SAS output as the lower CL (lower confidence limit) and upper CL (upper confidence limit). When creating provider-level reports using the Windows QI software, the user must specify that the confidence levels be included in the report. See Tools B2a and B2b for more information.

The **smoothed rate** is a weighted average of the hospital's risk-adjusted rate and the reference population rate, where the weight reflects the reliability of the hospital's risk-adjusted rate. This can be found in the SAS output or the Windows QI Provider Report.

4. Fill in the benchmark rates from the group of hospitals that you would like to use for comparison. Compare-PSI-rates-benchmark and compare-IQI-rates-benchmark will automatically compute percent difference and display how your hospital is performing relative to the national rate.

The **benchmark** is the rate used as a comparison point. You may choose your State's rate, the national rate, or any other rate that you may wish to use as a comparison. See Tool B5 for more information about benchmarking.

5. Modify the title of the graph or chart so that it reflects the years and indicators that you would like to observe over time.
6. Copy and paste the charts into the PowerPoint template or another document for display.

The AHRQ Quality Indicators

Results and Discussion of Data Analysis

INSTRUCTIONS FOR USING THIS TOOL – DELETE THIS SLIDE BEFORE PRESENTATION

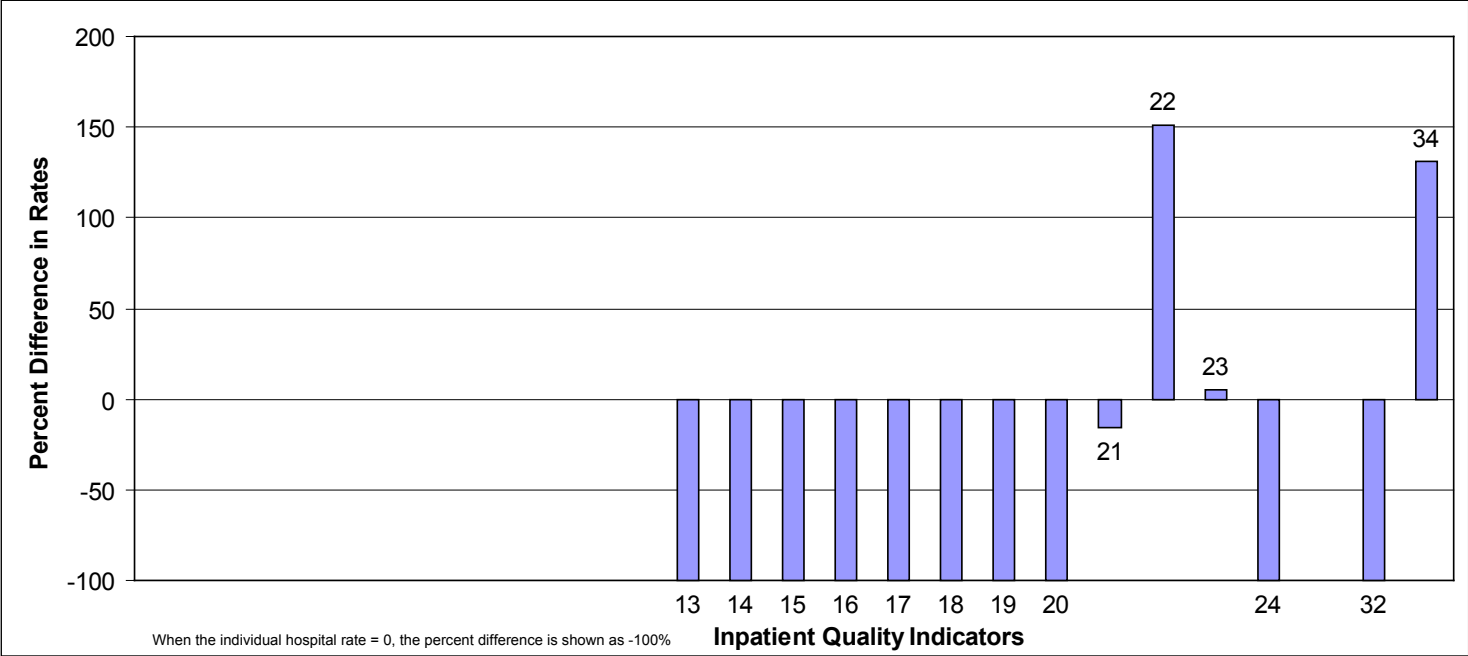
- *Use this PowerPoint presentation as a template for your presentation.*
- *Replace the charts with charts that you create with your data (use the Excel workbook for guidance) and replace the **red text** with your hospital's information.*

How can the AHRQ QIs be used in quality assessment?

- Can be used to:
 - Flag potential problems in quality of care
 - Assess performance and compare against peer hospitals
 - Observe your hospital's performance over time

Source: www.qualityindicators.ahrq.gov and AHRQ Quality Indicators Toolkit Literature Review

Your Hospital's Performance Relative to National Benchmarks

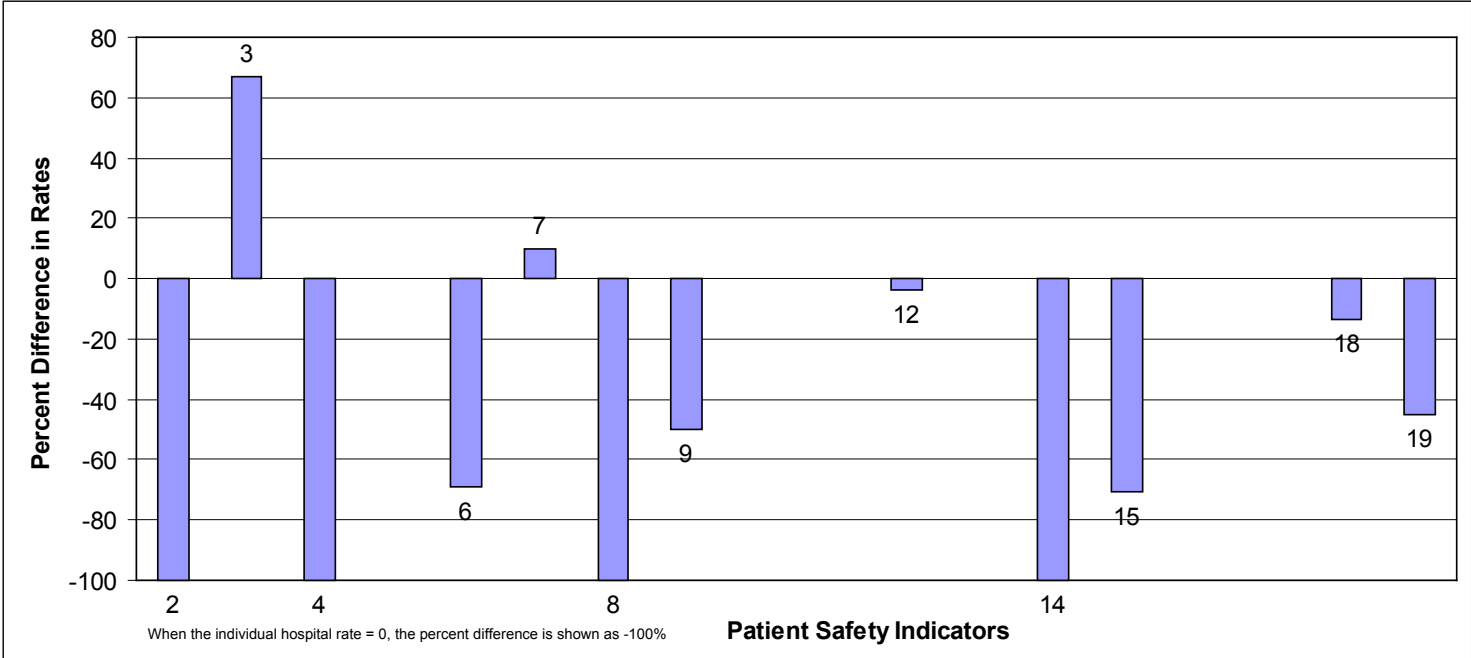


Relative to a national sample of hospitals, Your Hospital has similar or better performance on most of the IQIs.

Notes:

This chart comes from the Excel worksheet (compare-IQI-rates-benchmark).

Your Hospital's Performance Relative to National Benchmarks



Relative to a national sample of hospitals, Your Hospital has similar or better performance on many of the PSIs. However, Pressure Ulcers (PSI 3) occur at higher rates than the national sample – this may be an area where Your Hospital should focus quality improvement efforts.

Notes:

This chart comes from the Excel worksheet (compare-PSI-rates-benchmark).

DELETE THIS SLIDE BEFORE PRESENTATION

- *In this example, we will examine the rates of Pressure Ulcers (PSI 3) and how this particular hospital performed over time.*
- *Determine which indicator(s) you would like to focus on, and fill in these slides based on that indicator and your hospital's data.*
- *Based on the information that you would like to present, you may choose not to use all of the slides available here.*

Indicators That Require Attention

- Based on a review of **Your Hospital's** performance on the IQIs and PSIs, we have decided to focus on the following indicators:
 - **Pressure Ulcer (PSI 3)**
 -
 -
 -
 -

DELETE THIS SLIDE BEFORE PRESENTATION

- *You may want to include information about the indicator as background information.*
- *Go to www.qualityindicators.ahrq.gov/ or see the Fact Sheet in this toolkit (Tool A1) to obtain this information.*

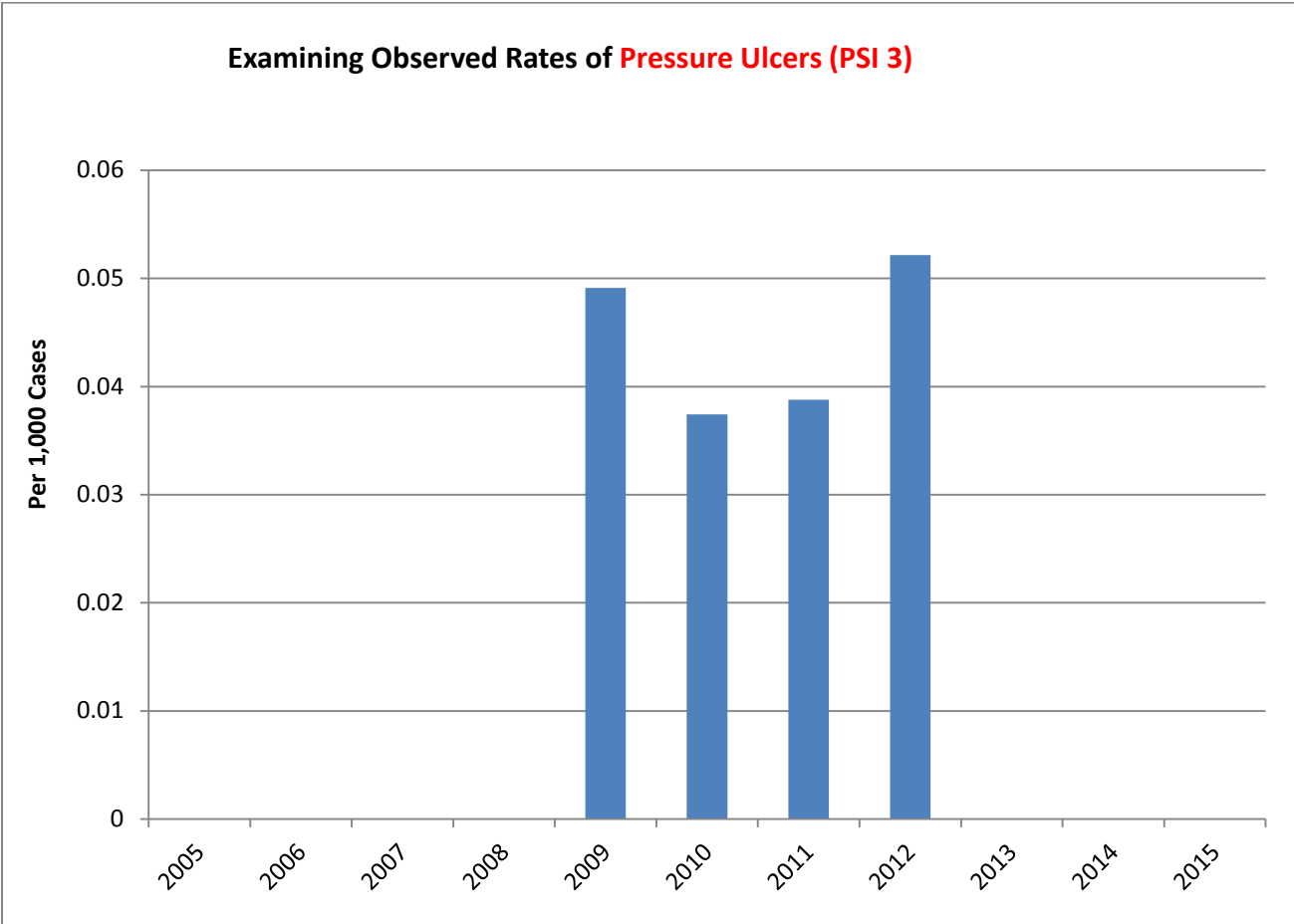
A PSI Example: Pressure Ulcer (PSI 3)

- Numerator: Discharges with ICD-9-CM code of pressure ulcer in any secondary diagnosis field among cases meeting the inclusion and exclusion rules for the denominator
- Denominator: All medical and surgical discharges age 18 years and older defined by specific DRGs or Medicare Severity DRGs that do not meet any of the exclusion criteria
- ***DELETE THIS TEXT BEFORE PRESENTATION: Replace this information with information about your chosen indicators. Copy this slide and repeat as necessary.***

ICD-9 = International Classification of Diseases, 9th Revision; DRG = diagnosis-related group.

Source: www.qualityindicators.ahrq.gov/Modules/PSI_TechSpec.aspx.

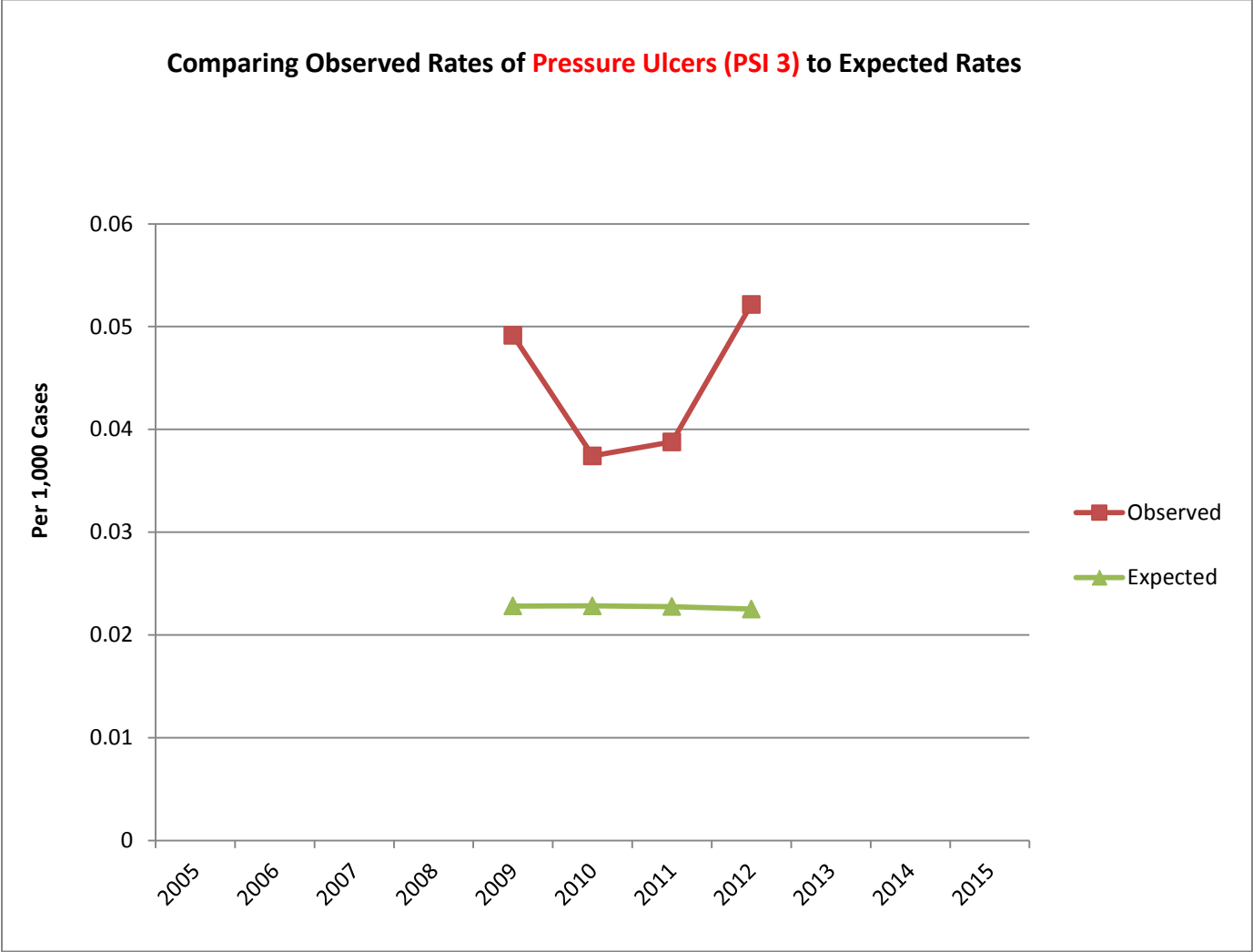
Comparing Performance Over Time



Notes:

This chart comes from the Excel worksheet (trend-observed).

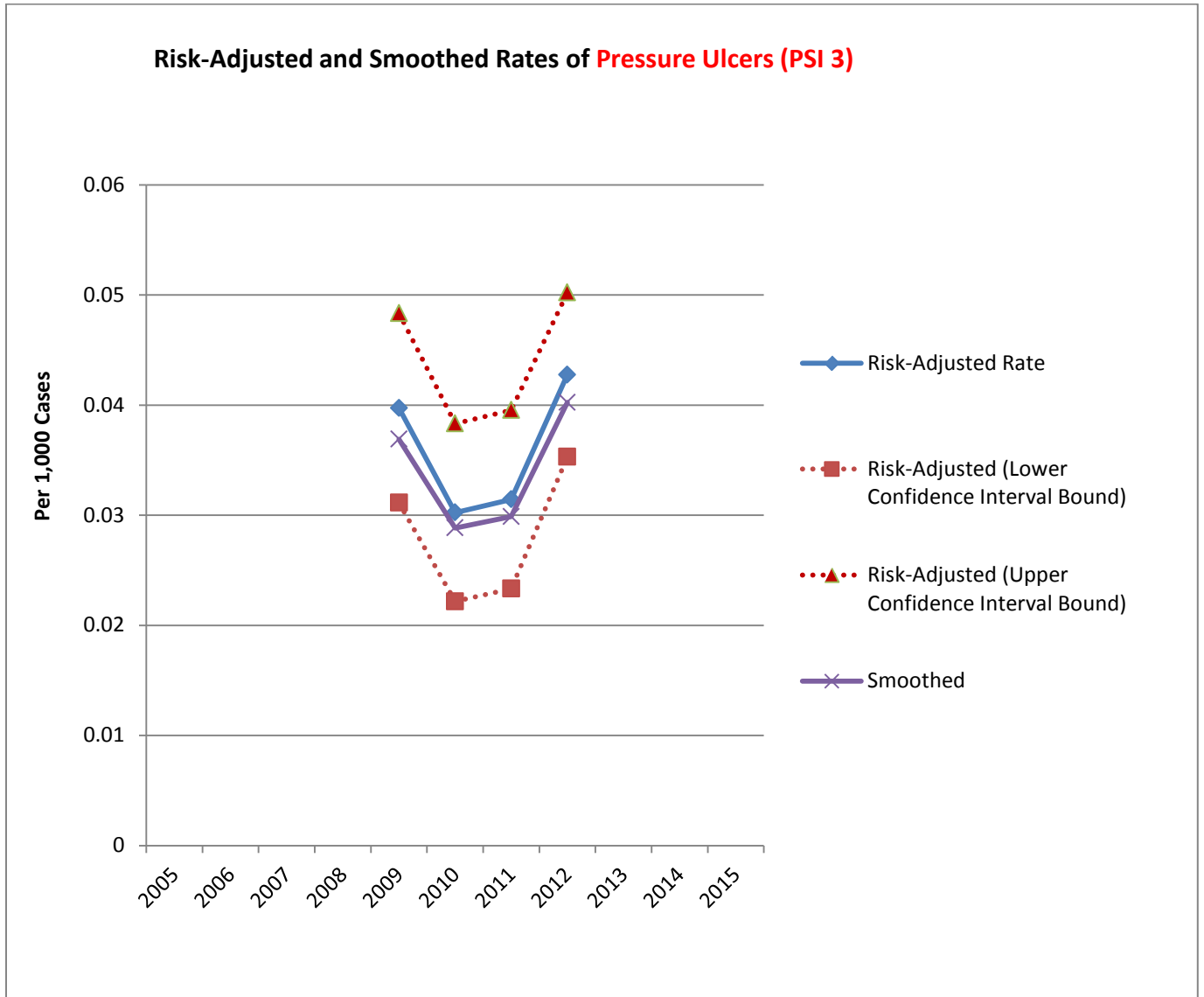
Comparing Observed Performance to Expected Performance over Time



Notes:

This chart comes from the Excel worksheet (trend-observed-expected).

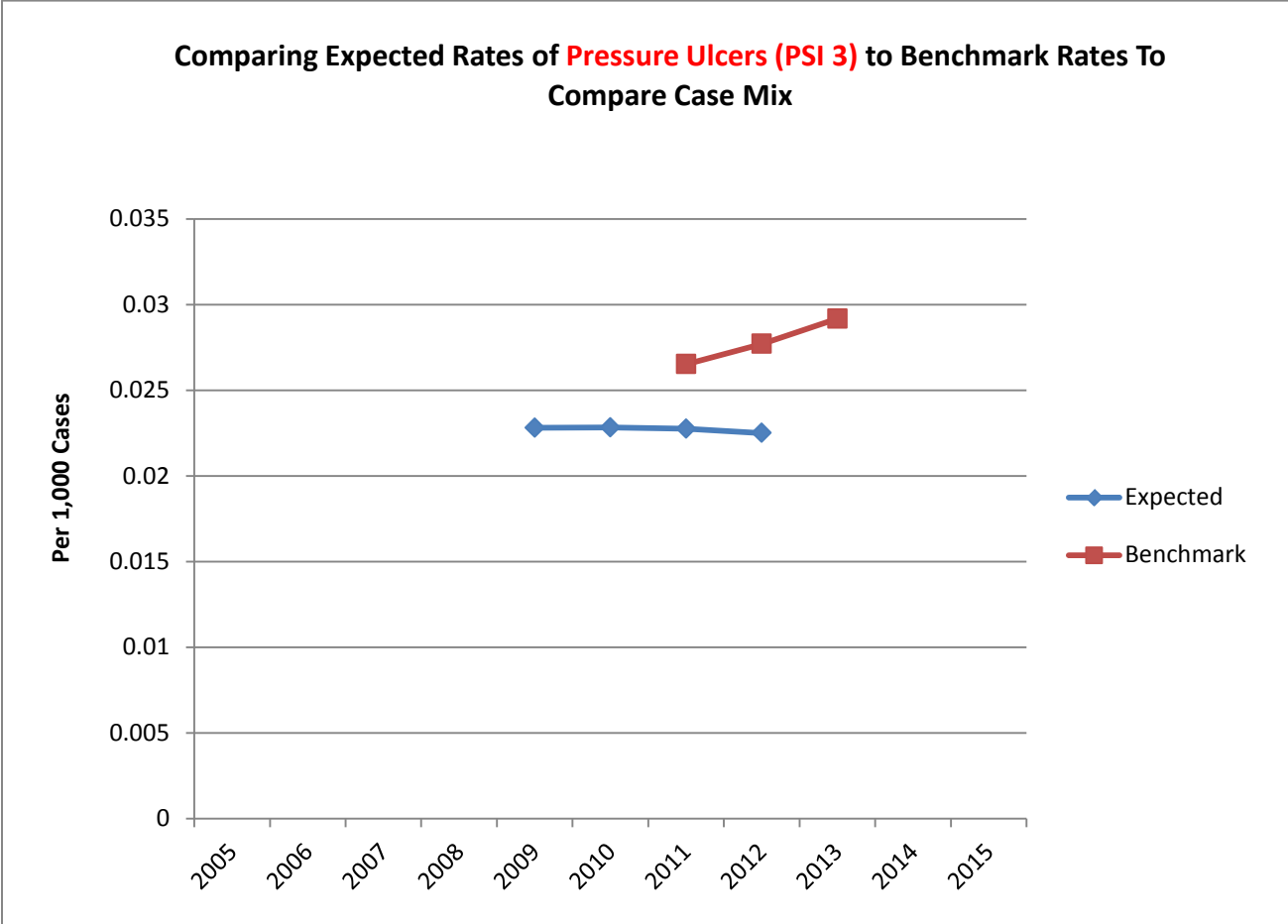
Comparing Risk-Adjusted and Smoothed Rates Over Time



Notes:

This chart comes from the Excel worksheet (trend-risk-adjusted-smoothed).

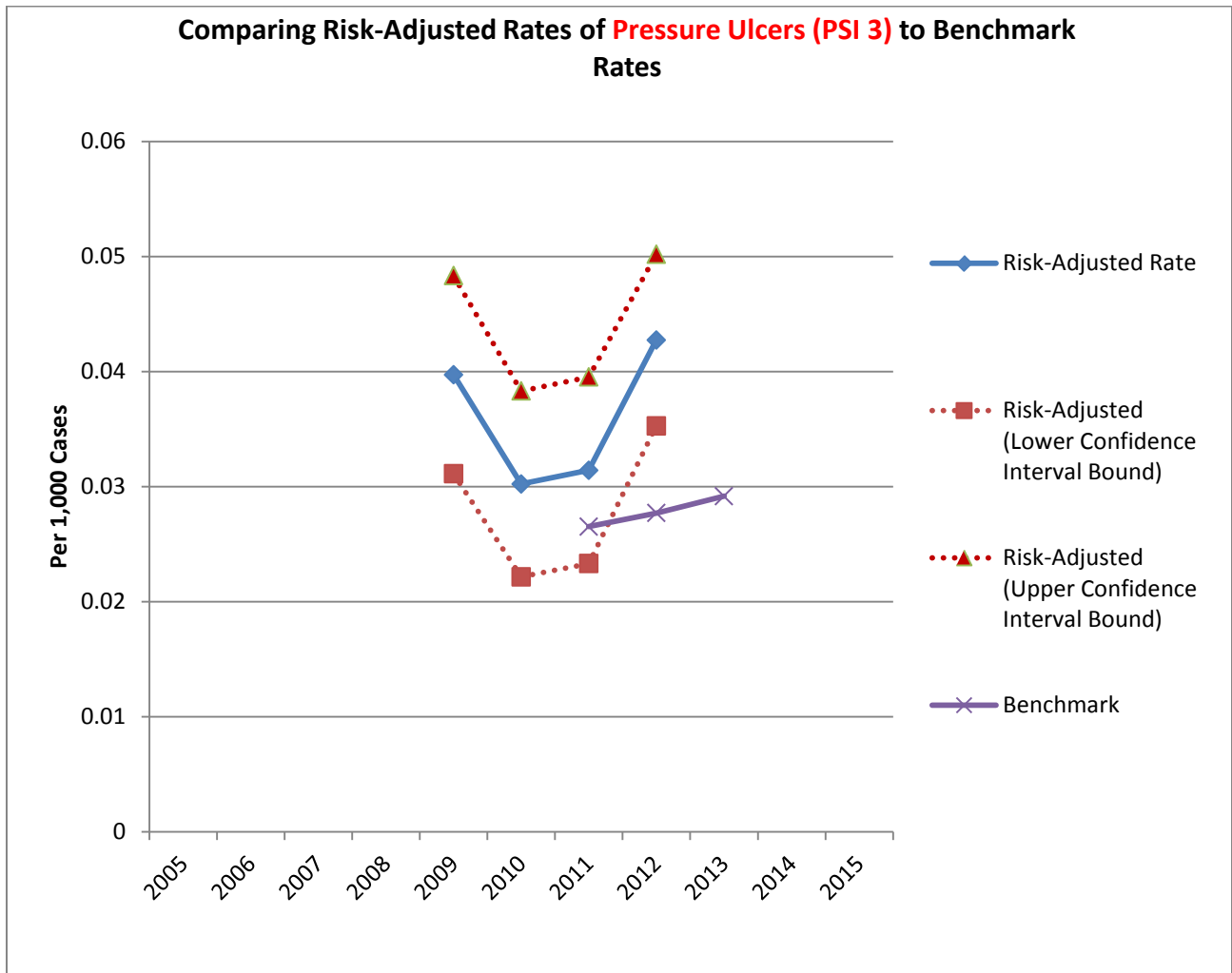
Evaluating Case Mix Relative to Other Hospitals



Notes:

This chart comes from the Excel worksheet (trend-expected-benchmark).

Comparing Hospital's Performance to National Performance Over Time



Notes:

This chart comes from the Excel worksheet (trend-risk-adjusted-benchmark).

The AHRQ Quality Indicators

Results and Discussion of Data Analysis

INSTRUCTIONS FOR USING THIS TOOL – DELETE THIS SLIDE BEFORE PRESENTATION

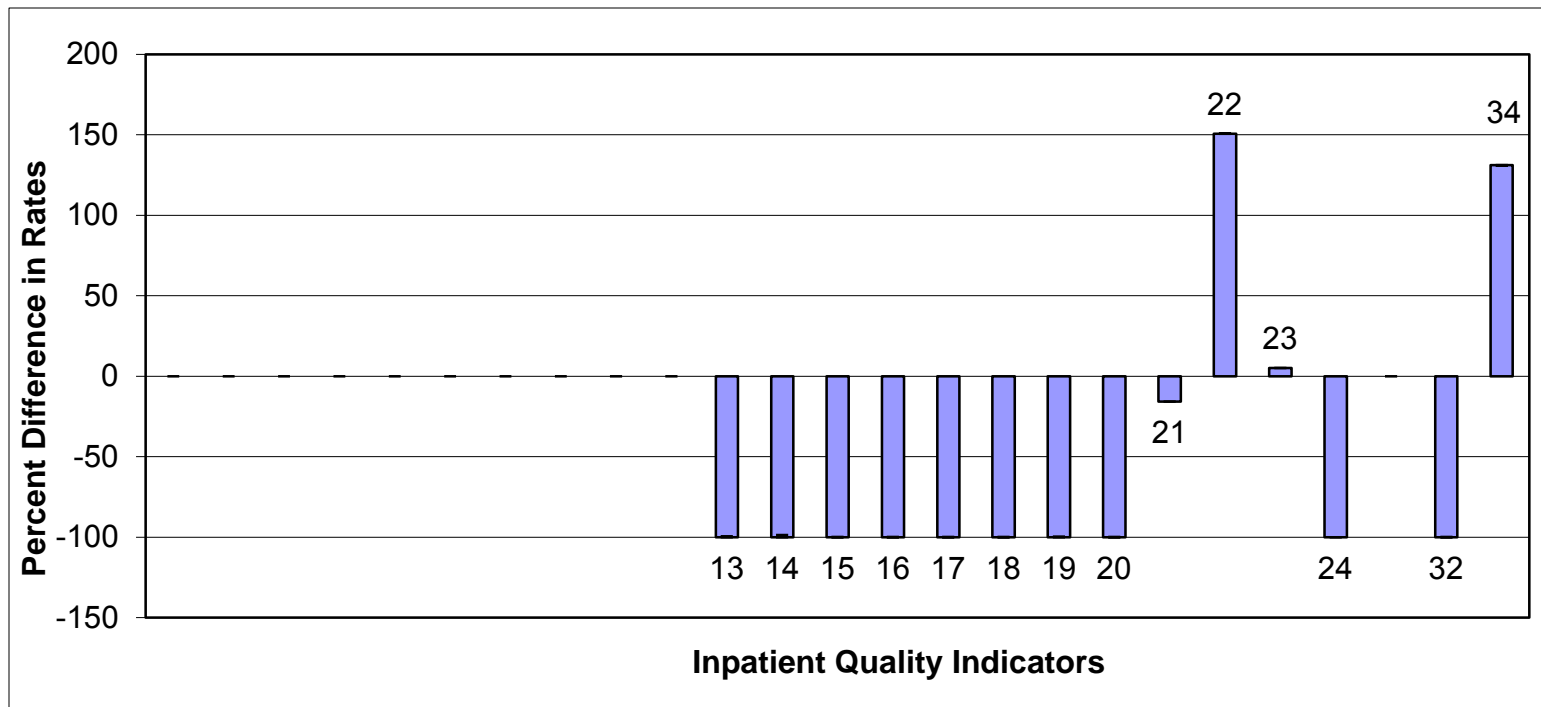
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 - Assess performance and compare against peer hospitals
 - Observe your hospital's performance over time

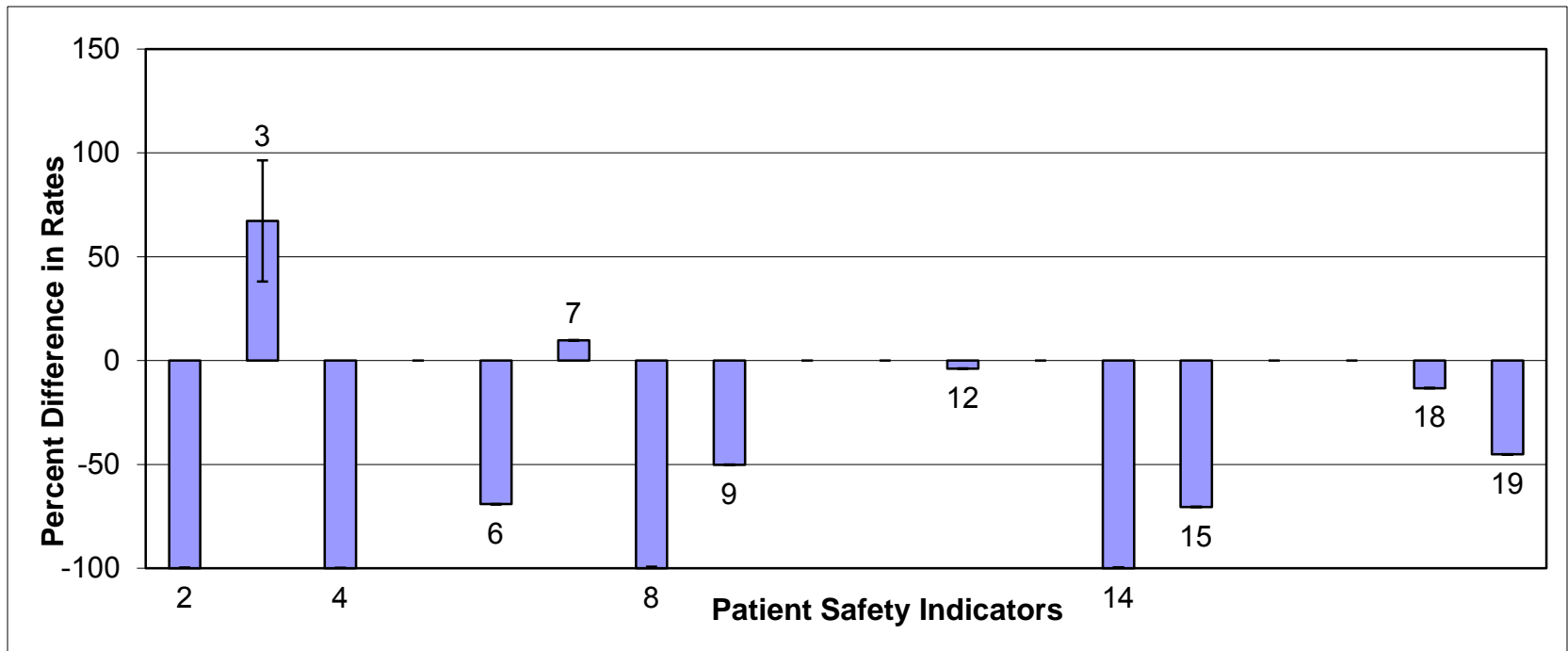
Source: www.qualityindicators.ahrq.gov and AHRQ Quality Indicators Toolkit Literature Review

Your Hospital's Performance Relative to National Benchmarks



Relative to a national sample of hospitals, **Your Hospital has similar or better performance on most of the IQIs.**

Your Hospital's Performance Relative to National Benchmarks



Relative to a national sample of hospitals, Your Hospital has similar or better performance on many of the PSIs. However, Pressure Ulcers (PSI 3) occur at higher rates than the national sample – this may be an area where Your Hospital should focus quality improvement efforts.

DELETE THIS SLIDE BEFORE PRESENTATION

- *In this example, we will examine the rates of Pressure Ulcers (PSI 3) and how this particular hospital performed over time.*
- *Determine which indicator(s) you would like to focus on, and fill in these slides based on that indicator and your hospital's data.*
- *Based on the information that you would like to present, you may choose not to use all of the slides available here.*

Indicators that Require Attention

- Based on a review of **Your Hospital's** performance on the IQIs and PSIs, we have decided to focus on the following indicators:
 - **Pressure Ulcer (PSI 3)**

DELETE THIS SLIDE BEFORE PRESENTATION

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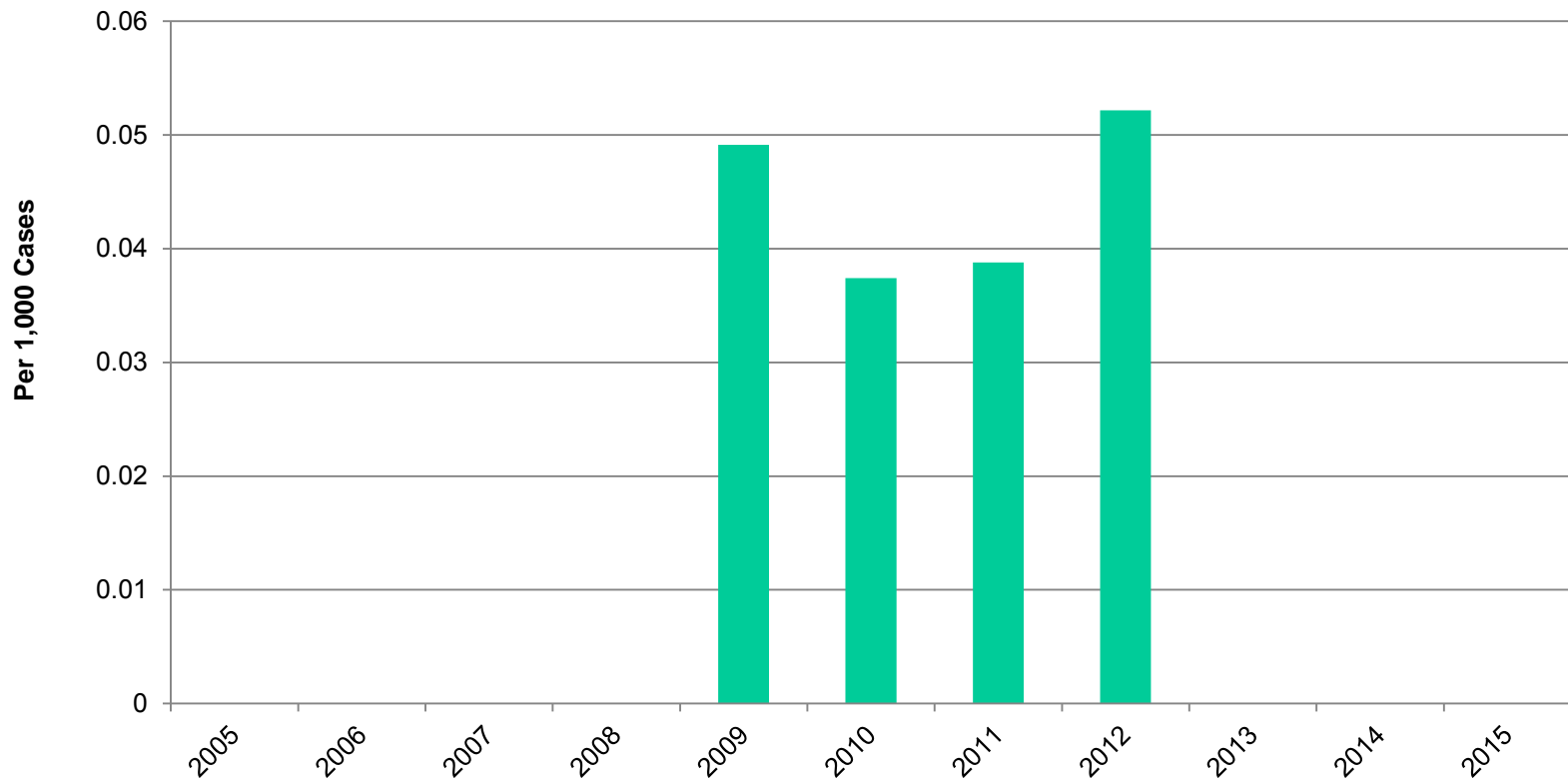
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- Denominator: All medical and surgical discharges age 18 years and older defined by specific DRGs or Medicare Severity DRGs that do not meet exclusion criteria
- ***DELETE THIS TEXT BEFORE PRESENTATION: Replace this information with information about your chosen indicators. Copy this slide and repeat as necessary.***

ICD-9 = International Classification of Diseases, 9th Revision; DRG = diagnosis-related group.
Source: www.qualityindicators.ahrq.gov/Modules/PSI_TechSpec.aspx.

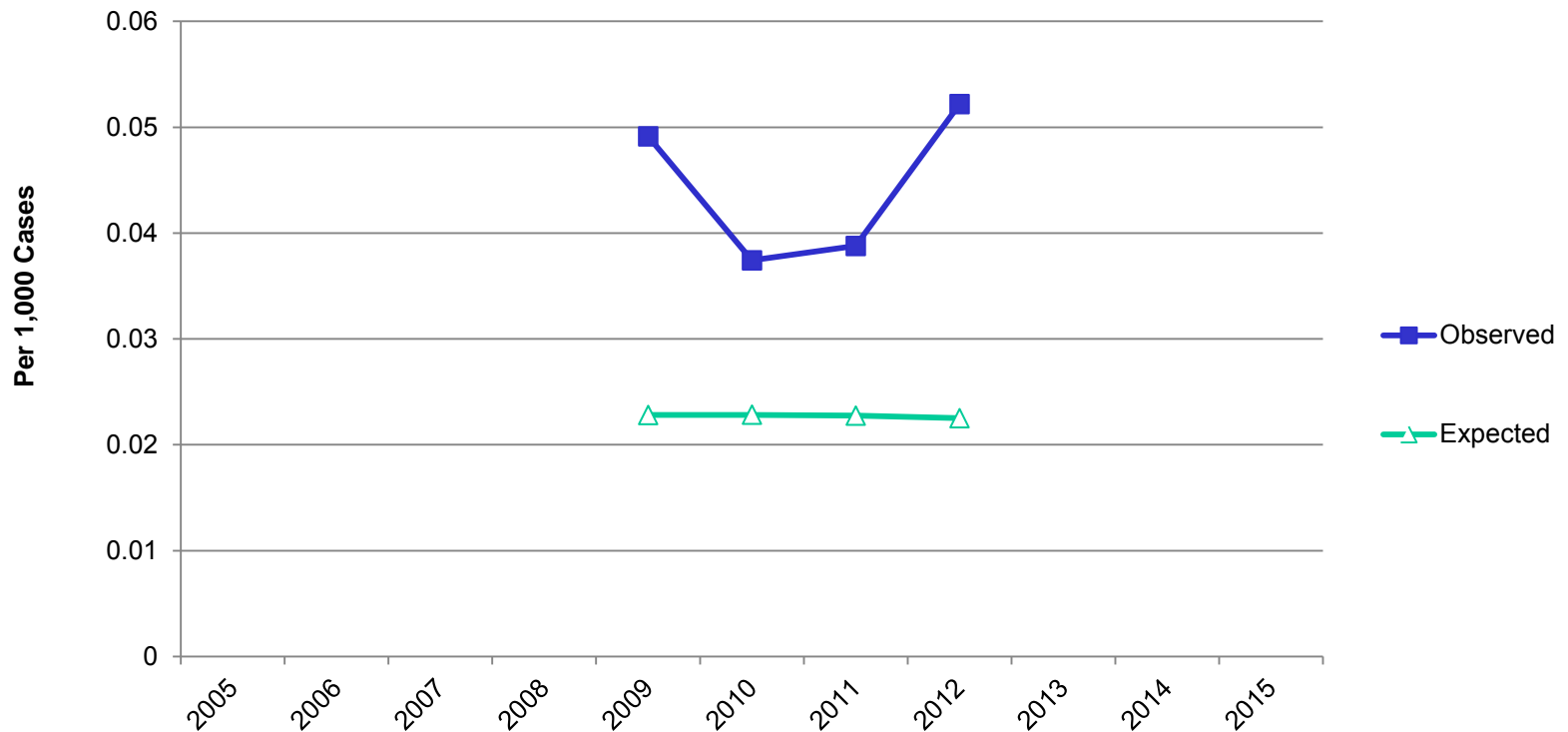
Comparing Performance Over Time

Examining Observed Rates of **Pressure Ulcers (PSI 3)**



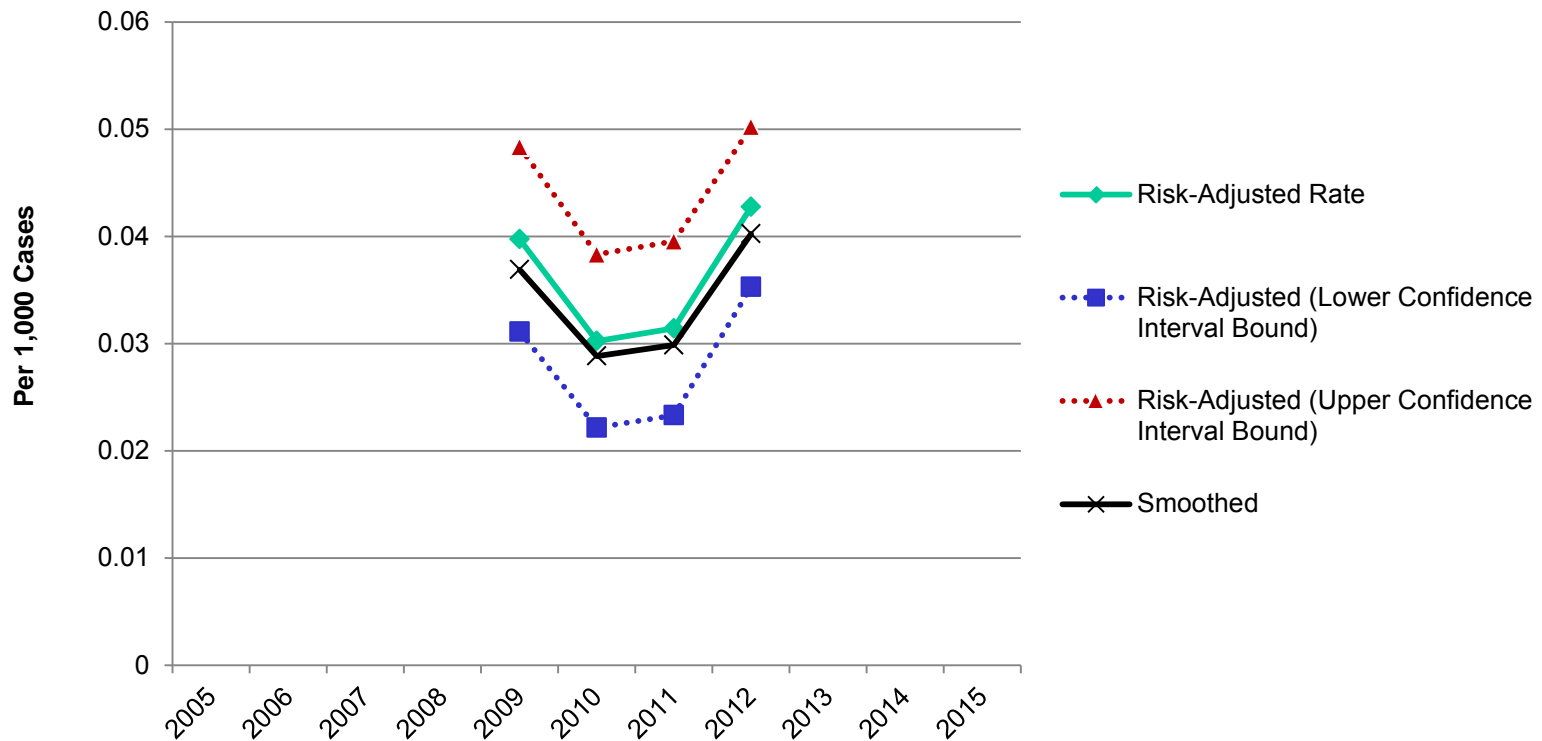
Comparing Observed Performance to Expected Performance over Time

Comparing Observed Rates of **Pressure Ulcers (PSI 3)** to Expected Rates



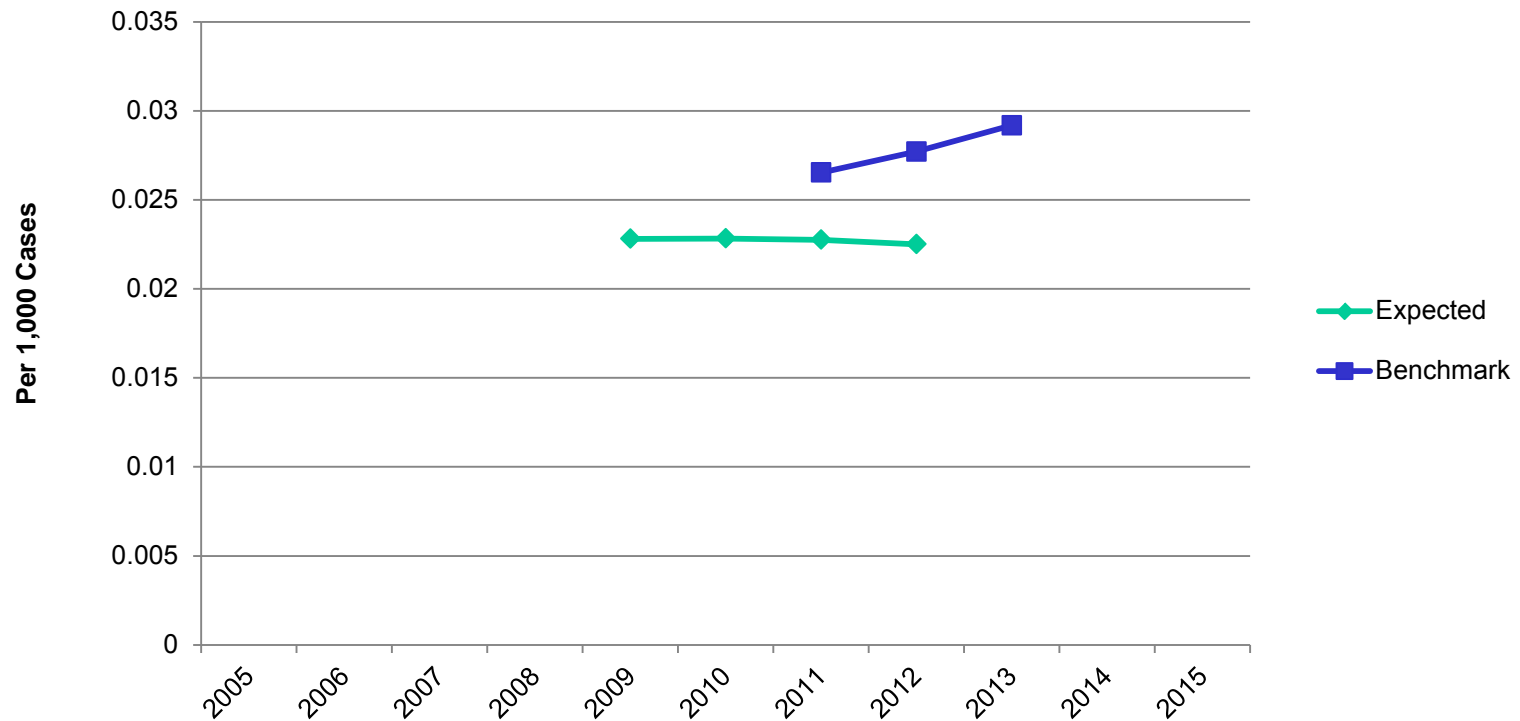
Comparing Risk-Adjusted and Smoothed Rates Over Time

Risk-Adjusted and Smoothed Rates of **Pressure Ulcers (PSI 3)**



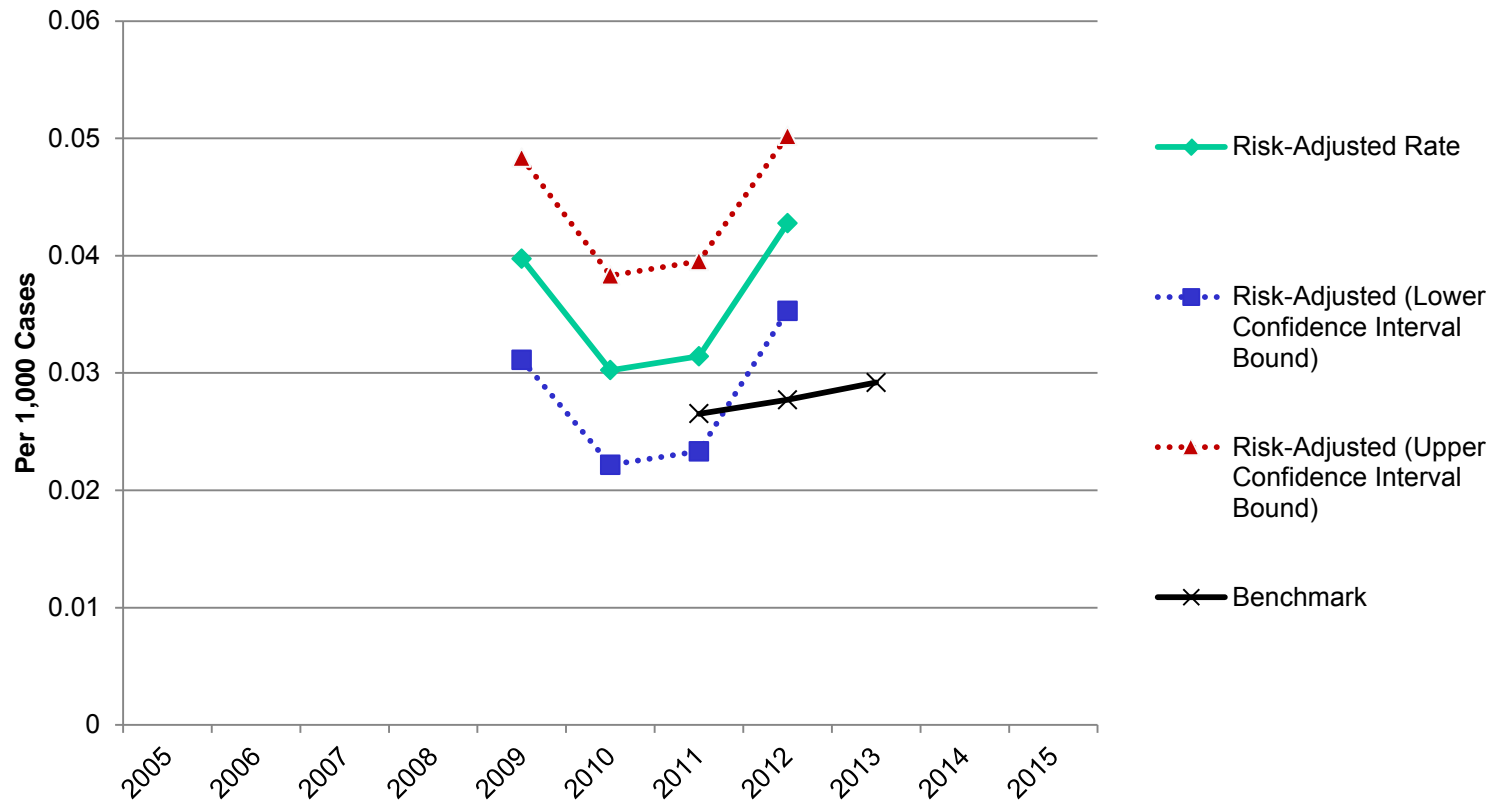
Evaluating Case Mix Relative to Other Hospitals

Comparing Expected Rates of **Pressure Ulcers (PSI 3)** to Benchmark Rates To Compare Case Mix



Comparing Hospital's Performance to National Performance Over Time

Comparing Risk-Adjusted Rates of **Pressure Ulcers (PSI 3)** to Benchmark Rates



INSTRUCTIONS

Documentation and Coding for Patient Safety Indicators

What is this tool? The purpose of this tool is to facilitate improvements to documentation and coding processes to ensure that PSI rates are accurate. The tool has two sections. The first describes procedures to address problems with documentation and coding practices among providers and hospital staff. The second illustrates some of the issues that can arise when documenting and coding each PSI.

Who are the target audiences? The primary audiences for this tool are providers, clinical documentation improvement specialists, coders, and quality officers. All of them have roles in coding diagnoses and procedures from medical records, which will be used to calculate PSI incidence rates.

How can this tool help you? By using this tool, stakeholders should gain a better understanding of how documentation and coding can affect PSI rates. They also will learn about actions they can take to estimate their PSI rates more accurately. Efforts to improve documentation and coding accuracy can reduce variability in data, increase confidence in the PSI rates, and help identify areas where improvements can be made in both measurement and care processes.

How does this tool relate to the others? This tool should be used in conjunction with the other tools for applying quality indicators (QIs) to hospital data (B tools). After you calculate your hospital's PSI rates, you can assess their validity by examining how accurately providers document diagnoses, procedures, events, and related issues. You also can look at how accurately these items were coded for use in quality measurement and billing processes.

When ICD-9ⁱ becomes ICD-10. All of the information provided in this documentation and coding tool is based on use of the ICD-9-CM codes for calculating PSI incidence rates. When the ICD-10 codes become the standard for the U.S. health care system, AHRQ will revise the definitions of the PSIs to conform to the new codes. New coding issues will likely arise as hospitals start to work with the revised PSIs. This tool will need to be revised at that time, to be consistent with the new PSI definitions and to provide guidance regarding relevant documentation and coding issues.

ⁱ ICD-9 is the International Classification of Diseases, 9th Revision. ICD-9-CM refers to the ICD-9 Clinical Modification. ICD-10 refers to the 10th Revision.

Addressing the Documentation and Coding Process

The documentation and coding process is the transformation of narrative descriptions of diseases, injuries, and health care procedures into numeric or alphanumeric designations (that is, code numbers). The code numbers are detailed to accurately describe the diagnoses (what is wrong with the patient) and the procedures performed to test or treat these diagnoses.

Policymakers are placing greater emphasis on quality performance and expect hospitals to report on clinical care measures. Therefore, hospitals are now focusing both on coding for appropriate reimbursement and coding for accurate quality measurement and reporting.

The documentation and coding issues and suggested actions discussed in this section are relevant not only for coding of medical information for the PSIs but also for a hospital's entire documentation and coding process. In the following section, issues specific to the PSIs are discussed, including issues and actions specific to each PSI.

Coders must use the documentation provided by the treating providers, in compliance with coding regulations, to establish the codes for each inpatient stay. To achieve accurate coding, providers need to understand the coding process and the rules that must be followed to ensure coding objectivity.ⁱⁱ Providers should use consistent language and specific diagnostic terms to document clinical care and to provide the complete information needed for accurate coding. Also needed is a well-established process through which clinical documentation improvement (CDI) specialists and coders can query providers to resolve questions or issues (Preskitt, 2005; Ballentine, 2009; Orcutt 2009). The American Health Information Management Association offers guidance on how best to establish CDI and compliant query practices (Journal of AHIMA May 2010 and Journal of AHIMA February 2013).

In summary, effective documentation and coding processes involve the following key steps:

- *Documentation*: Establish documentation criteria for providers, including specific diagnostic terms that are consistent with clinical definitions and compliant with coding regulations.
- *Coding*: Establish coding criteria for conditions or events using the documentation from providers, and offer training on using these criteria.
- *Query process*: Establish an effective process that CDI specialists and coders can use to obtain clarification from providers on their documentation that may affect the coding process.

Documentation by Providers

Because coders can use only documentation that complies with coding regulations, physicians and other providers need to understand coding requirements and learn to consistently document

ⁱⁱ Refer to the coding guidelines in the *AHA Coding Clinic* (2011), as designated by the four cooperating parties: American Hospital Association, American Health Information Management Association, Centers for Medicare & Medicaid Services, and National Center for Health Statistics.

using appropriate terminology. They need to document diagnoses, conditions, symptoms, and procedures using the following practices:

- Avoid abbreviations and symbols.
- Write complete SOAP (subjective, objective, assessment, and plan) notes.
- Become familiar with rules and concepts of documentation and coding.
- Be accurate and comprehensive.
- Document a thorough history and physical.
- Document the outcomes of “rule out,” “consider,” and “possible” diagnoses.
- Identify the principal diagnosis.
- Include all secondary diagnoses and conditions.
- Answer all queries for clarification promptly and fully.

Expert Coding

Coders should be encouraged and empowered to focus on the quality of coding, not just productivity or reimbursement. It is important to take the time to ensure that the coded record is an accurate representation of the patient’s clinical condition and treatment. Clinical documentation specialists and coders should make careful queries to providers to clarify documentation when needed. Hospitals have found that the following issues have been sources of coding errors:

- Incomplete or inadequate provider documentation.
- Incorrect principal diagnosis selection, such as:
 - Coding a condition when a complication code should have been used.
 - Coding a symptom or sign rather than a diagnosis.
 - Assuming a diagnosis without definitive documentation of a condition.
 - Coding only from the discharge summary and not the complete medical record.
 - Incorrectly applying the coding guidelines for principal diagnosis, especially when two or more diagnoses equally meet the definition of principal diagnosis.
- Incorrect or missing comorbidities or complications.
- Incorrect present on admission (POA) assignment.
- Limitation of coding to the Medicare Severity diagnosis-related group (MS-DRG) (i.e., not coding the full record because reimbursement will not change with additional codes).
- Incorrect MS-DRG assignment.
- Encoder errors or incorrect encoder pathway.
- Incorrect memorization of diagnosis and procedure codes.

Query Process

Queries may be generated whenever the medical record lacks codable documentation or information is missing, conflicting, ambiguous, or illegible. It is important to have a well-defined query process to ensure that your clinical documentation specialists and coders can effectively obtain needed information without leading the provider or miscoding the information. A sample query form is provided below that might be used in that process. Hospitals may choose to form a

CDI team consisting of trained nurses, coders, and other specialists that concurrently reviews charts and queries providers to clarify documentation prior to discharge.

Although coders cannot use documentation from nurses and allied health professionals, their notes often provide clues to issues that the provider may have failed to document. Hospitals should consider coordinating nurses' notes with provider documentation, especially for PSIs for which nurses' notes are known to be a good source of information (e.g., pressure ulcers).

SAMPLE QUERY FORM

Clinical scenario: During the removal of an abdominal mass, the surgeon documents, in the description of the operative procedure, a “serosal injury to the stomach was repaired with interrupted sutures.”

Query: In the description of the operative procedure a serosal injury to the stomach was noted and repaired with interrupted sutures. Was this serosal injury and repair:

A complication of the procedure

Integral to the above procedure

Not clinically significant

Other

Clinically Undetermined

Please document your response in the health record or below accompanied by clinical substantiation.

Name: _____ Date: _____

Rationale: This is an example of a query necessary to determine the clinical significance of a condition resulting from a procedure.

Clinical Documentation Improvement

Many hospitals have implemented a CDI program to successfully enhance the quality of clinical data. The essential steps for achieving an effective CDI program are described in the *UHC Clinical Documentation Challenges 2009 Field Book*:

- Hire and train expert clinical documentation specialists to conduct concurrent chart review and clarify documentation before discharge.
- Educate providers about the need to partner with CDI staff to ensure the accuracy of performance data.
- Implement practices that support documentation improvement, such as a query process, education, tools and aids, and expert coding.

- Hold providers accountable for compliance with documentation requirements (e.g., financial incentives, recertification criteria, suspension, and peer review).
- Hold providers accountable for responding to queries for documentation clarification.
- Benchmark documentation and coding performance and communicate the results.
- Recognize and reward good performance.

Hospitals have successfully used a variety of structures for their CDI program, depending on their specific needs and cultures. Some approaches that have been successfully used by CDI programs to promote comprehensive documentation and accurate data include (UHC, 2010):

- Focus on units or services with poor performance data (e.g., elevated mortality index, high PSI rates).
- Track and communicate documentation query response rates by provider.
- Implement user-friendly query response methods (e.g., electronic queries linked to the medical record and documentation resources).
- Query for secondary diagnoses, comorbidities, complications, and risk-adjustment factors even when the additional codes will not change reimbursement.
- Review all deaths (e.g., patients who died with a low risk of mortality) to uncover improvement opportunities for documentation and coding and safe, high-quality clinical care.

Specific Strategies for Successful Documentation and Coding

The following set of strategies to improve coding processes have been delineated (Ballantine, 2009; UHC, 2009):

- Educational initiatives for clinical documentation specialists and coders:
 - Introductory didactic presentations on the PSIs and how their rates are calculated.
 - Online tutorial: documentation and coding.
 - Periodic memos with coding tips (“Tip of the Month”).
 - Comprehensive online references and coding tips.
 - Posters, announcements, and branding.
- Provider support:
 - Introductory didactic presentations on the PSIs and how their rates are calculated.
 - Training on documentation and coding and how they can affect the hospital.
 - Intranet site with references and frequently asked questions.
 - Clinical documentation improvement liaisons.
 - Electronic health record offering on-demand documentation assistance.
 - Direct contact with clinical documentation specialists and coders.
 - Feedback associated with analysis of performance data and query response results.
 - Provider champions or dedicated documentation and coding specialists.
 - Presentation of a focus topic each month with suggestions to prevent patient safety events.

- CDI team and coding department changes:
 - Adequate staffing with expert CDI staff and coders.
 - Ongoing training and education for CDI specialists and coders.
 - Standing documentation and coding committee.
 - Internal and external audits of documentation and coding accuracy.

Training

Training for providers, clinical documentation specialists, and coders is essential to respond to changing expectations for accurate coding of clinical conditions and quality measures. Training also helps promote mutual understanding of clinical and coding terminology.

Provider buy-in is critical for effective documentation and coding, which can be encouraged through careful education, executive support, and provider champions. It also is important to hold providers accountable for compliance with documentation expectations and timely query responsiveness. To get buy-in, you can provide handouts (such as the fact sheets in this toolkit [Tools A1a and A1b] and information about ICD-9 codes and how they are applied), pocket guides, and electronic health record alerts with coding terminology and frequently asked questions. Hospitals may want to make clinical documentation specialists available to provide real-time chart review, provider clarification, and one-on-one education.

One effective method for gaining buy-in from providers for documentation improvement is to present PSI rates based on their current style of documentation, side by side with revised rates after documentation clarification. This type of presentation highlights the consequences of inadequate documentation and the importance of standardization and clarification.

The hospital may also need to upgrade the skills of clinical documentation and coding staff. Coding errors may be due to a lack of knowledge of coding principles and terminology, or due to unfamiliarity with changing coding requirements. The quality of staff's initial training, as well as their ability to stay abreast of current guidelines, is fundamental to their expertise.

Ways To Establish an Effective Coding Communication and Review Process

The hospital can build a foundation for an accurate and comprehensive coding process by establishing written coding compliance policies that provide instructions on the entire process, from point of service to billing or claim forms. The American Health Information Management Association has published a coding compliance document that lays out a set of suggested protocols to include in an organization's policies (AHIMA, 2010). This document is a useful guide for developing hospital documentation and coding policy, which would include a standard process for the management of documentation, queries, coding, and ongoing quality assurance. AHIMA also offers guidance on developing a CDI program (AHIMA 2010) and writing compliant, nonleading queries (AHIMA 2013).

Other useful resources are existing policies and procedures established by hospitals or health systems. The following examples of coding policies and procedures are available on the Internet:

Hawaii Health Systems
 Corporation Policies and Procedures
 Medical Records: Coding and Documentation for Inpatient Services
 Effective date: September 15, 2000
 Accessed July 27, 2011, at http://hawaii.gov/hhsc/policies-and-procedures/Patient%20Care/PAT%201003_091500_.pdf

Iowa Health System
 Coding and Documentation for Inpatient Services
 1.BR.12
 Effective Date: February 2001; revised June 2003 and July 2005
 Accessed August 1, 2011, at: http://www.ihs.org/documents_smm_pnp/public/2461_1BR12.pdf

University of Illinois College of Medicine, Chicago, Illinois
 Coding and Documentation Policy and Procedure No. 3
 Date: August 5, 2010
 Healthcare Coding and Documentation Compliance
 Accessed July 27, 2011, at:
http://chicago.medicine.uic.edu/UserFiles/Servers/Server_442934/File/Compliance/COM_Compliance_Coding_Policy.pdf

Actions To Code Patient Safety Events Accurately

A number of issues during both the documentation and coding processes can affect the validity of the PSIs. The *positive predictive value (PPV)* is an assessment of how accurately the measurement (i.e., the reported PSI rate) reflects the occurrence of actual events. The formula for PPV is:

$$\text{Positive Predictive Value (PPV)} = \text{True Positives} / \text{Flagged Cases}$$

The ideal value for PPV is equal to 1, where the number of true positives is equal to the number of flagged cases. If the number of true positives is lower than the number of flagged cases ($PPV < 1$) (e.g., individuals were coded as having a patient safety event when no event actually occurred), there is a problem with *false positives*.

On the other hand, the problem may be one of missed cases that should have been detected, which would result in the number of true positives being higher than the number of flagged cases. Missed cases are more difficult to address than false positives, because they are present in cases that were not identified for calculating PSI rates. Finding missed cases requires a new review of the relevant cases (in the rate denominator) for evidence of events that previously had not been detected.

Reasons for False Positives

Several key reasons for false positives in the PSI rates have been identified by hospitals and reported in the health care literature. These include coding of POA, miscoding, lack of coding

specificity, inclusion of nonelective surgical admissions, and inaccurate coding of history of events.

Present on admission. One of the most frequently cited causes of false positive cases is improper use of the POA flag (Glance, et al., 2008). Most PSIs have a coding exception that removes cases that arrived at the hospital with a condition that would be coded as a patient safety event had it occurred during the patient’s stay (see Table 2). If POA is not indicated in the documentation or is not properly coded, the PSI rate will be inflated (Houchens, et al., 2008).

Improper use of the POA flag is a particular problem for hospitals that receive many transfers from other institutions. When the clinical conditions are unclear, it is appropriate for the provider to document “rule out,” “possible,” or “consider” diagnoses as long as he or she thoroughly documents the resolution of these tentative conditions in the medical record.

Miscoding. Diagnosis or procedure codes can be miscoded by either assigning an incorrect code or omitting a code, which may also lead to inflated PSI rates. One example of miscoding is to code intentional procedures such as laceration of plaque as an accidental puncture or laceration (PSI 15).

Lack of coding specificity. If documentation or codes are not specific enough, rates can be inflated. This issue is especially important for the following PSIs:

- PSI 4: (Death Among Surgical Inpatients With Serious Treatable Complications) requires precise coding of complex comorbidities; variation in clinical documentation and coding practices can bias rates of this PSI (Talsma, et al., 2008; Rosen, et al., 2006).
- PSIs 7 and 13 (Central Venous Catheter-Related Bloodstream Infection [CLABSI] and Postoperative Sepsis), a provider may write, “consider sepsis,” which may trigger coders to code “sepsis” despite the lack of evidence of a confirmed infection. Again, it is appropriate for a provider to document tentative conditions and complications as long as he or she follows through to document the confirmation, exclusion or suspected and treated but uncertain conditions.

Another example of lack of coding specificity is a bias against coding chronic conditions or comorbidities for patients who die (Iezzoni, et al., 1992). The rate for PSI 2, Death in Low Mortality DRG, is especially vulnerable to this effect. A lack of codes for comorbidities may distort its rate by including cases in the denominator that should not be there, which likely would increase the PSI rate. Hospitals should establish effective mortality review procedures to assess both the quality and safety of clinical care and the accuracy and completeness of clinical documentation and coding.

History of event. Finally, coders may mistakenly code providers’ documentation of “history of” an event as an actual event, which will inflate PSI rates. For example, providers may write “history of pneumothorax, which may be mistakenly coded as a pneumothorax.

Reasons for Missed Cases

Finding missed cases in PSI measurements may be much more difficult than finding false positives. Several of the reasons listed above (especially miscoding and lack of specificity) may

bias results in a downward direction. For example, missed cases could occur if an accidental laceration is not clearly documented in the medical record or if cases with sepsis are not identified due to incomplete review of the record.

Hospital quality staff who are interested in finding missed cases may need to come up with creative solutions for finding them. One example would be to inspect laboratory documentation of infections to search for missed line infections. Another would be to audit charts to find missed cases, especially those of high-risk patients (e.g., long length of stay, ICU populations who may be at risk for pressure ulcers or CLABSI, deaths, patients with “age extremes”).

Documentation and Coding Issues for Individual PSIs

Some specific documentation issues for each PSI are listed in Table 1, and some specific coding issues for each PSI are listed in Table 2. The PSIs are grouped as Surgical PSIs, Medical and Surgical PSIs, and Obstetric PSIs. These issues were identified through a search of published papers on PSI measurement issues as well as from feedback from hospitals during field testing of this toolkit and subsequent development of this tool.

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Table 1. Documentation Issues Pertaining to Each Patient Safety Indicator

PSI Grouped by Type		Documentation Problems Identified
Surgical PSIs		
4	Death Rate Among Surgical Inpatients With Serious Treatable Complications	Admit type must be correctly assigned. Only Admit Type = 3 for elective admission is included in the denominator.
5	Retained Surgical Item or Unretrieved Device Fragment Count	Foreign body intentionally left in during a procedure is NOT considered a retained FB for purposes of coding.
8	Postoperative Hip Fracture	Document comorbidity exclusions such as seizures, cancer, stroke, trauma/injury, and psychoses.
9	Perioperative Hemorrhage or Hematoma	Need to distinguish between ecchymosis (flat bruising of the skin) and hematoma (bruising with mass). Hemorrhage is excessive blood loss; some procedures inherently have large volumes of expected blood loss. Document any coexisting coagulation disorders.
10	Postoperative Physiologic and Metabolic Derangement	Exclude preexisting conditions. Review ionic contrast documentation to assess whether the radiology contrast media was the cause of the postoperative physiologic and metabolic derangement.
11	Postoperative Respiratory Failure	Respiratory failure may be documented or coded incorrectly when the diagnosis actually is respiratory insufficiency. Some events coded as respiratory failure are a normal part of the postoperative course, not respiratory failure.
12	Perioperative Pulmonary Embolism or Deep Vein Thrombosis (DVT)	DVT or pulmonary embolism documented as ‘rule-out’ without further documentation should be clarified with the provider. Diagnoses documented as “rule-out” at discharge will be coded as confirmed per CDC Official Coding Guidelines. DVT/PE prophylaxis can be mistaken for treatment of confirmed DVT/PE.
13	Postoperative Sepsis	Whenever possible, verify whether postoperative sepsis truly occurred if documentation does not clearly indicate sepsis. Consider querying the provider for more information in the following instances: <ol style="list-style-type: none"> 1. There is no documentation anywhere in the record of sepsis other than the Discharge Summary. 2. Several progress notes state sepsis but it is not consistent in all of the progress notes and it is not documented at the time of discharge (i.e., discharge summary or final progress note) or present in an ID consult. 3. Sepsis is documented early in the visit (i.e., the emergency department and first progress note) but is not listed as a diagnosis throughout the chart or in the discharge summary. 4. Both bacteremia and sepsis are documented. (bacteremia is a laboratory finding of bacteria in the blood). Seek clarification for conflicting documentation. <p>If the medical record uses the term urosepsis and meets the clinical indicators for sepsis, query the provider to determine if urosepsis means a simple urinary tract infection or sepsis (UHC Documentation Guide, Sepsis_SIRS).</p>
14	Postoperative Wound Dehiscence	Secondary closure of abdominal wound must be performed.

PSI Grouped by Type		Documentation Problems Identified
Medical and Surgical PSIs		
2	Death in Low Mortality Diagnosis-Related Groups	Improper documentation and selection of principal diagnosis can group an encounter to Low Mortality DRG when it may not be.
3	Pressure Ulcer	Lack of present-on-admission documentation, lack of provider note. Provider must document the pressure ulcer; the stage of the ulcer can be documented and coded from nurse or other clinician notes.
6	Iatrogenic Pneumothorax	Intentionally induced pneumothorax should not be coded to a complication.
7	Central Venous Catheter-Related Bloodstream Infections (CV-CRBIs)	<p>The narrative of the code for CV-CRBI is “infection due to central venous catheter”, which means that this code should be assigned when the catheter is the source of the infection, not when it becomes infected from another source (e.g., bacteremia, sepsis from the urinary tract).</p> <ul style="list-style-type: none"> • Common coding practice had been to apply this code when documentation just stated “infected catheter.” • Query should be generated to ask for the source of the infection. • Work with providers to make them aware of the documentation requirements. • Work with coders to explain how to use this code appropriately.
15	Accidental Puncture or Laceration	<p>When coding for punctures or lacerations, it is important to distinguish between those that are inherent to the procedure itself and those that are unintended and are therefore considered a complication.</p> <p>Query the provider:</p> <ul style="list-style-type: none"> • If the provider’s postoperative/procedure note and operative/procedure report do NOT clearly describe the circumstances of the puncture or laceration. • If the postoperative/procedure note documentation conflicts with the operative/procedure report.
16	Transfusion Reaction	
Obstetric PSIs		
18	OB Trauma – Vaginal	Document clearly the occurrence and severity (degree) of lacerations during delivery. Episiotomy done to facilitate delivery is NOT the same as a laceration.
19	Delivery With Instrument OB Trauma – Vaginal Delivery Without Instrument	

Table 2. Coding Issues Pertaining to Each Patient Safety Indicator

PSI Grouped by Type	POA Required	Miscoding	Lack of Coding Specificity	Measure Includes Only Elective Admissions
Surgical PSIs				
4 Death Rate Among Surgical Inpatients With Serious Treatable Complications			Include coding of comorbidities to more accurately capture the rate (Rosen, et al., 2006; Talsma, et al., 2008)	
5 Retained Surgical Item or Unretrieved Device Fragment	X	Foreign body intentionally left by surgeon.		
8 Postoperative Hip Fracture	X			
9 Perioperative Hemorrhage or Hematoma	X	Need to distinguish between ecchymosis (flat bruising of the skin) and hematoma (bruising with mass). Indicator requires diagnosis code and procedure code.	Expected bleeding vs. hemorrhage	X
10 Postoperative Physiologic and Metabolic Derangement	X	May require one diagnosis code OR a diagnosis code and procedure code.		X
11 Postoperative Respiratory Failure	X	The coder should never assume a diagnosis of respiratory failure without a documented diagnosis by the provider. Postoperative respiratory failure is acute in nature, and thus should be classified as acute (518.51), or acute and chronic combined (518.53). Coding should distinguish between respiratory insufficiency and respiratory failure (UHC Documentation Guide Post-Operative Respiratory Failure).		X
12 Perioperative Pulmonary Embolism or Deep Vein Thrombosis (DVT)	X	“Superficial embolism” may be coded mistakenly as “deep embolism.” DVT/PE prophylaxis may be coded		

PSI Grouped by Type	POA Required	Miscoding	Lack of Coding Specificity	Measure Includes Only Elective Admissions
		mistakenly as an acute DVT being treated.		
13 Postoperative Sepsis	X	Should not be coded unless provider provides documentation of postoperative infection (even if probable, suspected, etc.)		X
14 Postoperative Wound Dehiscence	X	This indicator is identified by a procedure code.		
Medical and Surgical PSIs				
2 Death in Low-Mortality Diagnosis-Related Groups		Correct coding of principal diagnosis that leads to correct DRG assignment is essential.		
3 Pressure Ulcer	X	Important to document the stage and location of pressure ulcer to properly code it.	Provider documents existence of pressure ulcers. Nurses' notes can be used to determine staging (Medicare).	
6 Iatrogenic Pneumothorax	X	Pneumothorax may be an intentional part of a procedure; if so, it should NOT be coded as iatrogenic.		
7 Central Venous Catheter-Related Bloodstream Infections (CV-CRBI)	Identify tunneled catheters that are infected at admission and code as present-on-admission.	Peripheral lines may be miscoded as central lines. Thrombophlebitis is phlebitis (an inflammation of the vein) that is accompanied by thrombus formation. The code 999.31 is not the most appropriate code assignment if only phlebitis—and no infectious source—is documented. When assigning codes through an encoder system, first choose phlebitis/thrombophlebitis due to or resulting from implanted device. Then the system will offer choices: central venous catheter, infected (catheter-		

PSI Grouped by Type	POA Required	Miscoding	Lack of Coding Specificity	Measure Includes Only Elective Admissions
		related bloodstream infection)(Hickman, PICC, triple lumen), other/unspecified. <ul style="list-style-type: none"> • If no bloodstream infection is documented, choose other/unspecified, which assigns code 996.62. • If there is documentation of infection, choose central venous catheter, infection, which assigns code 999.31 (UHC Documentation Guide, Central Venous Catheter-Related Bloodstream Infections). CV-CRBIs or tunneled catheters that are infected at admission should be coded as present on admission (Romano, 2010).		
15 Accidental Puncture or Laceration	X	If laceration of plaque is the reason for surgery, do not code it as accidental. Chart reviews have found cases incorrectly coded as PSI that were actually due to normal operative conduct, complication other than accidental puncture and laceration (bleeding, infection, dislodgement of a gastronomy tube, or fracture), or disease-related lesion.	Tears incorrectly coded as lacerations. Occasionally, intraoperative bleeding or other routine events are overcoded as accidental puncture or laceration (Romano, 2010). Clarify whether lacerations are an integral part of a procedure or are accidental.	
16 Transfusion Reaction	X			
Obstetric PSIs				
18 OB Trauma – Vaginal 19 Delivery With Instrument OB Trauma – Vaginal Delivery Without Instrument		To code the PSIs correctly: <ul style="list-style-type: none"> • Distinguish between episiotomy (incision intentionally made) and lacerations. • Be sure the degree of laceration 		

PSI Grouped by Type	POA Required	Miscoding	Lack of Coding Specificity	Measure Includes Only Elective Admissions
		<p>documented corresponds to the repairs made.</p> <ul style="list-style-type: none"> • Be sure that a coded delivery diagnosis is accompanied by codes for delivery procedure and outcome. 		

INSTRUCTIONS

Assessing Indicator Rates Using Trends and Benchmarks

What is this tool? This tool provides guidance on how to assess your hospital's performance on the AHRQ Quality Indicators (QIs), by examining trends in the hospital's QI rates and comparing them to the rates of other similar hospitals.

Who are the target audiences? The primary audiences for this tool are three groups of hospital staff:

- Quality and safety staff, as well as clinical and other staff (e.g., quality or patient safety officer at the hospital) involved in quality improvement work, should be involved in assessing the hospital's performance on the QIs and making decisions on priorities for improvement.
- Hospital board and management leaders need to review this information on a regular basis to monitor the hospital's performance on the QIs.
- Statisticians, data analysts, and programmers can help to develop and interpret the trend and benchmark data for the hospital.

How can this tool help you? You can use this tool to support the development of trend and benchmark information for comparing your hospital's current performance on the QI rates to its performance in previous years (trends) and to similar hospitals (benchmarks). These comparisons will help identify which QIs the hospital may need to address for quality improvement, because its performance on them either is declining (or not improving) or is lower than that of its peers.

How does this tool relate to others? This tool uses rates for the AHRQ QIs, which are the output from the software that AHRQ provides for calculating these rates. Guidance for use of these software programs is provided in the tools on *IQI and PSI Rates Generated by the AHRQ SAS Programs* (Tool B.2a) and *IQI and PSI Rates Generated by the AHRQ Windows QI Software* (Tool B.2b).

You also can use the PowerPoint and Excel worksheets on data, trends, and rates (Tool B.3) to display trends and comparisons for your QI rates for presentations.

The information generated from trend and benchmark analysis is used in the *Prioritization Matrix* (Tool C.1) to help guide the hospital through decisions regarding which PSIs or IQIs are most important to address in quality improvement efforts. It also can be used in the *Project Evaluation and Debriefing* (Tool D.8) and *Monitoring Progress for Sustainable Improvement* (Tool E.1)

Comparing Your Hospital's Quality Indicator Rates to Others

After calculating your hospital's QI rates, it is helpful to compare its rates with others, to help assess how well your hospital is currently performing. The two most common comparisons are with the *hospital's own historic performance* (trends in rates) and with *other hospitals* (benchmarks). You can use this information in two important ways to improve and sustain performance on the QIs:

- To inform decisionmaking early in your quality improvement process, regarding which indicators are priorities for quality improvement actions.
- To ensure that improvements achieved by an implementation process are sustained beyond the end of that process, by tracking both trend and benchmark information as part of an ongoing monitoring process

Performing Trend Analysis for the QI Rates

To conduct a trend analysis (or develop control charts) of a hospital's QI rates, calculate the rates for multiple time periods, and then plot those rates on graphs to identify any changes in rates that may be occurring over time. To have confidence that any changes in rates observed over time are real, you will need to calculate the rates for all years in the trendline using the same methods and measures. For valid trend information, it is important to be consistent over time in:

- The coding of your discharge data.
- The definitions of the QIs used.
- The calculations performed by the AHRQ QI software (using the same version for each year).
- The method used for risk adjustment.

The best way to achieve this consistency is to choose one method for each item and apply the method to all the years included in the trendline. Because the measurement methods for the QIs change from year to year, you will have to use the methods for one year instead of using the relevant methods for each year. At times, you will be constrained by the availability of the variables needed to calculate the rates, many of which are not available for all years (e.g., the present-on-admission variable). When this happens, it will be necessary to choose methods that are based on the data with the more limited set of variables (see below for further discussion).

Although this approach may make the rate estimates used for trending less accurate for some years, it allows you to make valid cross-year comparisons. Then you can use the correct rates for the current year for any other analyses that are relevant only to that year.

Consistency of the AHRQ definition of the QIs and AHRQ software programs. AHRQ has revised its definitions of the QIs frequently, for two reasons. The first is to incorporate into its QI definitions the annual updates made to the International Classification of Diseases, 9th Revision and diagnosis-related group codes. The other is to respond to new research findings regarding the validity and reliability of the QIs.

AHRQ typically revises its QI definitions and programs each year. Therefore, the rate you calculate for one year (with the old codes) may differ from that in the following year (with the new codes). As of June 2014, AHRQ released QI Version 4.3, which includes substantial changes (e.g., two patient safety indicators are deleted, and two others are renamed).

AHRQ does not provide guidance on how to account for the changes in coding when analyzing trends. Any bias that might be created when the old codes are used to estimate the updated QIs will depend on the specific changes made. The simplest approach you can take is to choose one version of the codes and use it to calculate QI rates for all the time periods included in your trend analysis.

Risk adjustment. In analyzing trends, it is advisable to calculate risk-adjusted QI rates to control for any changes that may occur in your patient population over time. If your patient characteristics remain stable over time, however, there is less need for risk adjustment. Different methods of risk adjustment can be used for your trend analysis. You may choose to use AHRQ's risk adjustment method, which is incorporated into the AHRQ QI software programs. Once you select a method, it should be applied consistently to rates across your trend timeline.

Ideally, you should calculate the QI rates for at least 4 to 5 years (more if possible) up to and including the most recent year for which you have data. Once you calculate the rates, you can display them in tables or graphs. (Refer to Tool B.3, Excel worksheets for charts and PowerPoint presentation for support in displaying this information.) Observation of the trendlines will provide information on whether your rates are improving, staying about the same, or declining. You can use regression methods to estimate a line through the years of data, using an observation for each year's rate. A statistically significant coefficient on the year variable will indicate a trend.

Trendlines also can be used to identify any changes in trends for QI rates related to quality improvement efforts. In these trendlines, your original 4 to 5 years of data (or more) serve as the baseline, and then you continue to chart trends for subsequent years during and after your improvement implementation period. If the postimplementation trend shows an improvement over the baseline trend, then you have identified a possible effect of your improvement efforts. You should use caution in attributing such a change in trend to your improvement efforts, however, because other factors may affect changes in rates and could confound your findings.

Comparing Your Hospital to Benchmarks

Benchmark data provide comparisons to other organizations similar to your hospital for performance measures of interest to you. You can use these benchmark comparisons to learn how well your hospital is doing on an array of measures, and you can identify the measures for which your hospital is doing quite well and others for which its performance is lower than your peers.

There is no single answer regarding which groups of hospitals you should use for benchmarking. The ideal benchmark would be groups of hospitals that you consider to be peers to your hospital, for example, academic medical centers, rural hospitals, or medium-size community hospitals. You may decide that you want to make comparisons to several hospital groups that are important

to your hospital based on mission or market strategy. Once you choose the comparison groups, you need to search for sources of the benchmark information.

Benchmark data for the AHRQ QIs may be found at national, State, and regional levels. National benchmark rates are currently provided by AHRQ. This information can be found either on the AHRQ Web site (at <http://hcupnet.ahrq.gov/HCUPnet.jsp>) or in the National Healthcare Quality Report and National Healthcare Disparities Report published by AHRQ. (The reports may be accessed at <http://www.ahrq.gov/research/findings/nhqrdr/index.html>).

Availability of data at the State and regional levels will vary, depending on the activities of organizations in each area. Some hospitals may rely on an outside agency, such as the State hospital association, a parent organization, or the University HealthSystem Consortium to analyze their data and produce their QI rates. These organizations typically provide benchmark comparisons for those using their services.

Check with your State or regional hospital association, or other systems in which you participate, to find out what comparative data they produce that you might use for benchmarks. In addition, many States now require public reporting of the QIs.

NOTE: When using average QI rates as benchmark comparisons, pay attention to which version of the AHRQ QI software was used to calculate the rates. Because different versions of the QI software generate different rates, even when applied to the same dataset, you will need to ensure that the benchmark QI rates you are using were generated from the same version of the QI software that you used to calculate your hospital's rates.

Similar to the trend data, benchmark information can be used early in your improvement process to help identify priority QIs for improvement, as well as later in the process to assess how much improvement is being achieved by your implementation process. For setting priorities, you can apply the benchmark information to your work with the *Prioritization Matrix* (Tool C.1). For later monitoring, it can be used with Tool D.8 (*Project Evaluation and Debriefing*) and Tool E.1 (*Monitoring Progress for Sustainable Improvement*).

AHRQ Quality Indicators Prioritization Matrix															
	Section 1- Blue		Section 2-Green					Section 3-Purple			Section 4-Orange				
	Own Rate and National Benchmark		Estimate Annual Cost and Cost To Implement					Rate Strategic Alignment and Regulatory Mandates <small>Rate on scale of 10 (agree/high) to 0 (disagree/low)</small>			Barrier Assessment (indicate Yes or No)				
			Volume of Cases at Risk	Cost of Single Event	Total Cost	Cost To Implement	Proxies for Cost	Strategic Alignment	External Mandates	Public Perception	Executive-Level Support	Staff Capability	Staff Willingness	Time and Effort	Ability To Monitor Progress
	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
List of PSIs/IQIs	Own Rate	National Benchmarks	Annual volume of this event	Anticipated average cost for one case with this event	The total annual cost of this event to our organization	Anticipated cost to investigate/ implement new process is less than annual cost of event	Additional information that could be used instead of or in addition to cost estimates in columns F-H	Aligned with established organizational goals and priorities	<ul style="list-style-type: none"> Regulatory Value-based purchasing Sentinel event 	<ul style="list-style-type: none"> Publicly reported Public perception Marketing Competitive pressure 	Do we have the committed support of our senior leadership?	Do we have staff with the needed skills for this PI team?	Are affected staff willing to change?	Will the added demand on staff time and effort be reasonable?	Do we have a method to review PI progress on a regular basis?
Patient Safety															

AHRQ Quality Indicators Prioritization Matrix															
	Section 1- Blue		Section 2-Green					Section 3-Purple			Section 4-Orange				
	Own Rate and National Benchmark		Estimate Annual Cost and Cost To Implement					Rate Strategic Alignment and Regulatory Mandates Rate on scale of 10 (agree/high) to 0 (disagree/low)			Barrier Assessment (indicate Yes or No)				
	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
List of PSIs/IQIs	Own Rate	National Benchmarks	Annual volume of this event	Anticipated average cost for one case with this event	The total annual cost of this event to our organization	Anticipated cost to investigate/ implement new process is less than annual cost of event	Additional information that could be used instead of or in addition to cost estimates in columns F-H	Aligned with established organizational goals and priorities	<ul style="list-style-type: none"> Regulatory Value-based purchasing Sentinel event 	<ul style="list-style-type: none"> Publicly reported Public perception Marketing Competitive pressure 	Do we have the committed support of our senior leadership?	Do we have staff with the needed skills for this PI team?	Are affected staff willing to change?	Will the added demand on staff time and effort be reasonable?	Do we have a method to review PI progress on a regular basis?
PSI 15 Accidental Puncture or Laceration															
Obstetric	PSI 17 Birth Trauma-Injury to Neonate														
	PSI 18 Obstetric Trauma-Vaginal Delivery With Instrument														
	PSI 19 Obstetric Trauma-Vaginal Delivery Without Instrument														
Death	PSI 2 Death in Low-Mortality DRGs														
	PSI 4 Death Among Surgical Inpatients														
Sentinel Event	PSI 5 Retained Surgical Item or Unretrieved Device Fragment Count														
	PSI 16 Transfusion Reaction														
AHRQ Inpatient Mortality for Selected Conditions Quality Indicator Composite	Conditions Composite														
	IQI 15 AMI Mortality														
	IQI 16 Heart Failure Mortality														
	IQI 17 Acute Stroke Mortality														

AHRQ Quality Indicators Prioritization Matrix															
	Section 1- Blue		Section 2-Green					Section 3-Purple			Section 4-Orange				
	Own Rate and National Benchmark		Estimate Annual Cost and Cost To Implement					Rate Strategic Alignment and Regulatory Mandates Rate on scale of 10 (agree/high) to 0 (disagree/low)			Barrier Assessment (indicate Yes or No)				
			Volume of Cases at Risk	Cost of Single Event	Total Cost	Cost To Implement	Proxies for Cost	Strategic Alignment	External Mandates	Public Perception	Executive-Level Support	Staff Capability	Staff Willingness	Time and Effort	Ability To Monitor Progress
	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
List of PSIs/IQIs	Own Rate	National Benchmarks	Annual volume of this event	Anticipated average cost for one case with this event	The total annual cost of this event to our organization	Anticipated cost to investigate/ implement new process is less than annual cost of event	Additional information that could be used instead of or in addition to cost estimates in columns F-H	Aligned with established organizational goals and priorities	<ul style="list-style-type: none"> Regulatory Value-based purchasing Sentinel event 	<ul style="list-style-type: none"> Publicly reported Public perception Marketing Competitive pressure 	Do we have the committed support of our senior leadership?	Do we have staff with the needed skills for this PI team?	Are affected staff willing to change?	Will the added demand on staff time and effort be reasonable?	Do we have a method to review PI progress on a regular basis?
IQI 18 Gastrointestinal Hemorrhage Mortality															
IQI 19 Hip Fracture Mortality															
IQI 20 Pneumonia Mortality															
AHRQ Inpatient Mortality for Selected Procedures Quality Indicator Composite	Procedures Composite														
	IQI 8 Esophageal Resection Mortality														
	IQI 9 Pancreatic Resection Mortality														
	IQI 11 AAA Repair Mortality														
	IQI 12 CABG Mortality														
	IQI 13 Craniotomy Mortality														
	IQI 14 Hip Replacement Mortality														
	IQI 6 and IQI 30 Percutaneous Coronary Intervention														
	IQI 7 and IQI 31 Carotid Endarterectomy														

AHRQ Quality Indicators Prioritization Matrix															
	Section 1- Blue		Section 2-Green					Section 3-Purple			Section 4-Orange				
	Own Rate and National Benchmark		Estimate Annual Cost and Cost To Implement					Rate Strategic Alignment and Regulatory Mandates Rate on scale of 10 (agree/high) to 0 (disagree/low)			Barrier Assessment (indicate Yes or No)				
			Volume of Cases at Risk	Cost of Single Event	Total Cost	Cost To Implement	Proxies for Cost	Strategic Alignment	External Mandates	Public Perception	Executive-Level Support	Staff Capability	Staff Willingness	Time and Effort	Ability To Monitor Progress
	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
List of PSIs/IQIs	Own Rate	National Benchmarks	Annual volume of this event	Anticipated average cost for one case with this event	The total annual cost of this event to our organization	Anticipated cost to investigate/ implement new process is less than annual cost of event	Additional information that could be used instead of or in addition to cost estimates in columns F-H	Aligned with established organizational goals and priorities	<ul style="list-style-type: none"> Regulatory Value-based purchasing Sentinel event 	<ul style="list-style-type: none"> Publicly reported Public perception Marketing Competitive pressure 	Do we have the committed support of our senior leadership?	Do we have staff with the needed skills for this PI team?	Are affected staff willing to change?	Will the added demand on staff time and effort be reasonable?	Do we have a method to review PI progress on a regular basis?

Tool C.1

INSTRUCTIONS

C.1. Prioritization Matrix

What is this tool? In today’s health care world, hospitals are required to take on more responsibility than ever. With many different competing priorities, senior leaders need to work to prioritize their efforts. With fewer resources than ever before, hospitals need to prioritize where to spend those resources to obtain maximum benefit. Tool C.1., the Prioritization Matrix, will help your organization determine which Patient Safety Indicators (PSIs) and Inpatient Quality Indicators (IQIs) to focus your resources on. In this tool, the PSIs and IQIs are grouped similarly for easier evaluation. For example, PSIs 17, 18, and 19 are grouped together under the section “Obstetric.”

The Prioritization Matrix (C.1) has four sections. The first section (blue) will identify which quality indicators (QIs) are worse than the benchmark set by your institution. The second section (green) will identify the cost implication of each QI for your organization. The third section (purple) will assist your organization in aligning each QI with your organizational strategic initiatives, external mandates your organization must comply with, and public perceptions of your care for each indicator. The fourth section (orange) will give your organization an idea of how likely each improvement initiative is to succeed, based on current barriers.

Organizations do not need to use every section in this toolkit. For example, if financial information will not be used in the decision process, that section can be left blank. Conversely, if there is additional organization-specific information needed for prioritization, columns can be added (e.g., length of stay, mortality rates, patients harmed).

This tool should be used to guide your decisionmaking process regarding priorities at your organization. The tool does not need to be used to make final decisions but should be used in your prioritization discussion. Ultimately, senior leadership must make the final decision on what should take priority at your organization.

Who are the target audiences? The target audiences for this tool are organization strategic planners, senior clinical leaders, and quality improvement leaders.

How can this tool help you? This tool is designed to help guide your organization’s discussion in determining the direction of organizational focus and decisions about which AHRQ QIs should be addressed during quality improvement initiatives.

How does this tool relate to the others? This tool should be used prior to starting work using the improvement methods tools (Section D). In particular, it can provide information on factors that may be barriers to implementation for use in the *Gap Analysis* (Tool D.5), and matrix outcomes (e.g., cost-effectiveness and volume) could be linked to the *Implementation Measurement* (Tool D.7) and *Project Evaluation and Debriefing* (Tool D.8).

Directions for Using the Prioritization Matrix

Section 1 - Blue: Own Rate and National Benchmark

1. Using section 1 of the matrix, calculate your organization's performance on each specific PSI and IQI (using section B of the toolkit); if the data are provided to you by an outside vendor, obtain those data. It is suggested that you use at least a year's worth of data in the tool. Prefill your performance rates for the specified time period, into column C, "Own Rate."
2. Determine what your organizational benchmark will be. It is up to your organization to determine what you will use as a benchmark. Consider using outside benchmarks, such as those received from vendors, benchmarks received from national studies, or the targets obtained from running the AHRQ QI software. Refer to Tool B.5 for more information on benchmarking. Once you decide on those benchmarks, fill them into column D, "National Benchmarks."
3. Once your hospital's specific rates and benchmarks are set, determine which PSIs and IQIs are worse than the benchmark your organization has set. Either check or highlight each box next to the PSIs and IQIs that have a rate worse than the benchmark. This will help your organization narrow down to which PSIs/IQIs are a potential issue within your organization.

Section 2 - Green: Estimate Annual Cost and Cost To Implement

4. In column E, "Volume of Cases at Risk," indicate the annual volume of each PSI and IQI event occurring within your organization. This number is the total raw number of events occurring within your organization for your chosen time period. Consider highlighting the high-volume indicators on the worksheet to bring those indicators to your attention. Each hospital will need to determine what is considered high volume for them.
5. Column F, "Cost of Single Event," indicates the average cost to your organization of one event. This number is meant to help estimate cost and is not absolute. Each organization will need to determine if this information will be used to prioritize. If so, it is imperative that you bring in members from your finance department to calculate these numbers.
6. Column G, "Total Cost," will estimate the total cost of this event to your organization for the chosen time period. To determine this number, for each PSI and IQI, multiply column E, "Volume of Cases at Risk" by column F, "Cost of Single Event." The total number should give you an idea of total cost to your organization for each indicator. Consider highlighting those indicators that have a high total cost for your organization. Again, each organization will have to determine on their own what will be considered high cost.
7. Column H, "Cost To Implement," will determine the anticipated cost in resources, such as supplies, staff time, and facility changes, to implement the improvement initiative compared to the total cost of the event to your organization. With the help of colleagues from the finance department, determine what the cost would be to your organization to implement an improvement project for the high-priority QIs. Compare the total costs of having an adverse event (Column G, Total Cost) with the anticipated cost to implement improvement initiatives (Column H, Cost To Implement). In other words, you are measuring the cost of implementation vs. the cost of not stopping these events. For each indicator, either answer "Yes," meaning the cost to improve is less than the cost of the event to the organization, or "No," meaning the cost to improve is more than the cost of the event to the organization.

8. For column I, “Proxies for Cost,” additional information may be used in addition to or instead of cost estimates in Columns F-H. Examples could include length of stay, additional procedures, readmissions, or patients harmed.

Section 3 - Purple: Rate Strategic Alignment and Regulatory Mandates

9. For column J, “Strategic Alignment,” read the statement and then rate, on a scale of 10-0, how much you agree or disagree that each indicator aligns with your strategic goals, cultural mission, organizational values, and priorities. A 10 indicates that you completely agree that the PSI/IQI aligns with organizational goals and priorities, while a score of 0 indicates you completely disagree that the PSI/IQI aligns with the organizational goals, mission, values, and priorities. Your team can go through and rate how well all the PSIs and IQIs align with your organization’s strategic goals, mission, values, and priorities and then highlight those indicators that are above a certain number.
10. In column K, “External Mandates,” the same rules apply. On a scale of 10-0, how much do you agree or disagree that each indicator has a high level of external regulatory mandates on your organization. This number should reflect your current situation. Have you been cited in the past by The Joint Commission regarding a certain condition? Are you currently under a Request for Information involving an indicator? Again, consider highlighting those indicators that are above a certain number.
11. In column L, “Public Perception,” rate how much public perception will influence your work on the indicators. Again, each organization will rate this item differently depending on their situation. Has your organization recently experienced negative press regarding an event? What would this look like in the community if you had an event in your organization? Are you competing for market share that would influence you to focus on a certain indicator? Again, consider highlighting those indicators that are above a certain number.

Section 4 - Orange: Barrier Assessment

12. In each column (M-Q), indicate whether your organization agrees with the barrier assessment (see below for further explanation of each category). In those areas marked with a no, your organization will need to address these barriers before an improvement project is started.

Barrier Assessment Categories

Executive-Level Support

Top-level commitment is vital to engendering commitment from those at the front line. If employees do not see that the company’s leadership is backing a project, they are unlikely to change.

Staff Capability

Since project teams handle a wide range of activities, resources, pressures, external stimuli, and unforeseen obstacles, they must be cohesive and well led. The team leader must be capable. The team members must have sufficient skills, motivations, and time to spend on the project.

Staff Willingness

It is important to recognize the role that managers and staff will play. By communicating with them early and consistently, senior executives can get employees on board.

Time and Effort

When companies launch transformation efforts, they frequently do not realize or do not know how to deal with the fact that employees are already busy with their day-to-day responsibilities.

Ability To Monitor Progress

The probability that projects will run into trouble rises exponentially when the time between reviews exceeds 8 weeks. Scheduling milestones and assessing their impact are the best way by which executives can review the execution of projects, identify gaps, and spot new risks.

AHRQ Quality Indicators Prioritization Matrix Example															
	Section 1- Blue		Section 2-Green					Section 3-Purple			Section 4-Orange				
	Own Rate and National Benchmark		Estimate Annual Cost and Cost To Implement					Rate Strategic Alignment and Regulatory Mandates Rate on scale of 10 (agree/high) to 0 (disagree/low)			Barrier Assessment (indicate Yes or No)				
	Q3/10-Q2/11		Volume of Cases at Risk	Cost of Single Event	Total Cost	Cost To Implement	Proxies for Cost	Strategic Alignment	External Mandates	Public Perception	Executive-Level Support	Staff Capability	Staff Willingness	Time and Effort	Ability To Monitor Progress
	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
List of PSIs/IQIs	Own Rate	National Bench- marks	Annual volume of this event	Anticipated average cost for one case with this event	The total annual cost of this event to our organization	Anticipated cost to investigate/ implement new process is less than annual cost of event	Additional information that could be used instead of or in addition to cost estimates in columns F-H	Aligned with established organizational goals and priorities	<ul style="list-style-type: none"> Regulatory Value-based purchasing Sentinel event 	<ul style="list-style-type: none"> Publicly reported Public perception Marketing Competitive pressure 	Do we have the committed support of our senior leadership?	Do we have staff with the needed skills for this PI team?	Are affected staff willing to change?	Will the added demand on staff time and effort be reasonable?	Do we have a method to review PI progress on a regular basis?
PSI 3 Pressure Ulcer	1.2	1.3	7	\$109,870	\$ 769,087	N		6	7	7	Y	Y	Y	Y	Y
PSI 6 Iatrogenic Pneumothorax	0.5	0.6	1	\$36,576	\$ 36,576	N		2	1	1	Y	Y	Y	Y	Y
PSI 7 Central Venous Catheter-Related Bloodstream Infections	3.2	0.9	25	\$82,147	\$ 2,053,675	Y		10	10	8	Y	Y	Y	Y	N
PSI 8 Postoperative Hip Fracture	0.0	0.0	3	\$147,947	\$ 443,841	N		3	3	1	Y	Y	Y	Y	Y
PSI 9 Perioperative Hemorrhage or Hematoma	3.0	3.5	1	\$59,727	\$ 59,727	N		4	3	2	Y	Y	Y	Y	Y
PSI 10 Postoperative Physiologic and Metabolic Derangement	0.9	1.5	4	\$120,629	\$ 482,516	N		3	3	2	Y	Y	Y	Y	Y
PSI 11 Postoperative Respiratory Failure	12.9	12.9	14	\$61,566	\$ 861,924	N		3	3	2	Y	Y	Y	Y	Y

Patient Safety

AHRQ Quality Indicators Prioritization Matrix Example															
	Section 1- Blue		Section 2-Green					Section 3-Purple			Section 4-Orange				
	Own Rate and National Benchmark		Estimate Annual Cost and Cost To Implement					Rate Strategic Alignment and Regulatory Mandates Rate on scale of 10 (agree/high) to 0 (disagree/low)			Barrier Assessment (indicate Yes or No)				
	Q3/10-Q2/11		Volume of Cases at Risk	Cost of Single Event	Total Cost	Cost To Implement	Proxies for Cost	Strategic Alignment	External Mandates	Public Perception	Executive-Level Support	Staff Capability	Staff Willingness	Time and Effort	Ability To Monitor Progress
	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
List of PSIs/IQIs	Own Rate	National Benchmarks	Annual volume of this event	Anticipated average cost for one case with this event	The total annual cost of this event to our organization	Anticipated cost to investigate/ implement new process is less than annual cost of event	Additional information that could be used instead of or in addition to cost estimates in columns F-H	Aligned with established organizational goals and priorities	<ul style="list-style-type: none"> Regulatory Value-based purchasing Sentinel event 	<ul style="list-style-type: none"> Publicly reported Public perception Marketing Competitive pressure 	Do we have the committed support of our senior leadership?	Do we have staff with the needed skills for this PI team?	Are affected staff willing to change?	Will the added demand on staff time and effort be reasonable?	Do we have a method to review PI progress on a regular basis?
PSI 12 Perioperative Pulmonary Embolism or Deep Vein Thrombosis	7.6	8.0	10	\$64,476	\$ 644,760	N		7	5	4	Y	N	Y	Y	Y
PSI 13 Postoperative Sepsis	12.7	11.7	15	\$49,215	\$ 738,225	N		9	7	3	Y	Y	Y	Y	Y
PSI 14 Postoperative Wound Dehiscence	1.9	2.0	2	\$55,790	\$ 111,580	N		2	2	3	Y	Y	Y	Y	N
PSI 15 Accidental Puncture or Laceration	3.2	3.3	1	\$22,629	\$ 22,629	Y		4	3	7	Y	N	Y	Y	Y
Obstetric PSI 17 Birth Trauma-Injury to Neonate	0.0	0.1	0	\$88,000	\$ -	N		2	3	9	Y	Y	Y	Y	Y
PSI 18 Obstetric Trauma-Vaginal Delivery With Instrument	134.8	135.1	17	\$90,000	\$ 1,530,000	N		2	3	8	Y	Y	Y	Y	Y
PSI 19 Obstetric Trauma-Vaginal Delivery Without Instrument	17.0	17.9	5	\$96,000	\$ 480,000	N		2	3	8	Y	Y	Y	Y	Y

AHRQ Quality Indicators Prioritization Matrix Example																
	Section 1- Blue		Section 2-Green					Section 3-Purple			Section 4-Orange					
	Own Rate and National Benchmark		Estimate Annual Cost and Cost To Implement					Rate Strategic Alignment and Regulatory Mandates Rate on scale of 10 (agree/high) to 0 (disagree/low)			Barrier Assessment (indicate Yes or No)					
	Q3/10-Q2/11		Volume of Cases at Risk	Cost of Single Event	Total Cost	Cost To Implement	Proxies for Cost	Strategic Alignment	External Mandates	Public Perception	Executive-Level Support	Staff Capability	Staff Willingness	Time and Effort	Ability To Monitor Progress	
	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	
List of PSIs/IQIs	Own Rate	National Benchmarks	Annual volume of this event	Anticipated average cost for one case with this event	The total annual cost of this event to our organization	Anticipated cost to investigate/ implement new process is less than annual cost of event	Additional information that could be used instead of or in addition to cost estimates in columns F-H	Aligned with established organizational goals and priorities	<ul style="list-style-type: none"> Regulatory Value-based purchasing Sentinel event 	<ul style="list-style-type: none"> Publicly reported Public perception Marketing Competitive pressure 	Do we have the committed support of our senior leadership?	Do we have staff with the needed skills for this PI team?	Are affected staff willing to change?	Will the added demand on staff time and effort be reasonable?	Do we have a method to review PI progress on a regular basis?	
Death	PSI 2 Death in Low-Mortality DRGs	0.4	0.0	1	\$24,919	\$ 24,919	N		6	2	5	Y	Y	Y	Y	Y
	PSI 4 Death Among Surgical Inpatients	129.7	142.9	15	\$13,906	\$ 208,590	N		6	3	5	Y	Y	Y	Y	Y
Sentinel Event	PSI 5 Retained Surgical Item or Unretrieved Device Fragment Count	0.0	0.0	0	\$53,699	\$ -	Y		6	9	8	Y	Y	Y	Y	Y
	PSI 16 Transfusion Reaction	0.0	0.0	0	\$86,698	\$ -	N		2	2	1	Y	Y	Y	Y	Y
AHRQ Inpatient Mortality for Selected Conditions Quality Indicator Composite	Conditions Composite	0.9	0.9	1	n/a		N		3	1	4	Y	Y	Y	Y	Y
	IQI 15 AMI Mortality	6.5	5.0	16	\$38,000	\$ 608,000	N		3	2	2	Y	Y	Y	Y	Y
	IQI 16 Heart Failure Mortality	2.0	2.6	15	\$18,927	\$ 283,905	N		2	1	1	Y	Y	Y	Y	Y
	IQI 17 Acute Stroke Mortality	8.9	10.9	42	\$35,000	\$ 1,470,000	N		2	3	3	Y	Y	Y	Y	Y
	IQI 18 Gastrointestinal Hemorrhage Mortality	2.3	2.3	5	\$9,659	\$ 48,295	N		1	2	4	Y	Y	Y	Y	Y
	IQI 19 Hip Fracture Mortality	2.7	0.0	3	\$18,152	\$ 54,456	N		3	3	3	Y	Y	Y	Y	Y

AHRQ Quality Indicators Prioritization Matrix Example															
	Section 1- Blue		Section 2-Green					Section 3-Purple			Section 4-Orange				
	Own Rate and National Benchmark		Estimate Annual Cost and Cost To Implement					Rate Strategic Alignment and Regulatory Mandates Rate on scale of 10 (agree/high) to 0 (disagree/low)			Barrier Assessment (indicate Yes or No)				
	Q3/10-Q2/11		Volume of Cases at Risk	Cost of Single Event	Total Cost	Cost To Implement	Proxies for Cost	Strategic Alignment	External Mandates	Public Perception	Executive-Level Support	Staff Capability	Staff Willingness	Time and Effort	Ability To Monitor Progress
	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
List of PSIs/IQIs	Own Rate	National Bench- marks	Annual volume of this event	Anticipated average cost for one case with this event	The total annual cost of this event to our organization	Anticipated cost to investigate/ implement new process is less than annual cost of event	Additional information that could be used instead of or in addition to cost estimates in columns F-H	Aligned with established organizational goals and priorities	<ul style="list-style-type: none"> Regulatory Value-based purchasing Sentinel event 	<ul style="list-style-type: none"> Publicly reported Public perception Marketing Competitive pressure 	Do we have the committed support of our senior leadership?	Do we have staff with the needed skills for this PI team?	Are affected staff willing to change?	Will the added demand on staff time and effort be reasonable?	Do we have a method to review PI progress on a regular basis?
IQI 20 Pneumonia Mortality	2.7	3.0	13	\$15,829	\$ 205,777	N		1	4	1	Y	Y	Y	Y	Y
AHRQ Inpatient Mortality for Selected Procedures Quality Indicator Composite	1.0	1.0	n/a	n/a		N		2	3	4	Y	Y	Y	Y	Y
IQI 8 Esophageal Resection Mortality	3.0	3.1	2	\$18,000	\$ 36,000	N		2	3	2	Y	Y	Y	Y	Y
IQI 9 Pancreatic Resection Mortality	2.0	2.9	3	\$65,557	\$ 196,671	N		2	4	2	Y	Y	Y	Y	Y
IQI 11 AAA Repair Mortality	4.1	4.0	1	\$23,299	\$ 23,299	N		4	2	4	Y	Y	Y	Y	Y
IQI 12 CABG Mortality	3.1	3.5	4	\$25,140	\$ 100,560	N		2	2	2	Y	Y	Y	Y	Y
IQI 13 Craniotomy Mortality	5.5	6.0	10	\$15,867	\$ 158,670	N		2	1	1	Y	Y	Y	Y	Y
IQI 14 Hip Replacement Mortality	0.1	0.0	1	\$35,000	\$ 35,000	N		1	3	3	Y	Y	Y	Y	Y
IQI 6 and IQI 30 Percutaneous Coronary Intervention						N		3	2	2	Y	Y	Y	Y	Y
IQI 7 and IQI 31 Carotid Endarterectomy						N		1	3	4	Y	Y	Y	Y	Y

Improvement Methods Overview

Prior to Action Planning

- Use Assessment of Organizational Readiness for Change related to the Inpatient Quality Indicators and Patient Safety Indicators (Section A tools or AHRQ Survey on Patient Safety Culture).
- Review current performance on each of the metrics (Section B tools).
- Determine priorities for performance improvement (Section C tool).

Preparation/Action Planning

- Designate staff who will work as a project team throughout the performance improvement initiative.
- Have the team review the output from the tools in sections A, B, and C.

Step 1

Diagnose the Problem

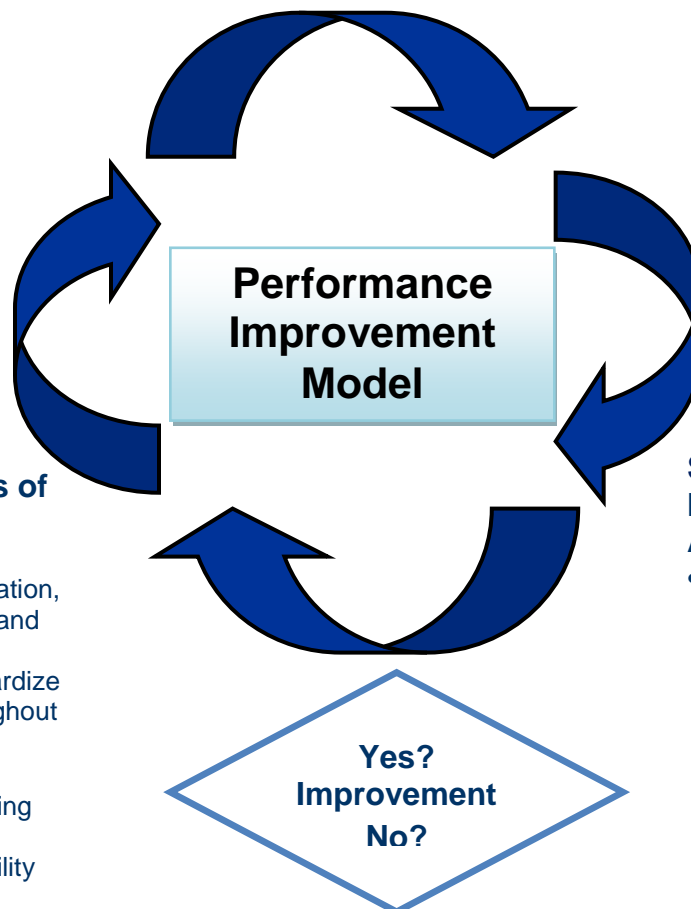
- Describe Improvement Initiative – Project Charter (Tool D.2).
- Review and Select Best Practices (Tools D.3, D.4)
- Conduct a Gap Analysis (Tool D.5)
- Select Best Practices on Gap Analysis

Step 5 **Evaluate,** **Standardize, and** **Communicate**

- Project Evaluation (Tool D.8)
 - Focus on lessons learned
 - Future planning
 - Standardization of best practices

Step 4: **Evaluate Effectiveness of** **Actions Taken**

- Results satisfactory:
 - Continue implementation, data measurement, and analysis
 - Integrate and standardize best practices throughout facility
- Results not satisfactory:
 - Identify issues blocking success
 - Report results to facility leadership



Step 2 **Plan and Implement** **Best Practices**

- Develop Implementation Plan (Tool D.6)

Step 3 **Measure Results and** **Analyze**

- Implementation Measurement (Tool D.7):
 - Collect data on key process measures related to each best practice
 - Review data to determine effectiveness

Source: Langley GJ, Nolan KM, Nolan TW, et al. The improvement guide: a practice approach to enhancing organizational performance. San Francisco: Jossey-Bass; 1996.

INSTRUCTIONS

Project Charter

What is this tool? The purpose of the project charter is to describe the performance improvement rationale, goals, barriers, and anticipated resources to which the team will commit.

Who are the target audiences? Staff members directly involved in the improvement project. Consider adding representatives from the physician and nursing staff, along with quality improvement representatives.

How can the tool help you? Upon completion of the project charter, the project team will have the following:

- Working knowledge of the project.
- Specific performance measures and targeted improvement goals.
- Identified organizational forces that may promote or impede project success.

How does this tool relate to others? The tool should be used following the completion of the prioritization matrix and in conjunction with the best practice detail forms.

Instruction Steps

1. Describe the project scope and provide goal statement. Some questions that can be addressed in the scope include whether this is a pilot project or will be implemented throughout the hospital. Which units will this project affect? Are certain service lines being included? What patient population will be included?
2. Document the case for change; list the key business reasons for initiating the project, specifically stating the business problem. These should come from Tool C.1, the prioritization matrix.
3. List the performance measures and baseline performance data. Set a performance goal for each measure.
4. List the project milestones that will guide your team in keeping on track. Milestones are major points in a project lifecycle. Some milestones for improvement projects could be the development of a tool or policy or completion of staff training on a new procedure.
5. Consider factors that are potential barriers to success such as resistance to change, resource limitations, or time constraints.
6. List the individuals or groups who will be affected by these strategies; include stakeholders.
7. Choose team members based on stakeholder analysis. Enter the project team members' names. Review the estimated percentage of time the executive liaison, M.D. liaison, and project liaison will dedicate to the project.
8. Document any additional resources that may be required, such as team members and administrative support.
9. Review the charter with the executive, M.D., and project liaisons and obtain signatures.

Resources

Project Charter Template. Version 1.5. Austin: Texas Project Delivery Framework, Texas Department of Information Resources; December 23, 2009.

Project Charter

Due: _____

To: _____

Project: _____ Schedule: _____ to _____

Institution: _____ Individual Completing This Form: _____

PROJECT PLAN

1. PROJECT DESCRIPTION/SCOPE. *Pilot unit or housewide project? Specific patient population? Are certain service lines being included?*

2. CASE FOR CHANGE (Potential ROI). *Describe the business reason(s) for initiating the project, specifically stating the business problem.*

3. PERFORMANCE MEASURES	Baseline	Goal

4. Milestones	Evaluation Date
a.	a.
b.	b.
c.	c.

5. POTENTIAL BARRIERS TO SUCCESS (from Tool C.1. Prioritization Matrix)

ASSEMBLE TEAM & RESOURCES

6. STAKEHOLDERS. List the individuals or groups who will be affected by these strategies.

a.	d.
b.	e.
c.	f.

7. TEAM MEMBERS. Consider including representatives from stakeholder groups noted above.

Executive Liaison: _____	Team Member: _____
Physician Liaison: _____	Team Member: _____
Project Liaison: _____	Team Member: _____
Team Member: _____	Team Member: _____
Team Member: _____	Team Member: _____
% Time Required of Each: Executive Liaison _____	Physician Liaison _____ Project Liaison _____

8. ADDITIONAL RESOURCES NEEDED

a. _____

b. _____

c. _____

9. SIGNATURES

Executive Liaison/Date: _____

Physician Liaison/Date: _____

Project Liaison/Date: _____

Resources:

- © 2007 by Karl E. Wieggers. Permission is granted to use and modify this template.
- Project Charter Template. Version 1.5. Austin: Texas Project Delivery Framework; December 23, 2009.
- DHFS – Project Chart.

INTRODUCTION TO THE BEST PRACTICES TOOL

What is this tool? The purpose of this tool is to provide:

- Detailed description of best practices, including suggestions for improvement, prescribed process steps, and additional resources.
- Sufficient information to complete a Gap Analysis (Tool D.5), make a decision to implement (or not to implement) a process, and develop an Implementation Plan (Tool D.6).

This tool provides information on evidence-based best practices when available, as well as information gathered from real-world experience in working with hospitals. The references cited were not derived from a full systematic evidence-based review. The best practices forms are not meant to replace validated guidelines.

The information contained in these documents should be used to review and compare against your organization's current processes to determine where gaps may exist. As always, the final decision regarding whether to implement the practices provided in this document should be made by a multidisciplinary quality improvement team in your hospital and should be based on circumstances specific to your organization.

Which PSIs and IQIs have best practices forms? Best practices forms have been developed for all PSIs for which there was sufficient evidence to recommend best practices. Best practices forms exist for the following 14 PSIs:

- PSI 03 Pressure Ulcer Rate
- PSI 05 Retained Surgical Item or Unretrieved Device Fragment Count
- PSI 06 Iatrogenic Pneumothorax Rate
- PSI 07 Central Venous Catheter-Related Blood Stream Infection Rate
- PSI 08 Postoperative Hip Fracture Rate
- PSI 09 Perioperative Hemorrhage or Hematoma Rate
- PSI 10 Postoperative Physiologic and Metabolic Derangement Rate
- PSI 11 Postoperative Respiratory Failure Rate
- PSI 12 Perioperative Pulmonary Embolism or Deep Vein Thrombosis Rate
- PSI 13 Postoperative Sepsis Rate
- PSI 14 Postoperative Wound Dehiscence Rate
- PSI 15 Accidental Puncture or Laceration Rate
- PSI 18 Obstetric Trauma Rate—Vaginal Delivery With Instrument
- PSI 19 Obstetric Trauma Rate—Vaginal Delivery Without Instrument

In addition to the PSIs, a more general best practices form addressing mortality review was developed, which hospitals can use to implement review and improvement strategies for any of the mortality-based IQIs.

Why are there only best practices for selected PSIs? There are some indicators for which it would be impractical or infeasible to develop best practices forms based on the available

evidence. The indicators for which we do not have best practices forms are listed below, along with a rationale for why best practices were not developed:

- *PSI 02 Death Rate in Low-Mortality Diagnosis Related Groups (DRGs)*: This PSI contains roughly 119 DRGs that are considered low mortality. Given the heterogeneity of these diagnoses, it would not be feasible to develop a best practices form that addresses all of these conditions. In addition, a best practices form addressing mortality review could be used to implement review and improvement strategies for any of the conditions contained in this PSI.
- *PSI 04 Death Rate Among Surgical Inpatients With Serious Treatable Conditions*: This PSI calculates postoperative deaths with the following complications: pneumonia, pulmonary embolism/deep vein thrombosis (VTE), sepsis, shock/cardiac arrest, or gastrointestinal hemorrhage/acute ulcer. Best practices forms for VTE and sepsis already exist, and the remaining conditions are too heterogeneous to be captured by one best practices form. However, as noted above, a best practices form addressing mortality review could be used to implement review and improvement strategies for any of the conditions contained in this PSI.
- *PSI 16 Transfusion Reaction Count*: There are extensive existing guidelines on blood product transfusions. Some guidelines are product specific, so the best practices form can become very complex. However, the creation of a very general best practices form about general practices related to preventing transfusion reactions would not help readers, as most, if not all, hospitals have transfusion guidelines in place.
- *PSI 17 Birth Trauma Rate—Injury to Neonate*: The existing literature on birth trauma and injury to the neonate suggests multiple risk factors, etiologies for, and types of birth trauma in neonates. Given this heterogeneity, creating one best practices form to address the various risk factors would not be feasible.

Who are the target audiences? The primary audiences include quality improvement leaders, clinical leaders, and multidisciplinary frontline staff members.

What does the tool include? The Best Practices and Suggestions for Improvement Tool details each of the following components of a best practice and its implementation:

- Background information on the problem
- Brief summary table of best practices
- Best processes/systems of care
- Additional resources

How does this tool relate to others? The Best Practices and Suggestions for Improvement Tool is used to prepare the Gap Analysis (Tool D.5) and the Implementation Plan (Tool D.6).

What are the steps for using the tool?

1. See instructions for Gap Analysis (Tool D.5).
2. Use the appropriate Selected Best Practices and Suggestions for Improvement Tool to populate the Gap Analysis (Tool D.5).

Commonly Used Abbreviations

- PSI—Patient Safety Indicator
- IQI—Inpatient Quality Indicator
- LOS—Length of Stay
- CMS—Centers for Medicare & Medicaid Services
- DRG—Diagnosis Related Groups

Selected Best Practices and Suggestions for Improvement

PSI 7: Central Venous Catheter (CVC)-Related Bloodstream Infections (BSIs)

Why Focus on Central Line-Related Bloodstream Infections (CLABSIs)?

- With a reported mortality rate of up to 35% and 14,000 to 28,000 associated deaths per year, hospitals are focusing improvement efforts in reducing and preventing CLABSIs.¹
- The prevalence of CLABSIs have been estimated to be around 80,000 in intensive care units each year, with 250,000 cases of bloodstream infections (BSIs) estimated to occur annually, if entire hospitals are assessed.²
- Recent data reveal that central venous catheters are increasingly used outside the intensive care unit, putting more patients at risk.¹
- Adverse outcomes include a prolonged length of stay of an additional 7 days; by several analyses, the cost of these infections is substantial, in terms of both morbidity and financial resources expended.^{3,4}
- CLABSIs not only cause patient harm, but also increase the cost of patient care significantly.
- At least part of this cost is likely to be shouldered by hospitals. In 2008 the Centers for Medicaid and Medicare Services (CMS) identified CLABSI as one of a number of conditions for which hospitals do not receive the higher payment for cases when the condition was acquired during hospitalization³.
- Starting in 2015, the central venous catheter-related bloodstream infection PSI will be one of the measures used for Medicare’s Hospital Value-Based Purchasing (as part of a composite indicator) that links quality to payment.⁵

Recommended Practice	Details of Recommended Practice
Central Line Insertion Checklist	A central line insertion checklist should be used to document that the insertion protocol was followed during insertion of a central line. The following elements, at a minimum, should be found on the checklist: Date, start time, end time, hands washed prior to insertion, sterile gloves, sterile gown, cap, mask for providers inserting and assisting with insertion, full-body sterile drape for patient, chlorhexidine skin prep, insertion site, type of catheter used, circumstances for insertion, dressing type, follow-up chest x ray complete, and provider inserting procedure note. ^{4,6-7}
Site Selection	The subclavian site is the preferred site for central line insertion while the femoral site should be avoided except in an emergency. ^{2,4,6-7}
Maximal Barrier Precautions and Skin Preparation	To prevent catheter-related BSI, providers must ^{2,4, 6-7} : <ul style="list-style-type: none"> • Wash hands before and after central line insertion. • Apply maximal barrier precautions. • Use chlorhexidine skin prep unless contraindicated.
Daily Monitoring, Assessment, and Line Access	All central lines should be accessed daily for need and removed promptly if the line is no longer needed for care of the patient. Central lines should also be assessed daily for the

	presence of infection and to ensure that the dressing is intact. ^{2,4,7} Disinfect hubs, needless connectors, and injection ports prior to use. ⁸
--	---

Best Processes/Systems of Care

Introduction: Essential First Steps

- Engage key nurses, physicians, hospitalists, and pharmacists from infection control, intensive care, and inpatient units including operating room; and representatives from quality improvement, radiology, and information services to develop time-sequenced guidelines, care paths, or protocols for the full continuum of care for placement and maintenance of central line catheters.

Recommended Practice: Central Line Insertion Checklist

1. Develop Insertion Checklist

- The above team must develop the central line insertion checklist. The checklist should have all of the following^{4,6-7}:
 - Date, start time, end time, hands washed prior to insertion, sterile gloves, sterile gown, cap, mask, full-body sterile drape, chlorhexidine skin prep, insertion site, type of catheter, circumstances for insertion, dressing type, follow-up chest x ray complete, person inserting, cart used, and procedure note.
- A central line insertion cart should include all the components and equipment needed to insert a central line. The cart should be available on all units/areas where central lines are inserted and should be brought into the room. The central line cart, at a minimum, should include all of the following⁶⁻⁷:
 - Supplies for maximal barrier precautions: sterile gloves, masks, sterile gowns, and caps for any provider inserting or assisting in the insertion of a central line. For the patient, a full-length sterile drape. (if Pyxis is used, replenish cart and charge patient).
 - Chlorhexidine for skin prep.
 - Central venous catheter insertion kit.
 - Central venous catheters (triple lumens, swans, PICCs, etc.).
 - Supplies to dress the catheter site (sterile, transparent, semipermeable dressings are preferred but if the site is bleeding or oozing or the patient is diaphoretic, a gauze dressing is preferred).
 - Central line insertion checklist.

2. Follow Protocol for Insertion

- The time-sequenced protocol includes the following for all insertions of central venous catheters:
 - Identify indications for catheter insertion and use. Patients must meet criteria for insertion, set by institution.⁶

- Define competency criteria to identify staff eligible to insert central lines and remove central lines within the institution. These procedures should be done by a nurse, physician, or other health care professional who has received appropriate education to ensure that the proper procedures are followed.⁶
- Start by first bringing the central line cart into the patient's room or within proximity of patient's room.
- The clinician assisting the procedure starts with the checklist. The health care professional assisting with the insertion completes the checklist and is empowered to stop the procedure if the central line protocol is not followed.
- Obtain informed consent from patient to insert the central line and put the consent in the medical record.
- Educate the patient and if needed, the family, about central line associated bloodstream infections.⁷
- Ensure that the person inserting and anyone assisting wash their hands with antiseptic soap and water or use an alcohol-based hand rub prior to starting to prep the patient (the use of gloves does not obviate hand hygiene).⁷

Recommended Practice: Site Selection

- Select appropriate site for insertion of central line^{2,6,7}:
 - The subclavian vein is the preferred site for nontunneled catheters in adults.²
 - Use of the femoral vein should be avoided except in an emergency.^{2,7}
 - The risks and benefits of a particular site must always be considered on an individual basis and clinician discretion should be used.
 - Providers (including any assistants) should wash their hands before and after palpating catheter insertion sites (palpation of the insertion site should not be performed after the application of antiseptic, unless performed with sterile gloves).

Recommended Practice: Maximal Barrier Precautions and Skin Preparation

- Prep skin:
 - Prepare skin with chlorhexidine skin antiseptic by first breaking the central core. Let the solution saturate the pad.
 - Apply with a back and forth motion for at least 30 seconds. Do not wipe or blot.⁴
 - Allow antiseptic solution to dry completely before puncturing the site.^{2,4}
 - If patient is allergic to chlorhexidine, apply substitute antiseptic (tincture of iodine, an iodophor, or 70% alcohol can be used as a substitute).
 - Apply maximal barrier precautions.^{2,4,6-7}
 - The clinician and anyone assisting with insertion should wear a cap, mask, sterile gown, and sterile gloves.
 - The patient should be covered from head to toe with a sterile drape, leaving a small opening for the insertion site.
 - Perform time-out to verify the patient ID x2, announce procedure to be performed, and verify that all medication and syringes are labeled.

- Clinician assisting is empowered to stop procedure if central line protocol is not followed.⁴
- Select appropriate catheter for insertion. Use the minimum number of ports or lumens essential for management of patient.
- Insert central line:
 - Consider placing central line via guided ultrasound if available.²
 - Place caps on lumens.
 - Suture in place or use sutureless securement device.
- Dress central line insertion site with a sterile, transparent, semipermeable dressing to cover the catheter site. If the site is bleeding or oozing or the patient is diaphoretic, a gauze dressing is preferred. Consider use of a chlorhexidine-impregnated sponge dressing.^{2,6}
 - Date and time the dressing.
 - Do not routinely apply prophylactic topical antimicrobial or antiseptic ointment or cream to the insertion site of peripheral venous catheters.
- After inserting and dressing the catheter site, remove gown and gloves and then wash hands.
 - Confirm catheter placement via X-ray after placement.
 - Clinician inserting central line should complete progress note on checklist, sign, and put in chart.

Recommended Practice: Daily Monitoring and Assessment

- Review necessity of central line daily^{2,6,7}:
 - During multidisciplinary rounds, review necessity of line and record date and time of line placement. If the patient has a long-term CVC (tunneled or totally implantable), determine a timeframe to review necessity, such as weekly.
 - Remove promptly if line is unnecessary.
 - Inspect central line site daily for signs of infection.
 - Do not replace catheters:
 - At scheduled time intervals.
 - Over a guide wire if the patient is suspected of having catheter-related infection.
 - For nontunneled catheters, change the transparent dressing and perform site care with a chlorhexidine-based antiseptic every 5 to 7 days or more frequently if the dressing is soiled, loose, or damp; change gauze dressing every 2 days or more frequently if the dressing is soiled, loose, or damp.
 - Clean all injection ports with 70% alcohol or an iodophor before accessing the system. Also cap all stopcocks when not in use.⁸
 - Ensure patency of central line by flushing after every central line use.

- When removing central lines, follow these steps:
 - Explain procedure to patient.
 - Position patient.
 - Perform hand hygiene and put on clean gloves.
 - Remove the dressing and discard along with gloves.
 - Repeat hand hygiene and don sterile gloves.
 - Remove sutures.
 - Ask the patient to take a deep breath, hold it, and bear down (if applicable).
 - Pull the catheter slowly and gently while covering the site with sterile gauze to prevent air embolism. Stop if there is any resistance.
 - Once catheter is removed, hold pressure until bleeding stops and apply a sterile occlusive dressing.
 - Inspect the integrity of the central line to make sure it did not break off inside the vein.
- Establish standing order sets for inserting central lines, to include chest x-ray to confirm placement, type of dressing to be used, dressing changes, and daily monitoring. Mandate the use of these standing orders anytime a central line is placed.
- Assign responsibility for appropriate placement of standing orders on units (decisions based on accessibility via electronic medical record versus paper).

Educational Recommendation

- Plan and provide education on protocols and standing orders to physician, nurses, and all other staff involved in inserting, maintaining, and accessing central lines (emergency department, intensive care unit, other medical units, ancillary departments, etc). Education should occur upon hire, annually, when this protocol is added to job responsibilities, and when new equipment is introduced in the organization.⁷

Effectiveness of Action Items

- Track compliance with elements of established protocol steps by using insertion checklist, appropriate documentation, and other required procedures.⁷
- Evaluate effectiveness of new processes, determine gaps, modify processes as needed, and reimplement.⁷
- Mandate that all personnel follow the central line protocol and develop a plan of action for staff in noncompliance.
- Provide feedback to all stakeholders (physician, nursing, and ancillary staff; senior medical staff; and executive leadership) on level of compliance with process.⁷
- Conduct surveillance and prevalence of bloodstream infections (using Centers for Disease Control and Prevention’s NHSN definitions) to evaluate outcomes of new process.⁷
- Monitor and evaluate performance regularly to sustain improvements achieved.⁷

Additional Resources

Systems/Processes

- Institute for Healthcare Improvement. How-to guide: prevent central line-associated bloodstream infection. Available

at: <http://www.ihl.org/resources/Pages/Tools/HowtoGuidePreventCentralLineAssociatedBloodstreamInfection.aspx>.

- How-to guide: improving hand hygiene. Available at: <http://www.ihl.org/knowledge/Pages/Tools/HowtoGuideImprovingHandHygiene.aspx>.
- Centers for Disease Control and Prevention. Guideline for hand hygiene in health-care settings. Available at: <http://www.cdc.gov/mmwr/PDF/rr/rr5116.pdf>.
- The Joint Commission. Preventing central line–associated bloodstream infections: a global challenge, a global perspective. Available at: http://www.jointcommission.org/assets/1/18/CLABSI_Monograph.pdf.
- Johns Hopkins Medicine Department of Hospital Epidemiology and Infection Control. Central Line-Associated Bloodstream Infections (CLABSI). Available at: http://www.hopkinsmedicine.org/heic/infection_surveillance/clabsi.html.
- Armstrong Institute for Patient Safety and Quality: CLABSI: Central Line-Associated Bloodstream Infection Prevention Toolkits & Resources. Available at: <https://armstrongresearch.hopkinsmedicine.org/csts/clabsi/resources.aspx>.
- The Joint Commission. CLABSI toolkit – preventing central-line associated bloodstream infections: useful tools, an international perspective. Available at: http://www.jointcommission.org/Topics/Clabsi_toolkit.aspx.

Policies/Protocols

- Montana State hospital policy and procedure-handwashing. Available at: <http://www.dphhs.mt.gov/msh/volumeii/infectioncontrol/handwashing.pdf>.
- JHH policy for the care of patient with short-term central venous catheter. Available at: https://cdn.community360.net/app/jh/csts/clabsi/JHH_VAD_Appendix_F_Care_Shortterm_Cath.pdf.
- Saskatoon Health Region central venous catheters insertion – assisting policy. Available at: <https://www.saskatoonhealthregion.ca/about/NursingManual/1073.pdf>.

Tools

- Johns Hopkins University. Central Line Insertion Care Team checklist. Available at: https://cdn.community360.net/app/jh/csts/clabsi/JHH_VAD_Appendix_C_Central_Line_Checklist.pdf.

Staff Required

- Physicians trained in inserting central lines
- Specially trained nurse to provide assistance with insertion of central line
- Multidisciplinary team rounding on patient

Equipment

- Antibacterial soap or alcohol-based hand rub
- Chlorhexidine skin antiseptic
- Maximal barrier precautions
- Central line catheters

Communication

- Systemwide education on protocol
- Time-out to verify hand washing before central line insertion

Authority/Accountability

- Senior leadership mandating protocol for all providers⁶
- Providers inserting and assisting insertion of central lines held accountable for following protocol
- RN empowered to stop procedure⁴

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Selected Best Practices and Suggestions for Improvement

PSI 12: Perioperative Pulmonary Embolism (PE) or Deep Vein Thrombosis (DVT)

Why Focus on DVE/PE?

- Together deep vein thrombosis (DVT) and pulmonary embolism (PE) constitute the largest cause of preventable hospital death. DVT and PE affect an estimated 300,000 to 600,000 people per year and may directly cause more than 100,000 deaths and contribute to another 100,000 deaths each year.
- DVT may increase hospital length of stay by 2 to 5 days and result in excess costs of about \$7,500. And PE can increase hospital length of stay by more than 5 days, result in an intensive care unit admission, and incur additional costs of more than \$10,000.
- At least part of this cost is likely to be shouldered by hospitals. In 2008 the Centers for Medicaid and Medicare Services (CMS) identified deep vein thrombosis and pulmonary embolism following certain orthopedic procedures as one of a number of conditions for which hospitals do not receive the higher payment for cases when the condition was acquired during hospitalization.¹
- Starting in 2015, the post-operative hip fracture PSI will be one of the measures used for Medicare’s Hospital Value-Based Purchasing (as part of a composite indicator) that links quality to payment.²
- The risk of DVT/PE in untreated patients after a major surgical procedure is approximately 20%. PE may occur in 1% to 2% of patients, and fatal PE may occur in 0.1% to 0.4%.

Recommended Practice	Details of Recommended Practice
Venous Thromboembolism (VTE) Risk Assessment	Evaluate each patient upon admission for the risk of developing VTE. Risk should be reassessed whenever the clinical situation changes. ³⁻⁶
Guideline-Directed VTE Prophylaxis Selection	Appropriate use of prophylaxis for VTE in patients at risk is the number one strategy to improve patient safety. Use clinically appropriate evidence-based methods of thromboprophylaxis. ^{3,4,6,7,8}
Nursing Assessment and Intervention	Promote highest level of patient mobility and advance as tolerated. ^{4,5} Assess for symptoms/presence of acute DVT and provide intervention, if appropriate. ⁵

Best Processes/Systems of Care

Introduction: Essential First Steps

- Engage key stakeholders, including pharmacy and therapeutics committee, nursing groups, orthopedics/surgery/trauma leaders, patient safety committee, perioperative committees, and chief residents and residency program directors; and engage representatives from quality improvement and information services as part of the team to develop time-sequenced guidelines, care paths, or protocols for the full continuum of care for prevention of VTE.³
- Team responsibilities include:

- Ensure institutional support and prioritization for the initiative, expressed in terms of a meaningful investment in time, equipment, personnel, and informatics, and a sharing of institutional improvement experience and resources to support any project needs.
 - Focus on reaching VTE prophylaxis targets and reporting to key medical staff committees.
 - Use reliable data collection and performance tracking.
 - Identify specific goals or aims that are ambitious, time defined, and measurable.
 - Draft or adopt evidence-based protocols that standardize VTE risk assessment and prophylaxis.⁶
 - Create institutional infrastructure, policies, practices, or educational programs promoting the use of the protocol.⁶
- Complete assessment of current practice and identify gaps.

Recommended Practice: VTE Risk Assessment

- Develop standardized VTE risk assessment that delivers decision support to the point of care; in other words, at the moment of medical decision making, providers have what they need to stratify the patient to a specific VTE risk level.^{3,4}
- Integrate VTE risk assessment into admission and transfer order sets.³
- Identify at-risk patients³⁻⁵:
 - Assess each patient’s VTE risk at admission. Risk factors include:^{4,6,7}
 - Active cancer or cancer treatment
 - Age over 60 years
 - Critical care admission
 - Dehydration
 - Known thrombophilias
 - Obesity
 - One or more significant medical comorbidities (heart disease, metabolic, endocrine or respiratory pathologies; acute infectious diseases; inflammatory conditions)
 - History of VTE
 - Use of hormone replacement therapy
 - Use of estrogen-containing contraceptive therapy
 - Varicose veins with associated phlebitis
 - Fracture of pelvis/hip/lower extremity
 - Indwelling central venous catheter
 - Immobility
 - Use stickers placed on patient charts or electronic reminders to prompt caregivers to take this step.
 - Use the VTE risk assessment to triage patients into low-, moderate-, or high-risk categories.^{3,5}

Recommended Practice: Guideline-Directed VTE Prophylaxis Selection

- Prompt providers to order VTE prophylaxis when completing admission or transfer orders; they also should have a standardized VTE risk assessment immediately available to support medical decision making (see “VTE Risk Assessment”).^{3,4}
- Ensure that VTE protocols also have a visual link from the level of VTE risk to the options for appropriate prophylaxis; this visual link will enable providers to make a rapid, accurate decision and take action to order appropriate prophylaxis.³
- Determine contraindications to pharmacologic prophylaxis and deliver decision support to the point of care so that providers know when to choose alternative prophylaxis, e.g., if specific contraindications to anticoagulation or heparin products exist.³

Recommended Practice: Nursing Assessment and Intervention

- Maximize patient mobility whenever possible and take measures to reduce the amount of time the patient is immobile because of the effects of treatment (e.g., pain, sedation, neuromuscular blockade, mechanical ventilation).^{4,5,8}
- Ensure nurse followup:
 - Ensure that appropriate treatment has been ordered and they are empowered to initiate contact with physicians if prophylaxis has not been ordered for an eligible patient.
 - Review for appropriateness of therapy.
 - Assess for symptoms/presence of acute VTE to provide intervention if appropriate.
 - Signs of DVT include unilateral leg swelling, warmth, and erythema. Patient may also complain of tenderness of the involved veins. In some cases, the patient may be asymptomatic.
 - The most common symptom of PE is dyspnea and the most common sign is tachycardia. Other signs and symptoms may include dry cough, pleuritic pain, hemoptysis, syncope, cyanosis, hypotension, anxiety, a low-grade fever, or neck vein distension.

Educational Recommendation

- Plan and provide education on protocols and standing orders to physician, nurses, and all other staff involved in DVT/PE prevention (emergency department, intensive care unit, other medical units, ancillary departments, etc.). Education should occur upon hire, annually, and when this protocol is added to job responsibilities.

Effectiveness of Action Items

- Track compliance with elements of established protocol.^{3,6}
- Evaluate effectiveness of new processes, determine gaps, modify processes as needed, and reimplement.³
- Develop a plan of action for staff in noncompliance.³
- Provide feedback to all stakeholders (physician, nursing, and ancillary staff; senior medical staff; and executive leadership) on level of compliance with process.³
- Conduct surveillance and prevalence of healthcare-associated VTE to evaluate outcomes of new process.^{3,6}
- Monitor and evaluate performance regularly to sustain improvements achieved.^{3,6}

Additional Resources

Systems/Processes

- Society of Hospital Medicine. VTE implementation guide. Available at: http://www.hospitalmedicine.org/Web/Quality_Innovation/Implementation_Toolkits/Venous_Thromboembolism/Web/Quality_Innovation/Implementation_Toolkit/Venous/First_Step/Implementation_Guide.aspx (requires account).
- UW Medicine Department of Pharmacy Anticoagulation Services. Available at: <http://depts.washington.edu/anticoag/home/>.
- University of Massachusetts. Preventing PE and DVT: a practical guide to evaluation and improvement. Available at: http://www.outcomes-umassmed.org/dvt/best_practice/.

Staff Required

- Nurses trained to use tool to triage patients into low, moderate, or high risk
- Providers educated and reminded to order appropriate VTE prophylaxis at admission^{3,6}
- Pharmacists educated in pharmacologic prophylaxis^{3,6}
- Physical therapists to assess and assist in patient mobility

Equipment

- Mechanical compression devices
- Compression stockings
- Vena cava filters

Communication

- Systemwide education on protocol³

Authority/Accountability

- Senior leadership mandating protocol for all providers³
- Clinical support personnel dedicated to ensure and document that mechanical prophylaxis is worn by patients
- Nurses empowered to initiate contact with physicians if prophylaxis has not been ordered for an eligible patient

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Selected Best Practices and Suggestions for Improvement

PSI 3: Pressure Ulcer

Why Focus on Pressure Ulcers?

- Pressure ulcers represent an important patient adverse event that is associated with significant patient and economic burden. The number of hospitalizations involving pressure ulcers increased by about 80% between 1993 and 2006.¹
- Acute care hospitals treat about 2.5 million pressure ulcers each year, and as many as 15% of hospital patients may have pressure ulcers at any one time.²
- Hospital-acquired pressure ulcer complications are associated with up to 60,000 deaths each year in the United States.²
- A pressure ulcer diagnosis may extend the typical hospital stay from 5 to 14 days and costs between \$16,755 and \$20,430, depending on the circumstances.¹
- At least part of this cost is likely to be shouldered by hospitals. In 2008 the Centers for Medicaid and Medicare Services (CMS) identified stage III and IV pressure ulcers as one of a number of conditions for which hospitals do not receive the higher payment for cases when the condition was acquired during hospitalization.³
- Starting in 2015, the pressure ulcer PSI will be one of the measures used for Medicare’s Hospital Value-Based Purchasing (as part of a composite indicator) that links quality to payment.⁴

Recommended Practice	Details of Recommended Practice
Skin Assessment at Admission and Daily, With Documentation of Lesions	Complete total skin assessment every 24 hours, with special attention to bony prominences, especially the coccygeal/sacral skin, heels and skin adjacent to external devices. ⁵ Include in the medical record complete documentation of any pressure ulcer found. ^{1,6-9}
Pressure Ulcer Risk Assessment at Admission and Daily	Evaluate all patients for pressure ulcers and pressure ulcer risk (using Braden Scale or other tool) upon admission and every 24 hours thereafter, using valid risk assessment, with results documented in the patient's chart. ^{1,7-9}
Repositioning of Patients Every 1 to 2 Hours and Promotion of Highest Level of Mobility	Reposition patients every 1 to 2 hours. ^{6,8,9}
Daily Rounds Assessment	Include in the daily rounds a nutritional assessment to ensure adequate nutrition and hydration and reassess the need for special pressure-distributing surfaces. ^{1,6-10}

Best Processes/Systems of Care

Introduction: Essential First Steps

- Engage key nurses, physicians, hospitalists, pharmacists, wound ostomy and continence (WOC) nurses, inpatient units, and representatives from quality improvement and information services to develop evidence-based guidelines, care paths, or protocols for the full continuum of care for the prevention of pressure ulcers.⁸
- The above team:
 - Identifies the purpose, goals, and scope and defines target population of this guideline.
 - Analyzes problems with guideline compliance, identifies opportunities for improvement, and communicates best practices to frontline nurses.
 - Establishes measures that will tell if changes are leading to improvement.
 - Agrees on the use of a standard risk assessment tool (for example, Braden Scale); facilities may adapt the tool to allow for easy completion, using check boxes and short phrases to ensure completion.

Recommended Practice: Skin Assessment at Admission and Daily, With Documentation of Lesions

- Determine organizational policy for the frequency of skin checks.
- Assign responsibility to staff for skin checks and repositioning of patients.
- Give all patients a head-to-toe skin inspection at admission and at least once a day, paying particular attention to bony prominences and skin adjacent to external devices.^{1,5-9}
 - Include a visual cue on each admission documentation record for the completion of a total skin assessment and risk assessment.⁹
 - Educate professionals on how to undertake a comprehensive skin assessment that includes the techniques for identifying blanching response, localized heat, edema, and induration (hardness).^{7,9}
 - Ensure that skin inspection includes assessment for localized heat, edema, or induration (hardness), especially in individuals with darkly pigmented skin.⁶
 - Ask individuals to identify any areas of discomfort or pain that could be attributed to pressure damage.⁷⁻⁹
 - Observe the skin for pressure damage caused by medical devices.^{7,8}
- Document results of the skin inspection in the medical record, including skin temperature, skin color, skin texture/turgor, skin integrity, and moisture status.^{1,6-9}
- Identify and stage all pressure ulcers according to the National Pressure Ulcer Advisory Panel (NPUAP) criteria. Also include the following^{1,8}:
 - Location.
 - Tissue type.
 - Shape.
 - Size.
 - Presence of sinus tracts/tunneling.
 - Undermining.
 - Exudate amount and type.
 - Presence/absence of infection.

- Wound edges.

Recommended Practice: Pressure Ulcer Risk Assessment at Admission and Daily

- Determine which pressure ulcer risk assessment will be used as the standard in your organization. Use a risk assessment tool with established validity and reliability, such as the Braden Scale or Norton Scale.^{1,6}
- Include in the pressure ulcer prevention protocol that a risk assessment should be completed at admission, daily and when the patient's status changes.⁶⁻⁹
- Assign responsibility for conducting a pressure ulcer risk assessment at admission and when the patient's status changes.
- Document risk assessment results in the medical record.⁷⁻⁹

Recommended Practice: Repositioning of Patients Every 1 to 2 Hours and Promotion of Highest Level of Mobility

- Have senior leaders ensure that staff can access the appropriate resources to help increase mobility.
- Educate caregivers to promote the highest possible level of patient mobility.¹
- Maintain head of bed at the lowest point consistent with patient's medical condition.^{1,8,9}
- Schedule regular turning and repositioning for bedbound and chairbound patients every 1 to 2 hours.^{1,6,8}
 - Frequency of repositioning will be influenced by variables such as the individual's tissue tolerance, his/her level of activity and mobility, his/her general medical condition, overall treatment objectives, and assessments of the individual's skin condition.^{1,7}
 - Record repositioning regimens, specifying frequency and position adopted, and include an evaluation of the outcome of the repositioning regimen.⁷

Recommended Practice: Daily Rounds Assessment

- For patients at risk, perform a nutritional assessment at entry to a new health care setting and whenever the patient's status changes.^{1,7,8}
- For patients at risk, develop a reliable process for consulting a dietitian when nutritional elements could contribute to risk of nutritional deficiencies.⁷⁻⁹
 - Ensure fluid balance by providing fluids and supplements as appropriate^{7,8}
- Give nutritional supplements only to at risk patients with identified nutritional deficiencies.^{8,10}
- Place at-risk patients on a pressure-reducing surface rather than a standard hospital mattress.^{1,6-9}
 - Triage use of pressure-redistributing beds and mattresses.⁷
 - Ensure a reliable process for redistributing pressure (e.g., use a turn clock as a reminder to staff, implement turn rounds).

Educational Recommendation

- Educational programs for the prevention of pressure ulcers should be structured, organized, and comprehensive and should occur upon hire, annually, and when this protocol is added to job responsibilities.^{8,9}

- Programs should be directed to all health care providers involved in preventing pressure ulcers. Education should also be directed toward patients, families, and patients' caregivers.^{8,9}

Effectiveness of Action Items

- Track compliance with elements of established protocol steps.^{8,9}
- Evaluate effectiveness of new processes, determine gaps, modify processes as needed, and reimplement.⁹
- Develop a plan of action for staff in noncompliance.
- Provide feedback to all stakeholders (physician, nursing, and ancillary staff; senior medical staff; and executive leadership) on level of compliance with process.
- Conduct surveillance and determine prevalence of healthcare-associated pressure ulcers to evaluate outcomes of new process.⁹
- Monitor and evaluate performance regularly to sustain improvements achieved.⁸

Additional Resources

Systems/Processes

- Agency for Healthcare Research and Quality. Preventing pressure ulcers in hospitals, a toolkit for improving quality of care. Available at: <http://www.ahrq.gov/professionals/systems/long-term-care/resources/pressure-ulcers/pressureulcertoolkit/index.html>.
- Institute for Healthcare Improvement. How-to guide: prevent pressure ulcers. ; 2011. Available at <http://www.ahrq.gov/professionals/systems/long-term-care/resources/pressure-ulcers/pressureulcertoolkit/index.html>.

Policies/Protocols

- Louisiana State University Health Sciences Center, Shreveport. P-70. Pressure ulcer prevention and wound care. Available at: <http://www.lsuhseshreveport.edu/BRFHHIntranet/TeamUHSPolicies-1.aspx> (requires login).
- Institute for Clinical Systems Improvement. Pressure ulcer prevention and treatment protocol. Available at: https://www.icsi.org/_asset/6t7kxy/.

Tools

- Braden Scale for Predicting Pressure Sore Risk. Available at: <http://www.bradenscale.com/images/bradenscale.pdf>.
- Pressure Ulcer Scale for Healing (PUSH Tool). Available at: <http://www.npuap.org/resources/educational-and-clinical-resources/push-tool/>.
- Pressure ulcer training. Available at: <https://members.nursingquality.org/NDNQIPressureUlcerTraining/>.
- European Pressure Ulcer Advisory Panel and National Pressure Ulcer Advisory Panel (NPUAP). Pressure ulcer prevention quick reference guide. Available at: http://www.npuap.org/wp-content/uploads/2012/02/Final_Quick_Prevention_for_web_2010.pdf.
- NPUAP. Pressure ulcer category/staging illustrations. Available at: <http://www.npuap.org/resources/educational-and-clinical-resources/pressure-ulcer-categorystaging-illustrations/>.

Staff Required

- Physicians (dermatology, family practice, geriatrics, internal medicine)
- Nurses
- Nursing assistants
- Relevant consultants (occupational therapy, physical therapy, enterostomal therapy, wound specialists, etc.)
- Dietitians

Equipment

- Access to equipment (therapeutic surfaces)

Communication

- Systemwide education on protocol
- Education on how to use the risk assessment accurately and reliably; requires staff development and competency testing in most organizations

Authority/Accountability

- Senior leadership mandating protocol for all providers

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Selected Best Practices and Suggestions for Improvement

PSI 5: Retained Surgical Item or Unretrieved Device Fragment Count

Why Focus on Retained Foreign Objects?

- Complications of retained foreign objects can include perforation of the bowel, sepsis, and even death.¹ These complications can occur early in the postoperative period, or even months or years later.
- Many consider retained foreign objects avoidable.¹
- Retained foreign objects represent a serious and significant patient adverse event. From 2005 to 2012, 772 retained foreign objects were reported to The Joint Commission, although this number may be higher, as these data are voluntarily reported.²
- The estimated cost of a retained foreign object is estimated to be between \$166,000 – \$200,000 per incident.³
- At least part of this cost is likely to be shouldered by hospitals. In 2008 the Centers for Medicaid and Medicare Services (CMS) identified retained foreign objects as one of a number of conditions for which hospitals do not receive the higher payment for cases when the condition was acquired during hospitalization.⁴
- As value-based purchasing evolves, quality will be increasingly linked to payment. Postoperative respiratory failure is not currently part of Medicare’s Hospital Value-Based Purchasing, but could be considered for future inclusion.⁵

Recommended Practice	Details of Recommended Practice
Counts at Appropriate Points During Surgery	Perform a sponge, sharp, and instrument count when instruments/sponges are opened, as surgery begins, as closure begins, and during subcuticular or skin closure in the same sequence. ^{1-3,6-10}
Appropriate Staff Education	Create an education model that promotes development of knowledge and research for perioperative staff consistent with national criteria. ^{2,11}
Team Collaboration	Promote and maintain a collaborative and ethical work environment that facilitates trust and confidence to allow all members of the interdisciplinary team the opportunity to speak up if patient safety is compromised. ¹¹⁻¹³
Use of Equipment and Instruments	Integrate new instruments or equipment into practice that prevents retention of foreign bodies, including incorporating technology, such as radio frequency identification devices and barcoding, as a safety practice. ^{10,11,14-16}
Standardized Practices	Integrate use of innovative surgical techniques, radiographic technology, and standardized practices and protocols for all procedures. ^{1,6,7}

Best Processes/Systems of Care

Introduction: Essential First Steps

- Engage key perioperative/procedure personnel, including nurses, physicians, technicians, anesthesiologists, and representatives from the quality improvement department, to develop evidence-based protocols for care of the patient preoperatively, intraoperatively, and postoperatively to prevent retention of foreign objects.²
- The above team:
 - Identifies the purpose, goals, and scope and defines the target population for this guideline.
 - Analyzes problems with guidelines compliance, identifies opportunities for improvement, and communicates best practices to frontline teams.
 - Establishes measures that would indicate if changes are leading to improvement, identifies process and outcome metrics, and tracks performance using these established metrics.
 - Determines appropriate facility resources for effective and permanent adoption of practices.

Recommended Practice: Counts at Appropriate Points During Surgery

- Count all sponges and instruments for a procedure where sponges or instruments could be retained.^{2,6,7}
- Count sharps and miscellaneous items (e.g., cautery tips and scratch pads) on all procedures.⁶
- Perform at least three or four counts:
 - When instruments/sponges are opened,
 - Before surgery begins,
 - As closure begins, and
 - During subcuticular or skin closure in the same sequence (i.e., start at surgical field, progress to table and then off the field).^{1,2,9,16}
- Complete the count audibly and have the count concurrently viewed by the circulator and one other person.^{2,6,10}
- Separate items being counted; place used sponges in a clear bag for visualization when performing final counts.^{3,6,9,10}
- Have circulators or another designee monitor sponges or other items that are not x-ray detectable and ensure that they are disposed of separately.
 - *Note: Needles less than 17 mm may not be detectable with plain x ray.*³
- Do not remove any sponges, sharps, or instruments from the operating room or procedural area until the case has been completed.⁶
- Ensure that the surgeon performs a methodical wound check prior to count.^{2,3}
- Use a time-out when final count occurs.^{2,9-10}
- Document the results of the final count in the surgical record or operative note.²
- Develop a protocol for staff to handle discrepancies, including use of x-ray detectable sponges and towels only.^{2,3,6,8,17}

- If there is a discrepancy, the surgeon and surgical team should be notified immediately.
- A manual inspection of the incision site should occur, along with inspection of the surrounding surgical area, including tables, linens, and the floor.
- If the object still is not found, a x ray should be obtained and read immediately.
- Document all appropriate steps taken to retrieve the object in the patient's medical record.

Recommended Practice: Appropriate Staff Education

- Create an education model that promotes development of knowledge and research for perioperative staff consistent with national criteria.^{2,11} The model should include:
 - Orientation for new hires.
 - Continuing education.
 - Multidisciplinary team communication.

Recommended Practice: Team Collaboration

- Promote and maintain a collaborative and ethical work environment that facilitates trust and confidence to allow all members of the interdisciplinary team the opportunity to speak up if patient safety is being compromised.^{2,11-13}
 - Create a safe environment for team members to report unsafe practices and unprofessional team behaviors; develop a mechanism for acquiring this information and a clear set of expectations for how this information is addressed.
 - Create a process to address staff that are noncompliant.

Recommended Practice: Use of Equipment and Instruments

- Integrate new instruments or equipment into practice that prevents retention of foreign bodies (e.g., absorbent mesh plug).
- Consider use of computer-assisted method for counting, including use of a barcoding system on surgical sponges and instruments.^{6,7,16}
- Consider use of radio frequency identification devices (RFIDs) on surgical sponges and instruments.^{2,11,14}
- Consider use of numbered surgical sponges and instruments for a more comprehensive, thorough count to reduce the risk for miscounting.¹⁰

Recommended Practice: Standardized Practices

- Integrate use of innovative surgical techniques, including the use of minimally invasive procedures when applicable.
- Consider routine use of a closing x-ray and radio-opaque surgical materials for all patients, especially high-risk patients (e.g., bariatric patients) or high-risk situations (e.g., emergency procedures).^{1,6,7}
- If not implemented routinely, then consider implementing additional screening methods for high-risk cases even when counts are documented as correct (e.g., obese patients, multiple handoffs, long procedures, procedures that convert from laparoscopic to open, emergency procedures).¹

Educational Recommendation

- Plan and provide education on any protocols related to foreign body retention to physician, nursing, and all other staff involved in operative or procedural cases. Education should occur upon hire, annually, and when this protocol is added to job responsibilities.²

Effectiveness of Action Items

- Track compliance with elements of established protocol by using checklists, appropriate documentation, etc.²
- Follow a standard for performance improvement such as PDSA (Plan-Do-Study-Act) or Lean Six Sigma. Also consider performing a failure mode and effects analysis to better understand the process and where breakdowns occur.
- Mandate that all personnel follow the safety protocols developed by the team to prevent foreign body retention and develop a plan of action for staff in noncompliance.
- Provide feedback to all stakeholders (physician, nursing, and ancillary staffs; and executive leadership) on level of compliance with process.
- Conduct a root cause analysis for any occurrences of foreign body retention.²
- Monitor and evaluate performance regularly to sustain improvements achieved.

Additional Resources

Systems/Processes

- American College of Surgeons. Statement on the prevention of retained foreign bodies after surgery. Available at: http://www.facs.org/fellows_info/statements/st-51.html.
- American College of Surgeons. Prevention of retained foreign objects. Available at: http://www.facs.org/fellows_info/bulletin/2009/2009-november-bulletin.pdf#page=27.

Policies/Protocols

- Institute for Clinical Systems Improvement. Perioperative Protocol. Prevention of unintentionally retained foreign objects during vaginal deliveries protocol. Available at: https://www.icsi.org/guidelines_more/catalog_guidelines_and_more/catalog_guidelines/catalog_patient_safetyreliability_guidelines/rfo/.
- Policy: NoThing Left Behind®: Prevention of Retained Surgical Items Multi-Stakeholder Policy. Available at: http://www.nothingleftbehind.org/uploads/NoThing_Left_Behind_Policy_v5.pdf.
- Department of Veterans Affairs, VHA Directive 2010-017. Prevention of retained surgical items. Available at: http://www.va.gov/vhapublications/ViewPublication.asp?pub_ID=2186.

Tools

- Pennsylvania Patient Safety Authority. Retained foreign object audit form. Available at: <http://patientsafetyauthority.org/EducationalTools/PatientSafetyTools/rfo/Documents/audit.pdf>.
- World Health Organization. Surgical safety checklist. Available at: http://who.int/patientsafety/safesurgery/tools_resources/SSSL_Checklist_finalJun08.pdf.

Staff Required

- Surgeons
- Radiologist

- Resident physicians
- Anesthesia professionals
- Perioperative registered nurses
- Surgical technologists

Equipment

- X ray and other imaging technologies to ensure that no surgical equipment is left within the body cavity
- Radio-opaque surgical materials

Communication

- Systemwide education on policy/protocol
- Time-out performed before start and at closing of surgical procedure

Authority/Accountability

- Operating room staff responsible for conducting counts at appropriate times
- All staff within the operating room to actively participate in the time-out and be empowered to stop the procedure if there are concerns

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Selected Best Practices and Suggestions for Improvement

PSI 6: Iatrogenic Pneumothorax

Why Focus on Iatrogenic Pneumothorax?

- Iatrogenic pneumothorax (IP) is a life-threatening complication seen in 3% of ICU patients.¹
- IP occurs primarily due to barotrauma related to mechanical ventilation or as a postprocedural event. Due to the development of improved equipment and techniques, IP can be largely preventable.¹
- Patients with accidental IP had an extra 4.4 days added to their LOS, \$18,000 in additional charges, and had a 6% higher risk of hospital death.²
- At least part of this cost is likely to be shouldered by hospitals. In 2008 the Centers for Medicaid and Medicare Services (CMS) identified iatrogenic pneumothorax with venous catheterization as one of a number of conditions for which hospitals do not receive the higher payment for cases when the condition was acquired during hospitalization.³
- Starting in 2015, the iatrogenic pneumothorax PSI will be one of the measures used for Medicare's Hospital Value-Based Purchasing (as part of a composite indicator) that links quality to payment.⁴

This indicator is also reported on Medicare's Hospital COMPARE as part of the Hospital Inpatient Quality Reporting Program.⁵

Recommended Practice	Details of Recommended Practice
Identification of Patients at Risk	Develop a process to address common iatrogenic pneumothorax risk factors identified in the literature. ¹
Safe Insertion Techniques During Pleural Procedures	Standardize procedures and position techniques during pleural procedures, such as thoracentesis and chest tube insertion. ⁶⁻⁹
Physician Training	Develop specified training components and criteria and establish a plan for continued competency. ^{6,7}
Standardized Practices	Develop and standardize practices for site identification, marking, and procedural practice. ^{6,7,10-12}

Best Processes/Systems of Care

Introduction: Essential First Steps

- Engage key procedural personnel, including nurses, physicians, technicians, and representatives from the quality improvement department, to develop evidence-based protocols for care of the patient preprocedure, intraprocedure, and postprocedure to prevent iatrogenic pneumothorax.
- The above team:
 - Identifies the purpose, goals, and scope and defines the target population for this guideline.
 - Analyzes problems with guidelines compliance, identifies opportunities for improvement, and communicates best practices to frontline teams.

- Establishes measures to indicate if changes are leading to improvement; identifies process and outcome metrics, and tracks performance using these metrics based on a standard performance improvement methodology (e.g., FOCUS-PDSA).
- Determines appropriate facility resources for effective and permanent adoption of practices.

Recommended Practice: Identification of Patients at Risk

- Determine risk for iatrogenic pneumothorax during the history and physical.
- Consider the many factors identified in the literature that are associated with a higher risk of iatrogenic pneumothorax. These can be categorized as either patient related or procedure related.^{2,13}

Patient-related factors include:

- Body habitus.
- Effusion size.
- Localized fluid.
- Chronic obstructive pulmonary disease.
- Diagnosis of cardiogenic pulmonary edema at admission.
- Diagnosis of acute respiratory distress syndrome at admission.
- Insertion during the first 24 hours of a central venous catheter or pulmonary artery catheter.
- Use of vasoactive agents within 24 hours postprocedure.¹
- Cancer of kidney and renal pelvis (risk is likely due to the need for transthoracic needle aspiration, which is used for diagnostic purposes).

Procedure-related factors include:

- Transthoracic needle aspiration.
- Thoracentesis.
- Subclavian venipuncture.
- Positive pressure ventilation.
- Bronchoscopy.
- Respiratory and mechanical ventilation.
- Abdominal cavity operations.
- Pleural biopsy.
- Coughing during the procedure (patient).

Recommended Practice: Safe Insertion Techniques During Pleural Procedures

- Standardize procedures and equipment.⁷
 - Use of real-time ultrasound to identify and mark site and/or guidance for thoracentesis.^{8,9,12,14-16}
 - Requirement of preprocedural verification of the correct patient using two identifiers.
 - Requirement of preprocedural verification of the intended procedure and the correct site selection.

- Use a lateral approach; avoid posterior approach if possible. A lateral approach minimizes risks of vessel laceration.^{6,8}
- Use blunt dissection vs. trocar use for chest tube insertion.^{6,9}

Recommended Practice: Physician Training

- Provide specified training, including three components:
 - Theoretical didactic training,
 - Simulated practice, and
 - Formal, supervised practice with minimum observation criteria.^{6,7}
- Consider identifying a subset of practitioners (e.g., focus group) who receive specific training to perform the procedure (thoracentesis, chest tube insertion) regularly. Establish criteria for continued competency with minimum procedural number.^{6,7}

Recommended Practice: Standardized Practices

- Appropriate site selection, including use of the "safe triangle" (defined by the anterior border of the latissimus dorsi, the lateral border of the pectoralis major, and a horizontal line through the anatomical position of the ipsilateral nipple) as a default to reduce chances of visceral perforation. Consider using pleural ultrasound to provide real-time localization of pleural fluid.^{6,10}
- Site marking performed immediately prior to the procedure to reduce the likelihood of fluid redistribution or tissue/organ movement secondary to patient repositioning.^{6,11}
- Implementation of procedural guidelines (e.g., American College of Chest Physicians).

Educational Recommendation

- Plan and provide education on protocols to physician, nursing, and all other staff involved in procedural cases. Education should occur upon hire, annually, and when this protocol is added to job responsibilities.

Effectiveness of Action Items

- Track compliance with elements of established protocol by using checklists, appropriate documentation, etc.
- Evaluate effectiveness of new processes, determine gaps, modify processes as needed, and reimplement practices.
- Mandate that all personnel follow the safety protocols developed by the team to prevent iatrogenic pneumothorax and develop a plan of action for staff in noncompliance.
- Provide feedback to all stakeholders (physician, nursing, and ancillary staff; senior medical staff; and executive leadership) on the level of compliance with process.
- Conduct surveillance and determine prevalence to evaluate outcomes of new process.
- Monitor and evaluate performance regularly to sustain improvements achieved.

Additional Resources

Systems/Processes

- World Health Organization. [Summary based on Surgical care at the district hospital.](http://www.who.int/surgery/publications/Postoperativecare.pdf) Available at: <http://www.who.int/surgery/publications/Postoperativecare.pdf>. Accessed June 25, 2014.

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Tools

- [Agency for Healthcare Research and Quality](#). Problems and prevention: Chest tube insertion [DVD]. For information on DVD, see Patient Safety: Findings in Action (fact sheet). Available at: <http://www.ahrq.gov/research/findings/factsheets/errors-safety/chesttubes/index.html>. Accessed June 25, 2014.

Staff Required

- Physicians
- Registered nurses
- Respiratory therapists

Equipment

- Computerized tomography (CT)
- Ultrasound

Communication

- Education on policy/protocol of monitoring and treatment of pneumothorax
- Communication system to escalate up the chain of command when provider not responding to diagnosis of pneumothorax or signs and symptoms of pneumothorax

Authority/Accountability

- Senior leaders such as chief/chairs of surgery and medicine, nursing leadership, and unit managers

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Selected Best Practices and Suggestions for Improvement

PSI 8: Postoperative Hip Fracture

Why Focus on Postoperative Hip Fracture?

- Hip fracture is one of the most serious consequences of elderly falls. Approximately 73%-90% of hip fractures result from a fall.¹ Preventing falls is key to preventing hip fractures.
- Falls are also associated with higher anxiety and depression scores, loss of confidence and are associated with increased LOS and higher rates of discharge to long-term institutional care.² Thus, preventing falls is likely to have other benefits beyond prevention of hip fractures.
- Fractures increase the risk of mortality.³ At 5 years post hip fracture, mortality has been estimated at 50% according to one study.⁴
- Not only does postoperative hip fracture cause patient harm, it also significantly increases the cost of patient care.
- At least part of this cost is likely to be shouldered by hospitals. In 2008 the Centers for Medicaid & Medicare Services (CMS) identified falls and trauma—including fractures—as one of a number of conditions for which hospitals do not receive the higher payment for cases when the condition was acquired during hospitalization.⁵
- Starting in 2015, the postoperative hip fracture PSI will be one of the measures used for Medicare’s Hospital Value-Based Purchasing (as part of a composite indicator) that links quality to payment.⁶

Recommended Practice	Details of Recommended Practice
Identification of Patients at Risk for Falls	Clinical and environmental factors that place a patient at risk for falling postoperatively should be identified and managed. ^{2,7}
Postoperative Medication Management	Polypharmacy has been shown to increase a patient’s risk for falls and postoperative hip fracture. ⁸⁻¹⁴ In addition, use of certain medications may reduce a patient’s risk for postoperative hip fracture after falling postoperatively. ^{3,11-14}
Standard Fall Prevention Protocol	Use a standardized fall prevention protocol to help reduce falls and associated injury. The falls prevention protocol should detail what interventions to put into place and for whom. ^{2,7}

Best Processes/Systems of Care:

Introduction: Essential First Steps

- Engage key personnel, including nurses, nursing assistants, physicians, technicians, physical therapists, occupational therapists, pharmacists, and representatives from the quality improvement department, to develop evidence-based protocols for care of the patient postoperatively who is at risk of hip fracture related to fall.¹⁵⁻¹⁷
- The above team:
 - Identifies the purpose, goals, and scope and defines the target population for this guideline.
 - Analyzes problems with guideline compliance, identifies opportunities for improvement, and communicates best practices to frontline teams.¹⁶

- Establishes measures to indicate if changes are leading to improvement; identifies process and outcome metrics, and tracks performance using these metrics.
- Determines appropriate facility resources for effective and permanent adoption of practices.

Recommended Practice: Identification of Patients at Risk for Falls

- Develop a systematic and standardized approach for team members to acquire detailed history and physicals and assessments for the following risk factors^{2,7,16,17}:
 - Older age
 - Polypharmacy
 - Functional dependence
 - Gait instability
 - Lower limb weakness
 - Urinary frequency and incontinence
 - Low albumin level
 - Severe anemia
 - Comorbidities as defined by the American Society of Anesthesia (ASA) score, which defines an individual’s preoperative health, of 3 or greater (A patient with severe systemic disease)
 - Emergency surgery
 - History of previous falls
 - Agitation and/or confusion
 - Iatrogenic delirium
 - Environmental hazards (i.e. medical equipment, electrical cords)

Recommended Practice: Postoperative Medication Management

- Develop a systematic and standardized approach for team members to acquire a detailed medication reconciliation upon admission:
 - Polypharmacy of greater than four or five medications per day can double a patient’s risk for falling.^{1,8-10,16,18,19}
 - Use of two or more medications in certain populations (e.g., elderly) may constitute polypharmacy and thus increase a patient’s risk.^{1,20}
- Develop a systematic and standardized approach for team members to evaluate a patient’s medication regimen postoperatively:
 - Limit use of narcotics and sedatives together.^{2,7,9}

Recommended Practice: Standard Fall Prevention Protocol

- Develop a systematic and standardized practice for postoperative fall prevention that includes assessing and addressing the aforementioned risks^{7,12,17}:
 - Familiarize the patient with the environment.
 - Have the patient demonstrate call light use and keep the call light within reach.
 - Keep patient personal possessions within the patient’s reach.
 - Have sturdy handrails in patient bathrooms, room and hallway.

- Place the hospital bed in a low position and keep the brakes locked.
- Keep non-slip, well-fitting footwear on patient.
- Utilize a night light or supplemental lighting.
- Keep floor surfaces clean and dry. Clean up all spills promptly.
- Keep patient care areas uncluttered.
- Communicate patient fall risk to all caregivers.
- Offer assistance to bathroom/commode or use bedpan hourly while awake.

Educational Recommendation

- Plan and provide education on protocols to physicians, nursing staff, therapists, pharmacists, and all other staff involved in postoperative care. Education should occur upon hire, annually, and when protocols are added to job responsibilities.^{15,16}

Effectiveness of Action Items

- Track compliance with elements of established practices by using checklists, appropriate documentation, etc.
- Evaluate effectiveness of new processes, determine gaps, modify processes as needed, and reimplement practices.^{15,17}
- Mandate that all personnel follow the safety practices related to preventing postoperative hip fracture as it relates to falling and develop a plan of action for staff in noncompliance.
- Provide feedback to all stakeholders (physician, pharmacy, nursing, and ancillary staff; senior medical staff; and executive leadership) on level of compliance with process.
- Conduct surveillance and determine prevalence of postoperative hip fracture, as it relates to falls, to evaluate outcomes of new process.¹⁵
- Monitor and evaluate performance regularly to sustain improvements achieved.

Additional Resources

Systems/Processes

- Agency for Healthcare Research and Quality. The Falls Management Program: a quality improvement initiative for nursing facilities. Available at: <http://www.ahrq.gov/professionals/systems/long-term-care/resources/injuries/fallspx/fallspxmanual.pdf>.
- Agency for Healthcare Research and Quality. Preventing falls in hospitals: a toolkit for improving quality of care. Available at: <http://www.ahrq.gov/professionals/systems/hospital/fallpxtoolkit/index.html>.

Policies/Protocols

- Vermont State Hospital Policy: Fall prevention. Available at: http://mentalhealth.vermont.gov/sites/dmh/files/policies/DMH-VSH_Fall_Prevention_Policy.pdf.
- St. Joseph’s Medical Center, Brainerd, MN, Protocol: [Inpatient Fall Prevention/Reduction](#). Available at: http://www.mnhospitals.org/Portals/0/Documents/ptsafety/falls/Inpatient_Fall_Prevention_Policy.doc.

Tools

- Brigham and Women’s Hospital. Fall TIPS (Tailoring Interventions for Patient Safety). Available at: http://www.brighamandwomens.org/Patients_Visitors/pcs/nursing/nursinged/Falls2Trial.aspx .
- Health Foundation for Western & Central New York. Step Up to Stop Falls Toolkit™. Available at: <http://www.hfwcnny.org/Tools/Broadcaster/frontend/itemcontent.asp?reset=1&ItemID=13>.
- Institute for Healthcare Improvement (IHI). Injurious Fall Data Collection Tool. Available at: <http://www.ihl.org/resources/Pages/Tools/InjuriousFallDataCollectionTool.aspx>.
- IHI. Transforming care at the bedside how-to guide: reducing patient injuries from falls. Available at: <http://www.ihl.org/resources/Pages/Tools/InjuriousFallDataCollectionTool.aspx>.

Staff Required

- Physicians
- Nurses
- Nursing assistants
- Physical therapists
- Occupational therapists
- Dietitian
- Social workers

Equipment

- Walkers
- Wheelchairs
- Bed monitors
- Commodes

Communication

- Systemwide education on policy/protocol of prevention of patient falls

Authority/Accountability

- Senior nursing leadership, nursing unit managers, physical therapy and occupational therapy managers

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Selected Best Practices and Suggestions for Improvement

PSI 9: Postoperative Hemorrhage or Hematoma

Why Focus on Postoperative Hemorrhage and Hematoma?

- Postoperative bleeding is a risk associated with all surgical procedures. The best way to reduce the risk of hemorrhage is to identify and correct potential causes of coagulopathy preoperatively as well as postoperatively.¹
- Cases from the Nationwide Inpatient Sample that were flagged by this PSI had 3.0% excess mortality, 3.9 days of excess hospitalization, and \$21,431 in excess hospital charges, relative to carefully matched controls that were not flagged.²
- As value-based purchasing evolves, quality will be increasingly linked to payment. Perioperative hemorrhage or hematoma is not currently part of Medicare’s Hospital Value-Based Purchasing, but could be considered for future inclusion.

Recommended Practice	Details of Recommended Practice
Management of Blood Loss	Proper management of blood loss, including frequent dressing checks, is key to management of postoperative hemorrhage and hematoma. ¹
Medication Management	Determine if and when discontinuation of antiplatelet/anticoagulant medication prior to the procedure or surgery is appropriate. ^{1,3,4,5}

Best Processes/Systems of Care

Introduction: Essential First Steps

- Engage key preoperative/perioperative/procedure personnel, including nurses, physicians, and surgical technicians, and representatives from the quality improvement department to develop evidence-based protocols for care of the patient preoperatively, intraoperatively, and postoperatively to prevent postoperative hemorrhage or hematoma.
- The above team:
 - Identifies the purpose, goals, and scope and defines the target population for this guideline.
 - Analyzes problems with guidelines compliance, identifies opportunities for improvement, and communicates best practices to frontline teams.
 - Monitors measures that would indicate if changes are leading to improvement, identifies process and outcome metrics, and tracks performance using these metrics.
 - Determines appropriate facility resources for effective and permanent adoption of practices.

Recommended Practice: Management of Blood Loss

- Interventions include applying pressure to the site and being prepared to return the patient to the operating room:

- Consider developing a standard set of criteria or early warning signs (see below) that will be used to trigger notification of the responsible surgeon of possible postoperative bleeding.
 - Incorporate all components of the criteria/early warning signs into a tool designed to provide standardized documentation of all pertinent details of the event. This tool will provide the data to track patient characteristics, processes, and outcomes for continuous quality improvement.
 - Establish a policy to empower nurses to rapidly escalate up the chain of authority to reach the responsible surgeon (limit time to 5-minute wait after initial page before move to notify next higher level of authority).
 - Provide educational sessions to all clinical staff on the pilot units (nurses, residents, attending physicians, respiratory therapists, patient care technicians, certified nursing assistants, etc.) in the use of the early warning signs criteria, required documentation, and policy for rapid escalation up the chain of authority to notify responsible surgeon.
- Common early warning signs of hemorrhage can include but are not limited to¹:
 - Restlessness and anxiety.
 - Frank bleeding and bruising.
 - Tachycardia.
 - Diminished cardiac output and dropping central venous pressure.
 - Reductions in urine output.
 - Swelling and discoloration of the extremities.

Recommended Practice: Medication Management

- Develop a process and protocol for determining if discontinuation of antiplatelet/anticoagulant medications prior to procedure or surgery is appropriate.¹
 - Practice recommendation should be selected based on individual patient risk factors and current evidence-based guidelines for a particular surgery.^{3,4,5}
 - Obtain a thorough history of medication use prior to surgery. The history must specifically address the use of over-the-counter and prescribed medications.
 - Document this information in the patient’s medical record so that it is available to all care providers.

Educational Recommendation

- Plan and provide education on protocols to physician, nursing, and all other staff involved in operative, procedural cases and the care of patients postoperatively. Education should occur upon hire, annually, and when this protocol is added to job responsibilities.

Effectiveness of Action Items

- Track compliance with elements of the established protocol by using checklists, appropriate documentation, etc.
- Evaluate effectiveness of new processes, determine gaps, modify processes, as needed and reimplement practices.

- Mandate that all personnel follow the protocols and practices developed by the team to prevent postoperative hemorrhage and hematoma and develop a plan of action for staff in noncompliance.
- Provide feedback to all stakeholders (physician, nursing, and ancillary staff; senior medical staff; and executive medical and administrative leadership) on level of compliance with process.
- Conduct surveillance and determine prevalence of postoperative hemorrhage to evaluate outcomes of new process.
- Monitor and evaluate performance regularly to sustain improvements achieved.

Additional Resources

Systems/Processes

- The Merck manual for health care professionals: Postoperative care. Available at: http://www.merckmanuals.com/professional/special_subjects/care_of_the_surgical_patient/postoperative_care.html?qt=&sc=&alt=. Accessed June 26, 2014.
- World Health Organization. Summary based on Surgical Care at the district hospital. Available at: <http://www.who.int/surgery/publications/Postoperativecare.pdf>. Accessed June 25, 2014.
- Anticoagulant Toolkit: Reducing Adverse Drug Events. Available at: <http://www.ih.org/knowledge/Pages/Tools/AnticoagulantToolkitReducingADEs.aspx>.

Policies/Protocols

- [Recommended Curriculum Guidelines for Family Medicine Residents: Care of the Surgical Patient](#), American Academy of Family Physicians
- http://www.uwhealth.org/files/uwhealth/docs/anticoagulation/Periprocedural_Anticoagulation_Guideline.pdf

Tools

- [The Post-Operative Handover Assessment Tool \(POHAT\)](#)

Staff Required

- Physicians
- Nursing and nursing assistants
- Respiratory therapists
- Transfusion medicine service

Communication

- Systemwide education on policy/protocol of monitoring postoperative patients

Authority/Accountability

- Senior leadership mandating protocol for all providers
- Providers involved in postoperative care are held accountable for following protocol

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Selected Best Practices and Suggestions for Improvement

PSI 10: Postoperative Physiologic and Metabolic Derangement

Why Focus on Postoperative Physiologic and Metabolic Derangement?

- This indicator measures how often hospitalized patients experienced problems with glucose control (if diagnosed with diabetes) or renal failure (if no previous renal disease) after having an operation. Careful management of blood glucose and fluids after surgery, especially in patients who have underlying medical problems, can prevent many of these complications.¹
- Patients that maintained blood glucose at or below 110 mg/dL in the postoperative period not only reduced mortality among critically ill patients, but also reduced bloodstream infections, acute renal failure, blood transfusions, mechanical ventilation, and intensive care.²
- Cases from the Nationwide Inpatient Sample that were flagged by this PSI had 19.8% excess mortality, 8.9 days of excess hospitalization, and \$54,818 in excess hospital charges, relative to carefully matched controls that were not flagged.¹
- At least part of this cost is likely to be shouldered by hospitals. In 2008 the Centers for Medicaid and Medicare Services (CMS) identified manifestations of poor glycemic control as one of a number of conditions for which hospitals do not receive the higher payment for cases when the condition was acquired during hospitalization.³
- As value-based purchasing evolves, quality will be increasingly linked to payment. This indicator is not currently part of Medicare’s Hospital Value-Based Purchasing, but could be considered for future inclusion.⁴

Recommended Practice: Details of Recommended Practice	
Implement Blood Glucose Monitoring Requirements	Implement blood glucose monitoring for appropriate patients with results readily available to all care providers.
Manage Prevention Strategies for Postoperative Patients	Avoid risk factors for acute renal failure in postoperative patients.

Best Processes/Systems of Care

Introduction: Essential First Steps

- Engage key procedural personnel, including nurses, physicians, nutrition/dietitians, and representatives from the quality improvement department, to develop evidence-based protocols for care of the patient postoperatively at risk for physiologic and metabolic derangement.
- The above team:
 - Identifies the purpose, goals, and scope and defines the target population.
 - Analyzes problems with guidelines compliance, identifies opportunities for improvement, and communicates best practices to frontline teams.
 - Establishes measures to indicate if changes are leading to improvement, identifies process and outcome metrics, and tracks performance using these metrics.

- Determines appropriate facility resources for effective and permanent adoption of practices.

Recommended Practice: Implement Blood Glucose Monitoring Requirements

- Ensure that all diabetic patients have diabetes documented in the medical record.⁵
- Consider obtaining an endocrinology consultation for diabetic patients. Involvement of specialists or specialty teams may reduce a diabetic patient’s length of stay, improve glycemic control, and improve outcomes.⁵
- Consider obtaining a dietary consultation with a focus on inpatient dietary needs and an assessment of the patient’s dietary self-management skills.⁵
- Carefully monitor and set up protocols to address the following risk factors for hypoglycemia^{5,6}:
 - Status of nothing by mouth or reduction of oral intake.
 - Discontinuation of enteral feeds, total parenteral nutrition, intravenous dextrose discontinuation.
 - Premeal insulin with no/little meal consumption.
 - Unexpected transport from nursing unit after rapid-acting insulin administration.
- Implement process by which patients are monitored for physical symptoms of hyperglycemia (frequent urination/urination during the night, unusual thirst, fatigue, blurred vision, etc.) and hypoglycemia (rapid heart rate, sweating, confusion, disorientation, etc.).⁵
- Ensure that the nurse reviews each bedside blood glucose level and alerts the physician of levels outside of threshold as specified by protocol.
- Ensure that the physician reviews blood glucose levels at least daily and adjusts treatment as needed. If adjustments are made to the insulin regimen, assessments of blood glucose levels are to be conducted more frequently.
- Track markers of poor glycemic management outcomes:
 - Hypoglycemic events.⁵
 - Ketosis events.

Recommended Practice: Manage Prevention Strategies for Postoperative Patients

- Implement the following strategies to prevent acute renal failure into the care of postoperative patients⁷⁻¹⁰:
 - Identify patients at risk (e.g. older age, hypovolemia, infection, etc.).
 - Avoid nephrotoxins or use with caution (e.g. ace inhibitors, aminoglycocides, amphotericin, aspirin, cisplatin, cyclosporines, low molecular weight dextran, NSAID, radioactive dyes, etc.).
 - Limit increases in abdominal pressure. Intra-abdominal pressure increases can be due to bleeding, intestinal distension, peritonitis, paralytic ileus and ascites.
 - Use volume expansion, vasodilators, and inotropes cautiously and avoid hypovolemia.

Educational Recommendation

- Plan and provide education on protocols to physician, nursing, dietary, and all other staff involved in caring for these patients. Education should occur upon hire, annually, and when this protocol is added to job responsibilities.

Effectiveness of Action Items

- Track compliance with elements of established protocol by using checklists, appropriate documentation, etc.
- Evaluate effectiveness of new processes, determine gaps, modify processes as needed, and reimplement practices.
- Produce monthly glycemic management outcome and renal failure reports and use to provide group and individual feedback to key stakeholders; physicians, nursing, nutrition and pharmacy staff; and senior medical and administrative leadership.
 - Develop plan of action for clinicians/units/teams whose patients consistently have above target blood glucose levels, frequent hypoglycemia events, and ketosis events.
- Mandate that all personnel follow the safety protocols developed by the team and develop a plan of action for staff in noncompliance.
- Provide feedback to all stakeholders (physician, nursing, nutrition, and other ancillary staff; senior medical and administrative leadership) on the level of compliance with processes developed.
- Monitor and evaluate performance regularly to sustain improvements achieved.

Additional Resources

Systems/Processes

- Clement S. Braithwaite SS, Magee MF, et al. Management of diabetes and hyperglycemia in hospitals. *Diabetes Care* 2004;(27)2:553-91.

Tools

- American Healthways. Inpatient management guidelines for people with diabetes. Available at: <http://www.healthways.com/success/library.aspx?id=873>.
- Campbell K, Braithwaite S. Preadmission treatment plan with history of blood glucose monitoring. In: Hospital management of hyperglycemia. *Clin Diabetes* 2004;22(2):81-88. Available at: <http://clinical.diabetesjournals.org/content/22/2/81.full>.
- The Joint Commission. Specifications manual for National Hospital Inpatient Quality Measures discharges 04-01-11 (2Q11) through 12-31-11 (4Q11). Available at: http://www.jointcommission.org/specifications_manual_for_national_hospital_inpatient_quality_measures/.
- National Guideline Clearinghouse. Standards of medical care in diabetes. IX. Diabetes care in specific settings.

Staff Required

- Physicians, nurses, pharmacists, dietitians, clinical diabetic educator, and nursing assistants.

Equipment

- Point of care glucose monitors.

Communication

- Detailed communication between the physician, pharmacist, nurse, and patient (including the family if applicable) regarding medication reconciliation and the outpatient medication regimen.
- Communication between patient, physician, nurse, and diabetes educator regarding patient education and the patient's diabetic self-management plan as an outpatient.

Authority/Accountability

- Senior leadership mandating protocol for all providers.
- Providers involved with the postoperative care of patients are held accountable for following the protocol.

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Selected Best Practices and Suggestions for Improvement

PSI 15: Accidental Puncture or Laceration

Why Focus on Accidental Puncture and Laceration?

- Accidental puncture and laceration is not uncommon among hospitals in the United States. According to the Healthcare Cost and Utilization Project, the risk-adjusted rate of this indicator was 2.83 per 1,000 eligible patients in 2008.¹
- Based on data from the Nationwide Inpatient Sample, cases flagged by this PSI had 2.2% excess mortality, 1.3 days of excess hospitalization, and \$8,300 in excess hospital charges, relative to carefully matched controls that were not flagged. Data from the VA hospital system showed similar findings, where cases that were flagged by this PSI had 3.2% excess mortality, 1.4-3.1 days of excess hospitalization, and \$3,359-6,880 in excess hospital costs, relative to carefully matched controls that were not flagged.¹
- At least part of this cost is likely to be shouldered by hospitals, as accidental puncture or laceration is considered an avoidable complication. In 2008 the Centers for Medicaid and Medicare Services (CMS) identified accidental puncture or laceration as one of a number of conditions for which hospitals do not receive the higher payment for cases when the condition was acquired during hospitalization.²
- Starting in 2015, the accidental puncture and laceration PSI will be one of the measures used for Medicare’s Hospital Value-Based Purchasing (as part of a composite measure) that links quality to payment.³
- This indicator is also reported on Medicare’s Hospital COMPARE as part of the Hospital Inpatient Quality Reporting Program.⁴
- Accidental puncture and laceration can also result in harm to health care personnel. Occupational exposure to bloodborne pathogens from needlesticks and other sharps injuries is associated with the approximately 385,000 needlesticks and other sharps-related injuries to hospital-based health care personnel that occur each year. Sharps injuries are primarily associated with occupational transmission of hepatitis B virus, hepatitis C virus, and HIV, and have been implicated in the transmission of more than 20 other pathogens.⁵
- Although there is little evidence on preventing patient accidental puncture-laceration, practices leading to the prevention of staff puncture-laceration can reduce risk for patients also.

Recommended Practice	Details of Recommended Practice
Use appropriate safety techniques during the perioperative period.	Use appropriate safety measures to protect patients and staff from accidental punctures and lacerations during the perioperative period.
At close of the surgery, appropriately dispose of all sharps.	Dispose of all needles and other sharps in appropriate containers after the completion of the surgery.

Best Processes/Systems of Care

Introduction: Essential First Steps

- Engage key nurses, physicians, and surgical technicians from the operating room; and representatives from quality improvement, radiology, and information services to develop time-sequenced guidelines, care paths, or protocols for the full continuum of care.⁶

Recommended Practice: Appropriate Safety Techniques During Perioperative Period

- Use appropriate equipment selection methods⁶⁻⁸:
 - Use scalpel blades with safety blades.
 - Use mechanical/instrument tissue retraction.
 - Use blunt surgical instruments.
 - Use alternative cutting methods (e.g., cautery, harmonic scalpel).
- Keep used needles on the sterile field in a disposable puncture-resistant needle container.
- Adopt a hands-free technique of passing suture needles and sharps between perioperative team members.^{6,9}
- Use a one-handed or instrument-assisted suturing technique to avoid finger contact with needles.
- Use control-release or pop-off needles.
- Double glove.^{8,10}
- Do not bend, break, or recap contaminated needles.⁹

Recommended Practice: Appropriate Sharps Disposal

- Use closable orange or red, leak-proof puncture-resistant disposable containers.⁷
- Place disposal containers close to the point of use.⁷
- Empty routinely and do not allow to overfill.⁷
- Use mounted, upright containers, either floor or wall.⁷

Educational Recommendation

- Plan and provide education on protocols and standing orders to physician, nurses, and all other staff involved in accidental puncture and laceration prevention and care. Education should occur upon hire, annually, and when this protocol is added to job responsibilities.

Effectiveness of Action Items

- Track compliance with elements of established protocol steps.⁷
- Evaluate effectiveness of new processes, determine gaps, modify processes as needed, and reimplement.⁷
- Mandate that all personnel follow the protocol and develop a plan of action for staff in noncompliance.
- Provide feedback to all stakeholders (physician, nursing, and ancillary staff; senior medical staff; and executive leadership) on level of compliance with process.
- Monitor and evaluate performance regularly to sustain improvements achieved.⁷

Additional Resources

Systems/Processes

- Centers for Disease Control and Prevention. Workbook for designing, implementing and evaluating a sharps injury prevention program. Available at: <http://www.cdc.gov/sharpssafety/resources.html>.
- ECRI Institute. Sharps Safety & Needlestick Prevention. Available at: https://www.ecri.org/Products/Pages/Sharps_Safety_Needlestick_Prevention.aspx.
- Occupational Safety & Health Administration. Needlestick/Sharps Injuries. Available at: <https://www.osha.gov/SLTC/etools/hospital/hazards/sharps/sharps.html>.
- American Nurses Association. Needlestick prevention guide. Available at: <http://www.nursingworld.org/MainMenuCategories/WorkplaceSafety/Healthy-Work-Environment/SafeNeedles/NeedlestickPrevention.pdf>.

Tools

- World Health Organization. Needlestick Injury Prevention Assessment Tool. Available at: http://www.who.int/occupational_health/activities/2needlest.pdf.

Staff Required

- Surgeons
- Perioperative nurses
- Surgical technologists

Equipment

- Personal protective equipment
- Sharps containers

Communication

- Systemwide education on protocol
- Communication between surgeon and surgical nurse/surgical technician on agreed upon neutral zone

Authority/Accountability

- Senior leadership mandating protocol for all providers

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Selected Best Practices and Suggestions for Improvement

PSI 14: Postoperative Wound Dehiscence

Why focus on postoperative wound dehiscence?

- Postoperative wound dehiscence occurs in up to 3% of abdominal surgeries, and is associated with significant risk of mortality between 14% and 50%.¹ Other adverse events include prolonged length of stay, subsequent surgeries and incisional herniation.^{2,3}
- Proper identification of patients at risk, prevention of surgical site infections, and appropriate post-surgical wound assessment and help decrease the incidence of postoperative wound dehiscence. Though many risk factors are non-modifiable, there are factors that can be addressed by hospitals, such as nutritional status and decreasing surgical error.
- Not only does postoperative wound dehiscence cause patient harm, it also significantly increases the cost of patient care.
- At least part of this cost is likely to be shouldered by hospitals. In 2008 the Centers for Medicaid and Medicare Services (CMS) identified surgical site infections (a risk factor for wound dehiscence) as one of a number of conditions for which hospitals do not receive the higher payment for cases when the condition was acquired during hospitalization.⁴
- Starting in 2015, the post-operative wound dehiscence PSI will be one of the measures used for Medicare's Hospital Value-Based Purchasing (as part of a composite measure) that links quality to payment.⁵
- This indicator is also reported on Medicare's Hospital COMPARE as part of the Hospital Inpatient Quality Reporting Program.⁶

Recommended Practice	Details of Recommended Practice
Wound dehiscence risk assessment.	Determine risk factors for postoperative wound dehiscence and identify patients at risk. ^{1-3,7}
Reduce the incidence of surgical site infections.	Administer timely and appropriate antibiotics preoperatively and postoperatively. ^{1,2}
Postoperative wound assessment.	Assess the surgical wound postoperatively and document any findings of wound dehiscence. ^{1,2,7}

Best Processes/Systems of Care

Introduction: Essential First Steps

- Engage key nurses, physicians, hospitalists, respiratory therapists, dietitians, pharmacists, and certified nursing assistants from infection control, intensive care, and inpatient units including operating room; and representatives from quality improvement, radiology, and information services to develop time-sequenced guidelines, care paths, or protocols for the full continuum of care.

Recommended Practice: Wound dehiscence risk assessment.

- Complete a preoperative assessment to identify factors that could increase the risk of postoperative wound dehiscence.^{1-3,7}
 - Patient related:
 - Anemia
 - Hypoproteinemia
 - Jaundice
 - Male gender
 - Overweight
 - Increasing age
 - Infection
 - Poor nutrition
 - Diabetes
 - Smoking
 - Malignancy
 - Chronic pulmonary disease
 - Presence of prior scar or radiation at the incision site
 - Noncompliance with postoperative instructions (such as early excessive exercise or lifting heavy objects)
 - Increased pressure within the abdomen due to: fluid accumulation (ascites); inflamed bowel; severe coughing, straining, or vomiting
 - Long-term use of corticosteroid medications
 - Procedure related:
 - Emergency surgery
 - Types of surgery (clean vs. contaminated)
 - Surgical error
- When possible, eliminate or mitigate risk factors.
- Educate patient about risk factors of noncompliance with postoperative instructions.
 - Encourage elimination of smoking products before surgery.^{1,2}
 - Optimize nutrition before surgery, especially increased protein.^{1,2}

Recommended Practice: Reduce the incidence of surgical site infections.

- Consider chlorhexidine bathing preoperatively.⁸
- If removing hair prior to surgery, use the following appropriate techniques.^{1,9}
 - Hair removal with clippers, depilatory, or no hair removal at all
- Prophylactic antibiotics should be administered within 1 hour prior to surgical incision.^{1,2,9}

- Administer appropriate antibiotic selection based on evidence based guidelines^{1,2,9}
- Reduce the amount of staff traffic in and out of the operating room
- Use appropriate wound dressings determined by the type of closure:¹
 - Primary: Dry, sterile cover dressing for 24-48 hours
 - Secondary and chronic: Dressings that provide a moist wound healing environment while preventing it from becoming too wet
- Perform routine pain assessments to ensure early identification of delayed wound healing.^{1,2}

Recommended Practice: Postoperative wound assessment.

- Documentation of the surgical wound should occur 48 hours after surgery to establish a baseline.^{1,2,7}
- Repeat assessment should occur every shift thereafter.^{2,7}
- Symptoms of wound dehiscence should be elicited, including^{1,2}:
 - Bleeding
 - Pain
 - Swelling
 - Redness
 - Fever
 - Broken sutures
 - Open wound
 - Pulling or ripping sensation reported by patient

Educational Recommendation

- Plan and provide education on protocols and standing orders to physician, nurses, and all other staff involved in postoperative care. Education should occur upon hire, annually, and when this protocol is added to job responsibilities.¹

Effectiveness of Action Items

- Track compliance with elements of established protocol steps.
- Evaluate effectiveness of new processes, determine gaps, modify processes as needed, and reimplement.
- Mandate that all personnel follow the sepsis protocol and develop a plan of action for staff in noncompliance.
- Provide feedback to all stakeholders (physician, nursing, and ancillary staff; senior medical staff; and executive leadership) on level of compliance with process.
- Monitor and evaluate performance regularly to sustain improvements achieved.

Additional Resources

Systems/Processes

- Agency for Healthcare Research and Quality. Universal ICU decolonization: an enhanced protocol. Available at: http://www.ahrq.gov/professionals/systems/hospital/universal_icu_decolonization/index.html
- Centers for Disease Control and Prevention (CDC). Surgical Site Infection (SSI). Available at: <http://www.cdc.gov/hai/ssi/ssi.html>.

Policies/Protocols

- World Health Organization (WHO). Postoperative care. Summary based on Surgical care at the district hospital. Available at: <http://www.who.int/surgery/publications/Postoperativecare.pdf>.

Tools

- CDC. Surgical Site Infection Toolkit. Available at: http://www.cdc.gov/HAI/pdfs/toolkits/SSI_toolkit021710SIBT_revised.pdf.
- WHO Surgical Safety Checklist. Available at: <http://www.who.int/patientsafety/safesurgery/checklist/en/>.

Staff Required

- Surgeons
- Perioperative and postoperative nursing

Equipment

- Dressing supplies
- Appropriate antibiotics

Communication

- Systemwide education on policy/protocol of monitoring postoperative patients

Authority/Accountability

- Senior leadership mandating protocol for all providers

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Selected Best Practices and Suggestions for Improvement

PSI 18 and 19: Obstetric Trauma Rate – Vaginal Delivery With and Without Instrument

Why Focus on Obstetric Lacerations?

- This particular best practice form focuses on PSI 18 and PSI 19, which center on 3rd and 4th degree perineal lacerations with and without instruments.
- The rate of third or fourth degree perineal lacerations range from 4% to 13%.¹
- When they do occur, it can have a physical, psychological, and financial impact on all involved.² If left untreated it may lead to persistent perineal pain, sexual and urinary problems, and fecal incontinence. Patients and families may resort to legal action in order to offset the financial burden of an obstetric adverse event.²
- Not only does obstetric trauma cause patient harm, it also significantly increases the cost of patient care.
- As value-based purchasing evolves, lesser quality care is less likely to be paid for. Though obstetric trauma is not currently part of Medicare’s Hospital Value-Based Purchasing program, these indicators could be considered for future inclusion.

Recommended Practice	Details of Recommended Practice
Identify patient risk factors associated with obstetric lacerations.	Identify and document any laceration risk factors patients may have. ^{3,4}
Use strategies to prevent third and fourth degree obstetric lacerations.	Use the following techniques to prevent obstetric lacerations: ⁴ <ul style="list-style-type: none"> • Allow time for adequate perineal thinning • Avoid an operative delivery • Avoid episiotomy • Perineal massage during the weeks before delivery in nulliparas • Lateral birth position • Perineal warm packs during the second stage

Best Processes/Systems of Care

Introduction: Essential First Steps

- Engage key nurses, physicians, hospitalists, respiratory therapists, dieticians, and pharmacists from infection control, intensive care, and inpatient units including operating room; and representatives from quality improvement and information services to develop time-sequenced guidelines, care paths, or protocols for the full continuum of care.

Recommended Practice: Identify patient risk factors associated with obstetric lacerations.

- The following are risk factors associated with third and fourth degree lacerations^{3,4}:

- Birth weight over 4 kg
- Persistent occipitoposterior position
- Nulliparity
- Induction of labor
- Operative delivery
- Mother age (< 21 years)
- Epidural analgesia (ensure that patients are not overly anesthetized)
- Second stage longer than 1 hour
- Shoulder dystocia
- Midline episiotomy
- Forceps delivery
- Use of oxytocin
- Delivery with stirrups

Recommended Practice: Use strategies to prevent third and fourth degree obstetric lacerations.

- Use the following techniques to prevent obstetric lacerations⁴:
 - Allow time for adequate perineal thinning.
 - Avoid an operative delivery.
 - Avoid episiotomy.⁵
 - Avoid induction of labor.
 - Use perineal massage during the weeks before delivery in nulliparas.
 - Ensure lateral birth position.
 - Use perineal warm packs during the second stage of labor.

Educational Recommendation

- Plan and provide education on protocols and standing orders to physician, nurses, and all other staff involved in obstetric care. Education should occur upon hire, annually, and when this protocol is added to job responsibilities.²

Effectiveness of Action Items

- Identify perinatal quality improvement and obstetrical adverse event prevention as an organizational priority and set performance goals for your hospital.
- Define and routinely monitor and analyze your hospital's perinatal quality measure and obstetrical adverse event rates against internal and external benchmarks.
- Implement comprehensive, evidence-based perinatal safety protocols and hold staff accountable for compliance.²

Additional Resources

Systems/Processes

- Institute for Healthcare Improvement. Idealized design of perinatal care. Available at: <http://www.ihl.org/resources/Pages/IHIWhitePapers/IdealizedDesignofPerinatalCareWhitePaper.aspx>.

- March of Dimes. Toward Improving the Outcome of Pregnancy III. Available at: <http://www.marchofdimes.com/professionals/toward-improving-the-outcome-of-pregnancy-iii.aspx>.
- Center for Medicare & Medicaid Innovation. Strong Start for Mothers and Newborns Initiative. Available at: <http://www.marchofdimes.com/professionals/toward-improving-the-outcome-of-pregnancy-iii.aspx>.
- ACOG recommends restricted use of episiotomies. Available at: http://www.acog.org/About_ACOG/News_Room/News_Releases/2006/ACOG_Recommendations_Restricted_Use_of_Episiotomies.
- Early deliveries without medical indications: just say no. Available at: http://www.acog.org/About_ACOG/News_Room/News_Releases/2013/Early_Deliveries_Without_Medical_Indications.

Policies/Protocols

- AHRQ Innovations Exchange. Rehearsing team care for relatively rare obstetric emergencies leads to improved outcomes. Available at: <http://www.innovations.ahrq.gov/content.aspx?id=2463>.
- AHRQ Innovations Exchange. Comprehensive program virtually eliminates preventable birth trauma. Available at: <http://www.innovations.ahrq.gov/content.aspxid=2081>.

Tools

- How-to guide: prevent obstetrical adverse events. Cambridge, MA: Institute for Healthcare Improvement; 2012. Available at <http://www.ihl.org/resources/Pages/Tools/HowtoGuidePreventObstetricalAdverseEvents.aspx>.

Staff Required

- Obstetricians
- Surgeons
- Obstetric nurses

Communication

- Systemwide education on policy/protocol of monitoring postoperative patients

Authority/Accountability

- Senior leadership mandating protocol for all providers

References

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Selected Best Practices and Suggestions for Improvement

PSI 11: Postoperative Respiratory Failure

Why Focus on Postoperative Respiratory Failure?

- Even though there is debate regarding the definition of true postoperative respiratory failure, it still remains an important patient adverse event. Generally, postoperative respiratory failure is the failure to wean from mechanical ventilation within 48 hours of surgery or unplanned intubation/reintubation postoperatively.¹
- Postoperative respiratory failure has been associated with increased cost, an increased length of stay, and increased mortality.^{2,3}
- As value-based purchasing evolves, quality will be increasingly linked to payment. Postoperative respiratory failure is not currently part of Medicare’s Hospital Value-Based Purchasing, but could be considered for future inclusion.

Recommended Practice	Details of Recommended Practice
Assess risk factors.	Develop a set of risk factors for postoperative respiratory failure and screen all patients undergoing elective surgery. ³
Initiate various treatments during the perioperative and postoperative period to reduce a patient’s risk of developing respiratory failure.	To prevent or lessen the risk of developing postoperative respiratory failure, perform lung expansion exercises, selective use of NG tubes and use short acting neuromuscular blockaid. ^{2,4}

Best Processes/Systems of Care

Introduction: Essential First Steps

- Engage key nurses, physicians, hospitalists, respiratory therapists, dieticians, and pharmacists from infection control, intensive care, and inpatient units including operating room; and representatives from quality improvement, radiology, and information services to develop time-sequenced guidelines, care paths, or protocols for the full continuum of care.

Recommended Practice: Assess Risk Factors

- Determine which patients are at increased risk for postoperative respiratory failure to better prepare clinicians to anticipate adverse events postoperatively, as well as improve allocation of resources after surgery.³
- Risk factors for postoperative respiratory failure are^{2,3}:
 - Age.
 - History of chronic obstructive pulmonary disease and/or congestive heart failure.
 - Smoking.
 - Functional dependence.
 - Serum albumin <3.0 g/dL.
 - BUN >30 mg/dL.
 - Higher ASA score/class.
 - Emergency surgery.
 - High-risk surgery (e.g., emergent and prolonged procedures, open vs. laparoscopic).

Recommended Practice: Initiate Various Treatments During Perioperative and Postoperative Period To Reduce Risk of Respiratory Failure

- Ensure that patients are using lung expansion exercises such as incentive spirometry, deep breathing, intermittent positive-pressure breathing, and continuous positive airway pressure. These exercises have been shown to reduce the likelihood of postoperative respiratory failure.
- Use nasogastric tubes selectively since they can increase the risk of aspiration.
- Use short-acting neuromuscular blockade. Long-acting neuromuscular blockade has a higher incidence of residual block, and patients with higher residual block were 3 times more likely to develop postoperative pulmonary complications than those without residual block.⁵

Educational Recommendation

- Plan and provide education on protocols and standing orders to physician, nurses, and all other staff involved in postoperative respiratory failure prevention and care (emergency department, intensive care unit, etc.). Education should occur upon hire, annually, and when this protocol is added to job responsibilities.

Effectiveness of Action Items

- Track compliance with elements of established protocol steps.
- Evaluate effectiveness of new processes, determine gaps, modify processes as needed, and reimplement.
- Mandate that all personnel follow the postoperative respiratory failure protocol and develop a plan of action for staff in noncompliance.
- Provide feedback to all stakeholders (physician, nursing, and ancillary staff; senior medical staff; and executive leadership) on level of compliance with process.
- Monitor and evaluate performance regularly to sustain improvements achieved.

Additional Resources

Systems/Processes

- World Health Organization. Summary based on Surgical care at the district hospital. Available at: <http://www.who.int/surgery/publications/Postoperativecare.pdf>.

Policies/Protocols

- AARC Clinical Practice Guideline: Incentive spirometry: 2011. Available at: http://aulanet.umb.edu.co/aulanet_jh/archivos/correo_umb/06PL62_062_A1/5545043_espirometriaintensiva.pdf.

Tools

- QxMD. Postoperative Respiratory Failure Calculator. Available at: <http://www.qxmd.com/calculate-online/respirology/postoperative-respiratory-failure-risk-calculator>.

Staff Required

- Surgeons
- Intensivists
- Nursing
- Respiratory therapy

Equipment

- Incentive spirometer

Communication

- Systemwide education on policy/protocol of monitoring postoperative patients.

Authority/Accountability

- Senior leadership mandating protocol for all providers.

References

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Selected Best Practices and Suggestions for Improvement

PSI 13: Postoperative Sepsis

Why Focus on Sepsis?

- More than 750,000 cases of sepsis are reported in the United States each year. Between 11 percent and 27 percent of ICU admissions have severe sepsis, with mortality rates ranging from 20 percent to more than 50 percent.¹
- Implementation of the entire Surviving Sepsis Campaign bundle has been associated with documentation of a decrease in mortality.²
- Not only does postoperative sepsis cause patient harm, it also significantly increases the cost of patient care. The cost of sepsis care in the United States has been estimated at \$400 billion annually.³
- Starting in 2015, the postoperative sepsis rate PSI will be one of the measures used for Medicare’s Hospital Value-Based Purchasing (as part of a composite indicator) that links quality to payment.⁴

Recommended Practice	Details of Recommended Practice
Screen patients for sepsis.	Develop a 1-page sepsis screening tool; integrate tool into electronic medical record. ^{2,5}
Use a sepsis resuscitation bundle.	Obtain blood cultures, administer antibiotics, measure serum lactate, and manage fluid status for hypotension and/or lactate ≥ 4 mmol/L within 3 hours of sepsis diagnosis. ^{2,4,6}
Policy and procedure development.	Use Surviving Sepsis Campaign’s evidence-based guidelines; include the 3-hour and 6-hour bundles. ²
Adopt sepsis measures.	Evaluate compliance by using process measures such as door-to-antibiotic time; share reports regularly to communicate progress. ²

Best Processes/Systems of Care

Introduction: Essential First Steps

- Engage key nurses, physicians, hospitalists, respiratory therapists, dieticians, and pharmacists from infection control, intensive care, and inpatient units including operating room; and representatives from quality improvement, radiology, and information services to develop time-sequenced guidelines, care paths, or protocols for the full continuum of care.²

Recommended Practice: Screen Patients for Sepsis

- Develop a 1 page sepsis screening tool; integrate tool into electronic medical record.⁷
- Identify patients quickly by using a standardized set of physiologic triggers or early warning signs that alert caregivers to respond quickly with appropriate interventions.
- Nurses should assess patients with a history suggestive of a new infection for sepsis at least daily.
- Screening should begin upon arrival at the emergency department or soon after hospital admission if not admitted through the ED.
- Use advanced practitioners or the rapid response team to screen admitted patients for sepsis.

- Develop a list of “triggers” for the rapid-response team to use in screening admitted patients for sepsis.
- Pilot the screening tool with 1 or 2 nursing units. Allow the staff piloting the tool to provide feedback. Incorporate staff feedback with the tool is revised.
- The screening tool should be no longer than 1 page and take only 2 or 3 minutes to complete.

Recommended Practice: Use a Sepsis Resuscitation Bundle

- The sepsis resuscitation bundle has 7 elements.²
 - To be completed within 3 hours of identification of sepsis:
 - Measure serum lactate.
 - Collect blood cultures before administration of the initial antibiotic.
 - Administer broad-spectrum antibiotics.
 - Administer 30 mL/kg crystalloid for hypotension or lactate \geq 4mmol/L.
 - To be completed within 6 hours of identification of sepsis:
 - For hypotension that does not respond to initial fluid resuscitation, apply vasopressors to maintain a mean arterial pressure (MAP) > 65 mmHg.
 - In the event of persistent arterial hypotension despite volume resuscitation (septic shock) or initial lactate \geq 4 mmol/L (36 mg/dL):
 - ◆ Measure central venous pressure (CVP).*
 - ◆ Measure central venous oxygen saturation (ScvO₂).*
 - Remeasure lactate if initial lactate was elevated.*

* Targets for quantitative resuscitation included in the guidelines are CVP of \geq 8 mm Hg, ScvO₂ of \geq 70%, and normalization of lactate.

Recommended Practice: Develop Policies and Procedures

- An organizationwide sepsis management protocol, policy, and/or procedures are necessary to integrate evidence-based guidelines into clinical practice.
- Convene a multidisciplinary team that includes different professions and service lines.²
- Incorporate the “Surviving Sepsis Campaign” evidence-based guidelines, including the 3-hour resuscitation and 6-hour care bundles, into the sepsis management protocol and/or procedures.²
- Develop a systemwide protocol. Institute the goal that all adult services use the same protocol, including the emergency and intensive care departments.
- Develop order sets, preferably electronic, for nonsevere sepsis and for severe sepsis/septic shock.
- Develop a systemwide antibiotic policy and/or procedure that includes type, dosing, initiation, timing, and compatibility.
- Use a process for screening patients for sepsis, such as a paper or electronic screening tool that is 1 page and will take 2-3 minutes to complete. Also consider use of the rapid-response team for screening.

- Incorporate a mechanism for handoff communication between the emergency department and intensive care unit.
- Implement a sepsis education program offered systemwide. Include didactic presentations and electronic offerings.

Recommended Practice: Adopt Sepsis Management Measures

- Organizational performance goals need to be determined. Use a retrospective chart review tool to identify baseline sepsis management compliance.
 - Evaluate compliance by using process measures such as door-to-antibiotic time; share reports regularly with stakeholders to communicate progress.
- Use a systemwide mechanism to share data with administrators, physicians, and staff, such as a sepsis management dashboard and/or reports.

Educational Recommendation

- Plan and provide education on protocols and standing orders to physician, nurses, and all other staff involved in sepsis prevention and care (emergency department, intensive care unit, etc). Education should occur upon hire, annually, and when this protocol is added to job responsibilities.²

Effectiveness of Action Items

- Track compliance with elements of established protocol steps.
- Evaluate effectiveness of new processes, determine gaps, modify processes as needed, and reimplement.
- Mandate that all personnel follow the sepsis protocol and develop a plan of action for staff in noncompliance.
- Provide feedback to all stakeholders (physician, nursing, and ancillary staff; senior medical staff; and executive leadership) on level of compliance with process.²
- Monitor and evaluate performance regularly to sustain improvements achieved.²

Additional Resources

Systems/Processes

- Surviving Sepsis Campaign bundles. Available at: <http://www.survivingsepsis.org/bundles/Pages/default.aspx>.
- Surviving Sepsis Campaign implementation kit. Available at: <http://www.survivingsepsis.org/Improvement/Pages/Implementation-Kit.aspx>.
- Surviving Sepsis Campaign educational materials. Available at: <http://www.survivingsepsis.org/Resources/Pages/Media.aspx>.
- AHRQ Innovations Exchange: Sepsis alert program leads to more timely diagnosis and treatment, reducing morbidity, mortality, and length of stay. Available at: [http://www.innovations.ahrq.gov/content.aspx?id=2264&tab=.](http://www.innovations.ahrq.gov/content.aspx?id=2264&tab=)
- AHRQ Innovations Exchange: Nine-hospital collaborative uses patient screening criteria, fast-track diagnosis, and treatment protocols to reduce sepsis mortality by approximately 50 percent. Available at: <http://www.innovations.ahrq.gov/content.aspx?id=3424>.

Policies/Protocols

- Stony Brook Medicine severe sepsis/septic shock recognition and treatment protocols. Available at: <http://www.survivingsepsis.org/SiteCollectionDocuments/Protocols-Sepsis-Treatment-Stony-Brook.pdf>.

Tools

- QxMD Online. Postoperative Respiratory Risk Calculator. Available at: <http://www.qxmd.com/calculate-online/respirology/postoperative-respiratory-failure-risk-calculator>.
- Surviving Sepsis Campaign protocols and checklists. Available at: <http://www.survivingsepsis.org/Resources/Pages/Protocols-and-Checklists.aspx>.
- Surviving Sepsis Campaign data collection tools. Available at: <http://www.survivingsepsis.org/Data-Collection/Pages/default.aspx>.

Staff Required

- Emergency department staff
- Intensive care unit staff
- Ancillary staff (lab, respiratory, dietary, etc.)

Equipment

- Equipment for blood draws.
- Appropriate medications, including antibiotics and vasopressors.

Communication

- Communication of critical lactate and blood culture results to team in a timely manner.

Authority/Accountability

- Senior leadership mandating protocol for all providers.

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Selected Best Practices and Suggestions for Improvement

IQI: Mortality review of Select Procedures and Conditions

Why Focus on Mortality Review?

- The 1999 Institute of Medicine report *To Err is Human: Building a Safer Health System* focused the attention of the health care community and the public on the estimation that between 48,000 and 98,000 deaths from medical errors occur each year.
- Sixty percent of the sentinel events reported to the Joint Commission between 2004 and June 2013 resulted in a patient death.¹
- The National Quality Forum states: “Healthcare organizations must systematically identify and mitigate patient safety risks and hazards with an integrated approach in order to continuously drive down preventable patient harm.”²
- Structured, multidisciplinary review is required to identify system processes that may result in failures in care, adverse events, and mortality.
- Understanding of system processes is necessary to take proactive steps to reduce preventable deaths.
- Starting in 2014, a number of mortality rates that are relevant to the IQIs will be used for Medicare’s Hospital Value-Based Purchasing (as part of a composite indicator) that links quality to payment:
 - Acute Myocardial Infarction 30-Day Mortality Rate [similar to IQI 15 Acute Myocardial Infarction (AMI) Mortality Rate and IQI 32 Acute Myocardial Infarction (AMI) Mortality Rate, Without Transfer Cases]
 - Heart Failure 30-Day Mortality Rate [similar to IQI 16 Heart Failure Mortality Rate]
 - Pneumonia 30-Day Mortality Rate [similar to IQI 20 Pneumonia Mortality Rate]
 - Acute Ischemic Stroke 30-Day Mortality Rate [similar to IQI 17 Acute Stroke Mortality Rate]
- The above mortality indicators are also reported on Medicare’s Hospital Compare as part of the Hospital Inpatient Quality Reporting Program (except for Acute Ischemic Stroke 30-Day Mortality Rate, which will begin in July 2014).

Recommended Practice	Details of Recommended Practice
Create a process for identifying cases	<ul style="list-style-type: none"> • 100% mortality case review is recommended. • Work with decision support staff or appropriate department to identify the IQIs using AHRQ software. (See Tool B.1 for additional detail.)
Conduct preliminary case review	Quality-trained clinicians perform initial case review to eliminate cases not needing further review and prepare selected cases for committee presentation and identify potential causative factors
Present case to mortality review committee	Case is presented to committee if appropriate.
Conduct systematic review of	Committee systematically reviews case to determine if any

case	followup actions are required.
Engage in action planning	Action planning may take two forms: <ul style="list-style-type: none"> • Counselling of staff • Performance improvement project to address systemic issues
Evaluate effectiveness of actions	Regularly assess actions taken to ensure that processes are being followed and the desired outcomes are achieved.

IQIs for Review:

This guideline will focus on an overview of a mortality review process that can be used to review the select procedures and conditions identified by AHRQ as reflecting the quality of care, as well as other mortality cases determined to require review:

Select procedures:

- IQI 08 Esophageal Resection Mortality Rate
- IQI 09 Pancreatic Resection Mortality Rate
- IQI 11 Abdominal Aortic Aneurysm (AAA) Repair Mortality Rate
- IQI 12 Coronary Artery Bypass Graft (CABG) Mortality Rate
- IQI 13 Craniotomy Mortality Rate
- IQI 14 Hip Replacement Mortality Rate
- IQI 30 Percutaneous Coronary Intervention (PCI) Mortality Rate
- IQI 31 Carotid Endarterectomy Mortality Rate

Select Conditions:

- IQI 15 Acute Myocardial Infarction (AMI) Mortality Rate
- IQI 16 Heart Failure Mortality Rate
- IQI 17 Acute Stroke Mortality Rate
- IQI 18 Gastrointestinal Hemorrhage Mortality Rate
- IQI 19 Hip Fracture Mortality Rate
- IQI 20 Pneumonia Mortality Rate
- IQI 32 Acute Myocardial Infarction (AMI) Mortality Rate, Without Transfer Cases

Best Processes/Systems of Care

Recommended Practice: Create a Process for Identifying Cases

- Decision support staff can identify IQI cases and all should be reviewed. Case numbers may be small so it may be beneficial to aggregate review results quarterly or biannually as appropriate to determine if there are trends in causative factors.

Recommended Practice: Conduct Preliminary Case Review

- Quality-trained clinicians perform initial case review to screen for cases not needing further review and prepare selected cases for committee presentation.
- The following algorithm should be used:

- Demographic information
 - Medical record number
 - Patient name
 - Age
 - Gender
 - Discharge status
 - Date of admission
 - Date of expiration
 - Admission status
 - Admission source
 - Principal diagnosis
 - Principal procedure
 - Attending
 - Service
 - Reviewer
- Case review
- Was the case sent to the medical examiner?
- Was an autopsy performed?
- Was the case an expected death?
 - Yes:
 - ◆ What was the condition on admission?
 - * Hospice
 - Do not resuscitate on admission
 - Stage 4 cancer
 - End stage AIDS
 - End stage chronic obstructive pulmonary disease
 - End stage congestive heart failure
 - End stage dementia
 - End stage liver disease
 - Other _____
- Was the case not an expected death on admission but expected at the time of death?
 - Yes:
 - ◆ Did any of the following occur during hospitalization?
 - * Death within 48 hours of admission or surgery
 - * Held in emergency department longer than 6 hours
 - * Return to ICU within 48 hours of transfer out of ICU
 - * Transfer from unit to ICU within 24 hours of admission

- * Hospitalization that is a readmission within 30 days
 - * Return to emergency department within 3 days of discharge
 - * Death associated with drug reaction
 - * Death associated with adverse drug reaction
 - * Death associated with medication error
 - * Death associated with medical device
 - * Healthcare-associated infection
 - * Fall during hospitalization
 - * Procedural complication during hospitalization
 - * Restraints used
 - * Return to surgery
 - * Change in procedure
 - * Rapid response team activation
 - * Cardiac arrest
 - * Intubation/reintubation
 - * DNR activated during hospitalization
 - * Diagnostic studies for emboli or DVT
 - * PP > 100 or INR > 6
- Was the case an unexpected death?
- Yes:
 - ◆ Did any of the following occur during the hospitalization (check all that apply)
 - * Death within 48 hours of admission or surgery
 - * Held in emergency department greater than 6 hours
 - * Return to ICU within 48 hours of transfer out of ICU
 - * Transfer from unit to ICU within 24 hours of admission
 - * Hospitalization that is a readmission within 30 days
 - * Return to emergency department within 3 days of discharge
 - * Death associated with drug reaction
 - * Death associated with adverse drug event
 - * Death related to medical device
 - * Healthcare-associated infection
 - * Fall during hospitalization
 - * Procedural complication during hospitalization
 - * Restraints used
 - * Return to surgery
 - * Change in procedure
 - * Rapid response team activation
 - * Cardiac arrest
 - * Intubation/reintubation
 - * DNR activated during hospitalization
 - * Diagnostic studies for emboli or DVT

* PP > 100 or INR > 6

- Is further review required?
 - Yes
 - ◆ Why?
- Review questions:
 - Causes for concern:
 - ◆ Diagnosis
 - ◆ Documentation/communication
 - ◆ Infection
 - ◆ Medication
 - ◆ Palliative care
 - ◆ Procedures
 - ◆ Prophylaxis
 - ◆ Resuscitation
 - ◆ Supervision/management
 - ◆ Triage/transitions
 - ◆ Human error
 - ◆ Other _____

Recommended Practice: Present Case to Mortality Review Committee

- Case should be presented and pertinent details from the preliminary case review shared.
- Facts should be presented without opinion.
- The committee should be multidisciplinary and at a minimum include hospital leadership, physicians, nursing staff, quality staff, and other patient care providers as indicated.
- The committee is committed to the confidentiality of the proceedings to enable honest discussion.

Recommended Practice: Conduct Systematic Review of Case

- Hold an open discussion with mortality review committee.
 - The discussion is conducted in a nonjudgmental and nonpunitive manner with input sought from all attendees regardless of hierarchy.³
 - “The ability to conduct objective, comprehensive, and holistic death reviews that involve all disciplines cannot be productive unless a blame-free culture is present.”⁴
 - “The incorporation of non-punitive reporting mechanisms also helps to identify areas in which change is needed and further encourages open dialogue.”⁵
 - Discussion is focused on causative factors and preventability³:
 - Causative factors:
 - ◆ Underlying disease

- ◆ Treatments and procedures, including iatrogenic events (intrinsic to usual procedures performed in accordance with standards of care) and nosocomial infections
 - ◆ Human error, including judgment, knowledge, and technical skills
 - ◆ Equipment malfunction, including equipment failure and inadequate equipment
 - ◆ Unit management factor (work environment) communication problems, failure to provide or enforce policy/protocol, absence of policy/protocol, understaffing, poor prioritization, inappropriate behavior or action, high stress situation
 - ◆ Other, including lack of communication/coordination between ICU and other departments, patient condition (agitation, confusion), fatigue or burnout of caregivers
 - ◆ Unidentified and independent of the disease process or ICU procedures
- Preventability:
 - ◆ Certainly preventable
 - ◆ Probably preventable
 - ◆ Probably not preventable
 - ◆ Certainly not preventable
- Focus on systems of care and medical management.
 - Find ways to prevent recurrence of the event if preventable.

Recommended Practice: Engage in Action Planning

- All participants participate in action planning based on causative factors.
- Recommendations are made to prevent recurrence of a similar event.
- Responsibility for implementation and education is assigned.

Recommended Practice: Evaluate Effectiveness of Actions

- Review of effectiveness is conducted in subsequent mortality review sessions.
- Aggregate results are reviewed regularly (quarterly or biannually) to determine if there is any recurrence of the event and remedial action is taken as needed.

IQI Specific Recommendations/Resources

Specific evidence-based recommendations to potentially reduce mortality and improve patient outcomes.

IQI 08 Esophageal Resection Mortality Rate

- Esophagectomy should be undertaken only in centers capable of carrying out careful case selection, with a large case volume and sufficient surgical and intensive care experience (grade B).
- The operative strategy should ensure that adequate longitudinal and radial resection margins are achieved whenever possible, along with a lymphadenectomy appropriate to the histological tumor type and its location (grade B).
 - Single layer manual or stapled anastomoses can be used (grade B).
 - Clinical anastomotic leakage should not exceed 5% (grade B).

- Curative (R0) resection rates should exceed 30% (grade B).
- Overall hospital mortality for esophageal resection should be less than 10% (grade B).⁶

IQI 11 Abdominal Aortic Aneurysm (AAA) Repair Mortality Rate

- Using an individualized assessment of risk factors for each specific patient allows categorization of operative mortality risk into low (1%-3%), moderate (3%-7%), and high (at least 5%-10% or greater) categories, which may be useful on a practical clinical level in terms of decisionmaking. See Brewster DC, Cronenwett JL, Hallett, Jr. JW, et al. Guidelines for the treatment of abdominal aortic aneurysms: Report of a subcommittee of the Joint Council of the American Association for Vascular Surgery and Society for Vascular Surgery. *J Vasc Surg* 2003;37(5):1106-17. Available at: http://www.geraldlawriemd.com/sections/aaa/jvs_aaa_treatment_guidlines.pdf (Table VII).

IQI 12 Coronary Artery Bypass Graft (CABG) Mortality Rate

- Refer to 2011 ACCF/AHA Guideline for Coronary Artery Bypass Graft Surgery: A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. Available at: <https://circ.ahajournals.org/content/124/23/e652.full.pdf+html>.

IQI 14 Hip Replacement Mortality Rate

- Use SCIP (Surgical Care Improvement Project) measures, including physical therapy/occupational therapy assessment.
- Assess the following postoperatively: neurovascular status, transfusion need, cardiac and respiratory status, neuropsychiatric status for delirium, dementia, or confusion, nutritional status.

IQI 15 Acute Myocardial Infarction (AMI) Mortality Rate

- ASA at admission and discharge.
- Beta blocker, statin, ACE inhibitor/ARB (if EF<40%) at discharge.

IQI 16 Heart Failure Mortality Rate

- Evaluation of ejection fraction.
- If EF<40%, patient needs ACE inhibitor/ARB.

IQI 17 Acute Stroke Mortality Rate

- STK-1 Venous Thromboembolism (VTE) Prophylaxis
- STK-2 Discharged on Antithrombotic Therapy
- STK-3 Anticoagulation Therapy for Atrial Fibrillation/Flutter
- STK-4 Thrombolytic Therapy
- STK-5 Antithrombotic Therapy By End of Hospital Day 2
- STK-6 Discharged on Statin Medication
- STK-8 Stroke Education
- STK-10 Assessed for Rehabilitation

IQI 19 Hip Fracture Mortality Rate

- Fall prevention practices (PSI 08 Post-operative Hip Fracture Best Practice Detail Form)

IQI 20 Pneumonia Mortality Rate

- Blood cultures performed within 24 hours prior to or 24 hours after hospital arrival for patients who were transferred or admitted to the ICU within 24 hours of hospital arrival.
- Blood cultures performed in the emergency department prior to initial antibiotic receipt in hospital.
- Initial antibiotic selection for community-acquired pneumonia in immunocompetent patient.

IQI 30 Percutaneous Coronary Intervention (PCI) Mortality Rate

- Perform within 90 minutes of hospital arrival.

IQI 31 Carotid Endarterectomy Mortality Rate

- Refer to AHA Scientific Statement [Guidelines for Carotid Endarterectomy: A Statement for Healthcare Professionals From a Special Writing Group of the Stroke Council, American Heart Association](https://circ.ahajournals.org/content/97/5/501.full). Available at: <https://circ.ahajournals.org/content/97/5/501.full>.

IQI 32 Acute Myocardial Infarction (AMI) Mortality Rate, Without Transfer Cases

- ASA at admission and discharge.
- Beta blocker, statin, ACE inhibitor/ARB (if EF<40%) at discharge.

References

1. Summary data of sentinel events reviewed by The Joint Commission. Available at: http://www.jointcommission.org/assets/1/18/2004_to_2Q_2013_SE_Stats_-_Summary.pdf. Accessed February 25, 2014.
2. Safe practices for better healthcare – 2010 Update. Washington, DC: National Quality Forum; April 2010. Available at: http://www.qualityforum.org/Publications/2010/04/Safe_Practices_for_Better_Healthcare_%e2%80%93_2010_Update.aspx. Accessed February 25, 2014.
3. Adapted from: Ksouri H, Balanant P-Y, Tadié J-M, et al. Impact of morbidity and mortality conferences on analysis of mortality and critical events in intensive care practice. *Am J Crit Care* 2010 Mar;19(2):135-45. Available at: <http://ajcc.aacnjournals.org/content/19/2/135.long>. Accessed July 3, 2014.
4. Rachel MM, Stewart MW. Establishing a mortality review process. *J Nurs Care Qual* 2009;24(3):211-22.
5. Jarve K, Sultan R, Lee A, et al. Multi-professional mortality review: supporting a culture of teamwork in the absence of error finding and blame-placing. *Hosp Q* 2002;5(4):58-61.
6. Allum, WH et al. Guidelines for the management of oesophageal and gastric cancer. *Gut* 2002;50(Suppl V):v1-v23. Available at: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1867706/>. Accessed July 3, 2014.

INSTRUCTIONS

Gap Analysis

What is this tool? The purpose of the gap analysis is to provide project teams with a format in which to do the following:

- Compare the best practices with the processes currently in place in your organization.
- Determine the “gaps” between your organization’s practices and the identified best practices.
- Select the best practices you will implement in your organization.

Who are the target audiences? The project liaison will be the primary individual to prepare this written gap analysis, but the entire improvement project team should be engaged in performing the gap analysis.

How can the tool help you? Upon completion of the gap analysis, project teams will have the following:

- An understanding of the differences between current practices and best practice.
- An assessment of the barriers that need to be addressed before successful implementation of best practices.

How does this tool relate to others? Information from the *Self-Assessment* (Tool A.3) about the readiness of the hospital to perform quality improvement for the Quality Indicators can be considered in the gap analysis as possible strengths or weaknesses (i.e., barriers) to be managed when implementing improvements. The best practice elements defined in the *Selected Best Practices and Suggestions for Improvement* (Tool D.4) are prefilled in the gap analysis tool. This provides the elements for the *Implementation Plan* (Tool D.6).

Instructions

1. List the expected evidence-based best practice in Column 1.
2. In Column 2, list all the steps associated with the best practice process.
3. In Column 3, document your organization’s practices and describe how they differ from each best practice element. Be specific and include information such as policies, protocols, guidelines, and staffing.
4. In Column 4, identify barriers that may hinder successful implementation of each best practice strategy. Consider systems, procedures, policies, people, equipment, etc.
5. In Column 5, indicate whether your organization will implement the best practice strategy. If not, explain why.
6. Repeat steps 2-4 for each best practice.

Gap Analysis Tool

Project:

Best Practice:

Individual Completing This Form:

Column 1

Column 2

Column 3

Column 4

Column 5

Best Practice	Best Practice Strategies	How Your Practices Differ From Best Practice	Barriers to Best Practice Implementation	Will Implement Best Practice (Yes/No; why not?)

INSTRUCTIONS

Implementation Plan

What is this tool? The purpose of the implementation plan is to provide a format in which to:

- Define the tasks/actions required to implement each selected best practice.
- Develop a communication/training and implementation plan.
- Set a timeframe and target dates for the completion of tasks/actions and communication/training.

Who are the target audiences? The project liaison will be the primary individual to complete this implementation plan, but the document should be used as a working document by the entire improvement project team.

How can the tool help you? Upon completion of the implementation plan, the project team will have a customized project plan that will guide activities through established timeline to completion of implementation.

How does this tool relate to others? This tool should be used with the other tools found in the Implementing Improvements section of the toolkit (section D).

Instructions

1. In Column 1, list the best practice your organization will implement, as identified in the gap analysis.
2. In Column 2, list the detailed tasks/actions for each best practice.
3. In Column 3, assign responsibility to team members for the completion of each detailed task/action.
4. In Column 4, set target completion dates.
5. Once the task for a particular best practice is completed, enter the date in Column 5.
6. In Column 6, determine whether communication/training is required for each task. If so, enter target dates of communication/training in column 7 and enter the actual completion dates in Column 8.
7. In Column 9, indicate the implementation start date and note in Column 10 whether implementation is complete.
8. Review the project plan at each team meeting. If target dates are not met, determine the cause and revise the project plan. Ultimately, the project's executive liaison will be responsible to ensure that the team has the adequate resources to complete tasks and that the team stays on track with task deadlines.

Note: Brainstorming with team members can be helpful for generating the detailed task/action list.

It is essential to consider several categories of key tasks when generating a list of detailed tasks/actions.

Consider these key task categories:

- Design/Customization of Best Practice
- Policy/Protocol Development
- Tools (documentation, forms, etc.)
- Staffing/Resources
- Equipment/Materials
- Education/Training
- Performance Evaluation

Consider the following example: If the team identifies "educate staff" as a necessary key task, the detailed tasks/actions may include developing the education inservice, developing the handouts, identifying staff members who require education, and notifying staff of the inservice dates.

INSTRUCTIONS

Implementation Measurement

What is this tool? The purpose of the implementation measurement tool is to provide a format in which you can determine if best practice processes are successful in your organization. The example provided can be adapted to other practices as well.

Who are the target audiences? The quality officer will be the primary individual to work with this tool to assess the effectiveness of implemented practices, but it also should be used by the entire improvement project team.

How can the tool help you? The Implementation Measurement Tool will help you determine the effectiveness of your implemented practices and if your team needs to change any practices. As part of the Plan-Do-Study-Act (PDSA) cycle, studying your results will help your team determine if improvements are successful. Without studying the results of change implementation, your team cannot determine if the changes are successful.

How does this tool relate to others? This tool should be used with the other tools found in the Implementing Improvements section of the toolkit (section D).

Instructions

Use this tool as an example of an implementation measurement tool. Evidence-based standards and best practices should be used in developing the questions.

Catheter-Related Bloodstream Infection Prevention Measurement Tool Element Clarifications

Section A

- A.1. Create a unique number that can be used to track your cases. This unique identifier will relate to the insertion of a central line, not a patient.
- A.3. Indicate if the cart was pulled into the room or brought within close proximity of the room for use. This information may be found on an insertion checklist.
- A.5. “The purpose of the time-out is to conduct a final assessment that the correct [patient], site, and procedure are identified.... During a time-out, activities are suspended to the extent possible so that team members can focus on active confirmation of the [patient], site, and procedure. A designated member of the team initiates the time-out and it includes active communication among all relevant members of the procedure team. The procedure is not started until all questions or concerns are resolved....” Excerpted from Joint Commission Perspectives® 2009 Oct;29(10):31. Available at: <http://www.jcrinc.com/common/PDFs/fpdfs/pubs/pdfs/JCReqs/JCP-10-09-S1.pdf>.
- A.6. This information could be found on an insertion check list in the medical record. Indicate which sterile technique precautions were used by the provider inserting the catheter and the person assisting in insertion. If specific sterile precautions were not documented, but a general statement indicates that precautions were used, then check “Use of sterile precautions/technique without specific interventions documented.”
- A.7. This information should be available on an insertion record. If no documentation can be found of skin antiseptics used during insertion, indicate “none of the above.” If “chlorhexidine” or “not tracking” is answered, skip question A7a. If you choose “Other,” you must specify why.
- A.7a. Only answer this question if “chlorhexidine” was NOT answered for question A.7. Indicate the reason chlorhexidine was not used. If you choose “Other,” you must specify why.
- A.8. Choose the site of entry for the central line. If you choose “Other,” you must specify a location that is not available in the above list. Do not select “Other” if an existing category applies. If “subclavian” or “not tracking” is answered, then do not answer question A8a.
- A.8a. Only answer this question if “subclavian” or “not tracking” was NOT answered for question A.8. Indicate the reason the subclavian site was not chosen for insertion. If you choose “Other,” you must specify why. If “physician discretion” is chosen, there must be documentation in the medical record. There must be documentation in the medical record as to reasons for selecting a specific vessel.
- A.9. Indicate what type of dressing was used to cover the central line site. If “Other” is checked, specify an answer.
- A.9a. Only answer this question if “transparent” or “not tracking” was NOT answered for question A.9. Indicate the reason a transparent dressing was not used. If you choose “Other,” you must specify why.
- A.10. For each central line insertion, indicate if an x ray was done to verify placement before central line use.
- A.11. For each central line insertion, indicate if the central line checklist was used during the procedure. The checklist can be found in the medical record. It is also acceptable if the checklist is saved for quality purposes.

Section B

- B.1. For this question, indicate if there is documentation of assessment of central line need and if the central line site was assessed. Day 1 will refer to the day after the central line was inserted. The date entered for “Day 1” in the question should be one day after the date entered in question A2. If the central line was discontinued anytime after insertion, then indicate “no central line present” in the appropriate box.

Catheter-Related Bloodstream Infection Prevention Measurement Tool

A. Central Line Insertion

1. Unique identifier: _____
2. Line insertion date:
Date of line insertion: __/__/____ (mm/dd/yyyy) Unknown/not documented
3. Is there documentation that a central line insertion cart was used for insertion?
 Yes
 No/unknown
 Not tracking
4. Is there documentation that consent was obtained prior to insertion?
 Yes
 No/unknown
 Not tracking
5. Is there documentation that a timeout was performed prior to insertion?
 Yes
 No/unknown
 Not tracking
6. Is there documentation in the medical record that any of the following sterile precautions were used during insertion of the central line? **(Check all that apply.)**
 Hand washing before procedure by person inserting and person assisting in inserting the line
 Sterile gloves worn by person inserting and person assisting in inserting the line
 Sterile gown worn by person inserting and person assisting in inserting the line
 Cap worn by person inserting and person assisting in inserting the line
 Mask worn by person inserting and person assisting in inserting the line
 Full body drape to cover the patient
 Use of sterile precautions/technique without specific interventions documented
 None of the above/unknown
 Not tracking
7. Indicate which of the following skin prep was used for central line insertion:
 Chlorhexidine (skip to question 8) Skin hygiene documented, agent unknown
 Betadine (iodine) Other (specify) _____
 Alcohol None of the above/unknown
 Not tracking (skip to question 8)
- 7a. Indicate reason chlorhexidine was not used:
 Patient allergy to chlorhexidine
 Other (specify) _____
 No reason indicated
8. Site of insertion: **(check one)**
 Subclavian (skip to question 9) Unknown/undocumented
 Internal jugular Other (specify) _____
 Femoral Not tracking (skip to question 9)

8a. Indicate reason subclavian not used:

- Physician discretion
- Other (specify) _____
- No reason indicated

9. Indicate which type of dressing was used: (check one)

- Transparent (skip to question 10)
- Gauze
- Other (specify) _____
- None of the above/unknown
- Not tracking (skip to question 10)

9a. Indicate reason a transparent dressing was not used:

- Site oozing/bleeding
- Patient diaphoretic
- Other (specify) _____
- No reason indicated

10. Is there documentation of a followup x ray completed to verify placement?

- Yes
- No/unknown
- Not tracking

11. Is there documentation of a central line insertion checklist used for insertion?

- Yes
- No/unknown
- Not tracking

B. Central Line Days

1. Indicate if the central line was assessed for need and the central line site was inspected everyday for up to 5 days after insertion:

Day	Date				
1	__/__/__	<input type="checkbox"/> No central line present	<input type="checkbox"/> Assessment of need	<input type="checkbox"/> Site inspected	<input type="checkbox"/> Neither
2	__/__/__	<input type="checkbox"/> No central line present	<input type="checkbox"/> Assessment of need	<input type="checkbox"/> Site inspected	<input type="checkbox"/> Neither
3	__/__/__	<input type="checkbox"/> No central line present	<input type="checkbox"/> Assessment of need	<input type="checkbox"/> Site inspected	<input type="checkbox"/> Neither
4	__/__/__	<input type="checkbox"/> No central line present	<input type="checkbox"/> Assessment of need	<input type="checkbox"/> Site inspected	<input type="checkbox"/> Neither
5	__/__/__	<input type="checkbox"/> No central line present	<input type="checkbox"/> Assessment of need	<input type="checkbox"/> Site inspected	<input type="checkbox"/> Neither

INSTRUCTIONS

Project Evaluation and Debriefing

What is this tool? The purpose of the project evaluation is to:

- Identify factors that contributed to the team's success.
- Identify factors that hindered the team's success.
- Identify additional clinical areas in the organization where the best practice can be implemented.
- Identify any followup work that may be required.
- Determine how the results of the project will be communicated.

Who are the target audiences? The project liaison will be the primary individual to work with this evaluation and debriefing tool, but it also should be used by the entire improvement project team.

How can the tool help you? Upon completion of the project evaluation, project teams will accomplish:

- Project closure.
- Recognition of lessons learned.
- Plans for future activities (if applicable).

How does this tool relate to others? This tool is used to evaluate the effectiveness of the D tools for implementing performance improvements, as well as other aspects of the hospital's initiative.

Instructions

1. Indicate whether goals set for each best practice on the project charter were successfully implemented.
2. List factors that helped and hindered the team's success.
3. Determine if the best practices will be implemented in other units, clinics, or programs. If yes, describe the plans for further implementation in the space provided.
4. Check the appropriate box to indicate whether additional followup activities need to be completed. If yes, describe the followup work in the space provided.
5. Determine whether internal and external communication plans need to be developed. If yes, describe in the space provided how the results of the project will be communicated within the organization and to external stakeholders.

Performance Improvement Project Evaluation

Project: _____ Performance Opportunity: _____

Institution: _____ Individual Completing This Form: _____

1. BEST PRACTICES IMPLEMENTED

- | | | |
|----------|----------------|--|
| a. _____ | Goal achieved? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| b. _____ | Goal achieved? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| c. _____ | Goal achieved? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| d. _____ | Goal achieved? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| e. _____ | Goal achieved? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| f. _____ | Goal achieved? | <input type="checkbox"/> Yes <input type="checkbox"/> No |

2. EVALUATION

What factors helped the team succeed?

What factors hindered the team's success?

- | | |
|----------|----------|
| a. _____ | a. _____ |
| b. _____ | b. _____ |
| c. _____ | c. _____ |

3. STANDARDIZATION AND INTEGRATION (FOLLOWUP)

- a. Will the best practice(s) be implemented in other units, clinics or programs? Yes No

If yes, what are the plans for further implementation?

- b. Is there additional followup work that needs to be completed? Yes No

If yes, list followup activities and related plan?

4. COMMUNICATION

a. Is there an internal communication plan to inform leadership, management, and staff of project results? Yes No

b. Is there an external communication plan to inform accrediting organizations and other stakeholders of project results? Yes No

c. Briefly describe ideas for internal and external communication plans:

INSTRUCTIONS

Monitoring Progress for Sustainable Improvement

What is this tool? This tool provides guidance on how to monitor and report your progress in sustaining performance improvements, including how to establish measures to track your efforts and suggested steps for the monitoring process. This tool provides the following information:

- An overview and rationale for a monitoring system to sustain improvements;
- Identification of the key elements of a monitoring system; and
- Guidance on how to establish each monitoring system element.

Who are the target audiences? The primary audiences for this tool are hospital leaders and managers, quality program staff, and analysts.

How can this tool help you? You can use this tool to guide your monitoring strategy to ensure that your hospital sustains the results achieved during your quality improvement work. The measures you monitor after implementation will include rates for the AHRQ Inpatient Quality Indicators (IQIs) and Patient Safety Indicators (PSIs), as well as other process or outcome measures that you identify as representing key performance elements.

After you work successfully to achieve improvements in clinical and administrative practices, it is important to establish a mechanism to ensure that those new practices (and related outcomes) are sustainable. Many hospitals do not do this and performance gains may erode significantly later. Using this tool, you can establish a monitoring mechanism that you can use to track key performance measures, communicate trends within the hospital, and identify emerging performance issues early so that you can correct them in a timely manner.

How does this tool relate to others? This tool should be used with the tool on *Applying the Quality Indicators to Hospital Data* (Tool B.1), which provides instructions for calculating and using IQI and PSI rates for quality improvement in your hospital, as well as the tool *Assessing Indicator Rates Using Trends and Benchmarks* (Tool B.5). This tool also will build on the work you did using the tools on *Implementation Measurement* (Tool D.7) and *Project Evaluation and Debriefing* (Tool D.8), both of which provide guidance on measuring and evaluating improvements during your implementation period. Once you have completed your implementation actions, this tool helps you continue measurement on a more limited scale, to help sustain your improvements over time.

What Is Involved in Ongoing Monitoring?

There is no single “correct” way to build a system for monitoring sustainability of performance. Each hospital will design its system to best fit its management culture, performance priorities, and available operating and technological resources. However, any monitoring system must be able to support active vigilance by your hospital staff of performance trends and emerging issues. The following elements are essential for any effective monitoring system:

- Choose a limited set of effective measures.
- Establish a schedule for regular reporting.
- Develop report formats to communicate clearly.
- Establish procedures for acting on problems identified.
- Assess sustainability on a periodic basis.

Each element is discussed here, including suggestions for development of an effective monitoring system to support sustainability of improvements you achieved for the AHRQ quality indicators (QIs).

If your hospital already has a comprehensive system for reporting trends in performance measures on a regular basis, you should be able to incorporate the key measures related to your QI improvement initiative into that system and to specify reporting frequencies. How you will do that, and whom you will work with, will depend on whether your hospital’s reporting system is automated or paper based.

If your hospital does not have an established monitoring system, then you will need to develop a process specifically for tracking the key measures you choose to monitor for your QI improvement initiative.

Choose a Limited Set of Effective Measures

You will need to make judicious choices of which measures of QI performance to include in your monitoring system. You will want to have a balance between tracking key aspects of your improved processes versus placing undue burden on hospital personnel and resources due to tracking too many measures.

You should select measures that allow you to address two “bottom line” questions about performance:

- Are we still using the new processes implemented in our improvement process, or have the processes started to erode?
- Are the outcomes the processes are intended to affect moving in the desired direction?

A negative answer to either question will require early action to diagnose what might be compromising performance, and then to correct identified problems.

Your implementation team should:

- Develop a list of candidate measures, with a rationale for the importance of each measure.
- Test each measure against the criteria described below.
- Identify and discard weak measures.
- If necessary, use a formal ranking process to identify priorities among the remaining candidate measures.

Such a process ensures that the measures are chosen carefully, and it also increases the sense of ownership that participating staff have in the measures.

Criteria for measure selection may include:

- **Processes, utilization, and outcomes.** Consider both process and outcome measures for inclusion in your monitoring system. The IQIs or PSIs for which you have been doing performance improvement should be included as the ultimate outcome measures (see Tool B.1, *Applying the Quality Indicators to Hospital Data*). Process measures also can be monitored to ensure that the key steps in the improved processes continue to be used over time. You can draw on the measures you used for evaluating progress in implementing your quality improvement plan (see Tool D.7, *Implementation Measurement*, and Tool D.8, *Project Evaluation and Debriefing*). This can maintain continuity between the implementation phase and subsequent operations.
- **Importance of the factor being measured.** The measures you choose should capture the most important milestones achieved for the new processes implemented—those you want to protect over time (e.g., PSI rates, use of timeouts before surgery, reduced length of stay).
- **Ability to interpret and act on findings.** An ideal measure will give clear signals that allow you to identify underlying issues that affect performance on a measure. It is sometimes difficult to determine if a change in a measure (e.g., increased length of stay, increased reporting of adverse events) is a sign of a performance problem, often because multiple factors may contribute to such a change.
- **Feasibility of measurement.** The most efficient way to collect data is to use data from existing automated information systems or to add data elements to these systems. If these sources do not provide the needed data, then you can use chart abstractions, surveys, new administrative forms, or special outcome studies. However, such studies are more resource intensive and are often more vulnerable to incomplete documentation.
- **Identifiable and measurable denominators.** To produce accurate reports for measures that are calculated as rates (e.g., percentage of patients with postsurgical infections), it is important to have complete counts for the relevant patient populations (e.g., all patients who had surgery during a time period). Other measures that are not expressed as rates also can be used for monitoring, such as the occurrence of serious adverse events (e.g., a sentinel event) that would require immediate action, or counts of desirable (e.g., use of debriefs for building teamwork) or undesirable activities.

Establish a Schedule for Regular Reporting

It is critically important to regularly report trends for your selected measures to key personnel throughout the hospital (see Tool B.5, *Assessing Indicator Rates Using Trends and Benchmarks*). The measures serve only as an information source; the key to successful monitoring is to communicate information to relevant groups and enable them to act on it to sustain effective processes and outcomes.

You will need to make the following choices in designing your reporting process:

1. How to calculate each measure and what data to use.
2. What time period to use for tracking each measure (e.g., monthly, quarterly, annually).
3. What information you want to generate on each measure.
4. Who will receive reports on measure trends.
5. How frequently reports will be provided to each of the recipient groups.

It is fine to track measures at different frequencies, as long as you have a rationale for that approach. For example, a measure you think will change slowly could be tracked annually, and a measure that you think could change more quickly should be tracked more frequently.

Hospital management should take a lead role in identifying the groups that will receive the monitoring reports, as well as the mechanisms used to communicate the information. To encourage engagement and action on issues, each group receiving reports should have an opportunity to participate in interpretation and discussion of the findings. Use their suggestions and perspectives to help guide actions to address any issues revealed in the trends.

Develop Report Formats To Communicate Clearly

The “best” methods to display monitoring data are the ones that work for your implementation team and other users. Some people find tables to be an effective way to communicate information; others prefer graphs. Two principles apply to all data display methods:

- Display only the most important information from your analyses to succinctly “tell the story” of trends in performance.
- Keep each table or graphic simple so that users can find the important information easily.

You should report the same results to all users of the monitoring information, but each type of user will be interested in different aspects of the information. For example, hospital leadership may want detailed information on all measures, whereas individual physicians, frontline nurses, other clinical staff, and support staff may want reports that focus on measures relevant to where they work.

You may want to use different reporting formats for the various user groups. Work closely with each user group in developing the reports so that you can understand their information needs and preferences for presentation. Remember that every step in the process will affect how receptive each group will be to the monitoring and how ready they will be to act when issues emerge that require their attention.

Establish Procedures for Acting on Problems Identified

Taking timely action to correct emerging issues is the best way to ensure the sustainability of improvements you have achieved. When you need to take action, you first will assess the situation to gain an understanding of the problem. Then you will develop and carry out an action plan to implement needed corrections. This process mirrors the one you used to implement your process improvements, for which tools in this toolkit can be used (Tools D.1 through D8).

Assess Sustainability on a Periodic Basis

In addition to routine monitoring, it is advisable to periodically perform a more detailed assessment of the status of desired practices. Such an assessment can stimulate increased vigilance by staff, and it may yield lessons for additional improvement actions.

INSTRUCTIONS

Return on Investment Estimation

What is this tool? When your hospital invests in a new program, quality improvement intervention, or technology, management often wants to know what kind of financial return it will achieve for that investment. A return on investment (ROI) analysis is a way to calculate your net financial gains (or losses), taking into account all the resources invested and all the amounts gained through increased revenue, reduced costs, or both.

This tool provides a step-by-step method for calculating the ROI for a new set of actions implemented to improve performance on one or more of the AHRQ Quality Indicators (QIs). It also provides a case example of ROI calculated by a hospital for implementation of computerized physician order entry (CPOE).

Who are the target audiences? The key audiences are the hospital's financial staff and quality staff, as well as statisticians, data analysts, and programmers, who will contribute to ROI calculations.

How can the tool help you? By using ROI, hospitals can better position themselves to maximize the impact of their quality investments. ROI can be used as both a planning and evaluation tool.

Using ROI as a planning tool. During the planning process before implementing improvement actions, projected ROI can be calculated to estimate how long it will take for an intervention to break even—that is, for the returns of the practice improvement to offset the upfront and ongoing implementation costs. This analysis can be done using data from the literature.

Using ROI as an evaluation tool. Actual ROI can be calculated after a practice improvement has been implemented to assess its value and inform decisions on future improvement actions. This analysis can be done using actual data from your hospital.

How does this tool relate to others? The ROI tool is used as a planning tool to develop cost and return information for use in setting priorities for improvements on the Patient Safety Indicators (PSIs) and Inpatient Quality Indicators (IQIs), with the results of these analyses applied in the Prioritization Matrix (Tool C.1). It also can be used as an evaluation tool along with the Project Evaluation and Debriefing tool (Tool D.8) to assess financial effects of the improvements implemented.

How does ROI differ from cost-effectiveness analysis (CEA)? CEA and ROI share some common features, but they differ in the effects that are addressed. Both ROI and CEA are expressed as ratios, and they use the same amounts for improvement investment costs. ROI shows how much financial gain a hospital can obtain from each dollar it invests in the quality improvement program, while the results of a CEA indicate the costs to a hospital for each unit of effectiveness it achieves through quality improvement actions, such as the costs for each adverse event avoided. These differences are reflected in the formulas used to calculate the ratios.

$$\text{ROI} = \text{Financial gains} / \text{Improvement investment costs}$$

CEA = Improvement investment costs / Effectiveness

Read the following for a step-by-step guide to performing ROI calculations.

Calculating and Interpreting Return on Investment (ROI)

An ROI is calculated as the ratio of two financial estimates:

$$\text{ROI} = \text{Net returns from improvement actions} / \text{Investment in improvement actions}$$

Where the numerator and denominator of this ratio are defined as follows:

- *Net returns from improvement actions.* The financial gains from the implementation of the improvement actions, which are generated by net changes in quality, efficiency, and utilization of services, or in payments for those services.
- *Investment in improvement actions.* The costs of developing and operating the improvement actions.

The step-by-step procedure described here can be used to perform ROI calculations to assess your financial return on improvement actions that you either are planning or have implemented. The term “improvement actions” refers to any hospital program or initiative that aims to improve the quality or safety of hospital inpatient care, which may include a focus on improving performance on the AHRQ QIs.

Step 1. Determine the Basic ROI Design

Before you start to calculate ROI for any given improvement actions, you need to make four design decisions that will structure your approach to the analysis:

1. **Define the scope of services affected by the improvement actions.** Some actions will be limited to making improvements in one hospital unit (e.g., the emergency department), and others will have a broader scope (e.g., across all nursing units). Carefully define the scope of services to be included in the ROI calculation, and ensure that financial estimates are specifically related to that scope of services.
2. **Define the timeline for implementation of improvement actions.** When implementing improvement actions in your hospital, those actions will occur over a time period that could be as short as a few months or as long as years. The ROI analysis needs to capture when those actions change the hospital’s operating procedures over time, to be able to estimate both the implementation costs and the financial effects of improvement actions. If changes occur over years, you will need to adjust the estimates for inflation and discount future costs and revenues.
3. **Define the comparison group.** To estimate the numerator (net return portion) for the ROI ratio, you need to compare the hospital’s finances under two conditions—with the improvement actions implemented and without them. Typically, this will be a comparison over time, with the “before” condition being the service processes before improvement actions, and the “after” condition the service processes after implementation. Other possible comparisons are comparisons across units within the same hospital, or across hospitals. If you use other units or hospitals as comparisons, be sure to choose comparison groups that have similar characteristics to your service entity except that they did not implement the improvement actions.

4. **Capture complete information on financial contributors.** To obtain the most accurate ROI estimate, you will need to identify and quantify as many of the financial contributors as possible for both the numerator and denominator of the ROI formula. For a planning phase ROI, you will be working with your best estimates of improvement action costs and of the components of net returns. For a postimplementation ROI, you will have actual data from your financial system on those contributors.

Step 2. Calculate the Return on Investment

To calculate the ROI for the improvement actions, you will develop estimates for both the numerator and denominator of the ROI ratio:

Net returns from the improvement actions (the ROI ratio numerator)
Investment in the improvement actions (the ROI ratio denominator)

Worksheets are provided here for your use in developing these estimates. Worksheet 1 can be used to estimate the costs for your investment in the improvement actions, and Worksheet 2 can be used to estimate the net returns from those actions.

Considerations When Calculating Investment Costs. Instructions for completing Worksheet 1 are provided at the top of the worksheet. You will use the same methods to prepare these costs that you use for program budgeting or financial accounting for actual costs. The grand total implementation costs calculated in the worksheet is the estimate for the ROI denominator.

The costs involved in implementing improvement actions may be incurred at different stages of the implementation process. *Your hospital's financial staff will need to track these costs at all stages of the program from its start to its end.* Table 1 shows the categories of costs at each stage of program planning, implementation, and maintenance (see descriptions of these components in Appendix I). These broad categories are meant as suggestions. Not all costs included will apply to all types of programs or quality improvement initiatives. In addition, you may identify other relevant costs that should be included but are not shown here.

Table 1. Categories of Costs Incurred at Different Stages of Implementing a Practice or Quality Improvement Program

Cost Category	Stages of the Improvement Actions				
	Planning and Development	Training	Startup	Ongoing Operation, Monitoring, and Maintenance	Shutdown
Personnel	X	X	X	X	X
Supplies	X	X	X	X	X
Equipment			X	X	
Training	X	X	X	X	
Information systems			X	X	X
Outreach and communication			X	X	X
External consultant costs		X	X	X	

Considerations for Calculating Net Return. Instructions for completing Worksheet 2 are provided at the top of the worksheet. The grand total financial effects derived in the worksheet is the estimate for the ROI numerator.

The estimation of these financial effects is more complex—and more subtle—than estimating the implementation costs. Implementation of improvement actions may have many positive effects on patients’ outcomes and health status. For example, improvement actions might reduce hospital-associated infections, rates of pressure ulcers, or patient mortality. Although these effects do not have a direct monetary value, many of them may affect a hospital’s revenues and expenses, which should be estimated in an ROI analysis. For example, reduction in adverse events can lead to reduced length of stay, which may affect finances either positively or negatively, depending on payment structures.

You will need to capture the two types of financial effects of changes in the hospital’s revenues and in its operating costs. For example, by reducing its infection rates, a hospital could eliminate the costs it had been incurring to provide the extra care required to treat infections. It also could enhance or protect its revenues, if insurers offered incentives for infection control or imposed penalties for occurrences of infections.

When calculating the hospital’s net return for the ROI, it is necessary to take into account that the effects on revenues and effects on costs work in opposite directions. From the hospital’s perspective, *an increase in revenues is good*, so a higher revenue due to improvement actions should be a positive number. On the other hand, *a decrease in costs is good*, so a lower cost due to improvement actions is good. Therefore, when calculating net return, subtractions of the action group and comparison group are performed in opposite directions. The instructions for these calculations are provided on Worksheet 2.

Calculating the ROI Ratio. Once you have estimated the implementation costs and the net effects on revenues and costs, the actual calculation of the ROI ratio is easy. Simply divide the estimated total net returns by the total implementation costs:

$$\text{ROI} = \text{Worksheet 2 Total (returns)} / \text{Worksheet 1 Total (investment)}$$

Calculating the Cost Savings. The two worksheets can also be used to calculate cost savings, another indicator of financial effects of the quality improvement program. The cost savings may be of interest to hospital managers to answer a basic question: “How much did we save?” The cost savings is the difference between returns and costs:

$$\text{Cost Savings} = \text{Worksheet 2 Total (returns)} - \text{Worksheet 1 Total (investment)}$$

Step 3. Interpret the ROI Ratio Obtained

The resulting value for your ROI ratio can fall into one of three categories:

1. *ROI greater than 1:* When an ROI is greater than 1, the returns generated by improvement actions are greater than the costs for development and implementation. In this case, ROI is considered to be *positive*. For example, an ROI of 1.8 indicates that for

every \$1 you invested in the quality improvement program, \$1.80 will be gained for the hospital.

2. *ROI less than 0*: With an ROI of less than 0, the improvement actions yield a net loss from changes in quality and utilization. In this case, ROI is considered to be **negative**. For example, an ROI of -1.5 indicates that for every \$1 invested, \$1.50 will be lost by the hospital.
3. *ROI between 0 and 1*: When ROI is between 0 and 1, the improvement actions yield a positive net return from changes in quality and utilization, but this return is too small to fully recover the action implementation cost. Therefore, an ROI in this range also is considered to be **negative**. For example, an ROI of 0.8 indicates that for every \$1 invested, 80 cents will be recouped by the hospital. In other words, the hospital loses 20 cents for every \$1 it spent on the quality program.

Worksheet 1. Calculating the Costs for Implementing the Improvement Actions (ROI Denominator)

Instructions for completing Worksheet 1 (Note: These are costs for implementation, NOT the subsequent changes in service finances.)

1. Prepare these costs using the same methods used for program budgeting. When the ROI is calculated during planning for a set of improvement actions, it is in fact a budget for that set of actions. Use the same line items for calculating actual costs after implementation. Some costs might be drawn from your hospital financial statements; others you will need to calculate yourself.
2. Enter the estimated costs for each line item (personnel, supplies, etc.) that is relevant to the improvement actions for each implementation stage (planning, training, etc.).
3. Sum the costs across rows to obtain a total cost estimate for each line item.
4. Sum the costs down the columns to obtain a total cost estimate for each improvement stage.
5. Obtain the grand total costs by summing the line item total costs (the highlighted box). *This is the denominator for the ROI calculation.*

Category of Implementation Costs	Implementation Costs by Stage of Improvement Action Implementation					Total Costs
	Planning and Development	Training	Startup	Ongoing Operation and Maintenance	Shutdown	
Personnel						
Supplies						
Equipment and depreciation						
Training						
Information systems						
Outreach and communication						
External consultant costs						
Total Costs						

Worksheet 2. Calculating the Net Returns for Implementing Improvement Actions (ROI Numerator)

Instructions for completing this worksheet: (Note: These are changes in service revenues and operating costs resulting from implementing the improvement actions.)

1. Identify items for which the improvement actions will have financial effects and list them in first column. The top set lists effects on revenues; the bottom set lists effects on costs. The ones listed here are examples; you may use different sets of items.
2. Estimate the costs for each item for the comparison group (e.g., before) and following implementation. If the comparison periods involve more than one year, you may need to adjust some of the costs for inflation or discount future costs to reflect time preference for money.
3. Calculate net change in revenues = B minus A (increase in revenue). Calculate net change in costs = A minus B (decrease in cost).
4. Sum the line item net changes to obtain the total net change (highlighted box). *This is the numerator for the ROI calculation.*

Effects Identified	(Real) Financial Effects of Improvement Actions			NOTES (Description of Effects Involved in Revenue or Cost Changes)
	A Comparison Period	B Implementation Period	Net Change	
Changes in Revenues: Admissions, readmissions, length of stay Payments from insurers New services provided Avoidance of penalties from insurers for "never events" Other effects on revenues	0		(B minus A)	
Changes in costs: Service operating costs: staffing, supplies, equipment, other due to _____ Admissions, readmissions, length of stay Intensity of care Productivity/efficiency changes			(A minus B)	
Avoidance of liability litigation Other effects on costs				
Total Costs				

Case Study for ROI Calculation

Although they are not ROI studies, many studies have reported on costs or hospital charges related to patient safety events (for example, Zhan and Miller using Healthcare Cost and Utilization Project data; Rivard, et al., using Veterans Affairs data; and Foster using MedPAR data). See details about these papers in the section “Other Information Sources To Assist With Calculating ROI.”) Their results might be useful for ROI calculation. Few ROI analyses have been published in the health-services literature because they are not typically performed as research studies.

One example was published, however, which is summarized here. Researchers at Brigham and Women’s Hospital (BWH) conducted an ROI analysis to determine the financial impact of implementing a computerized physician order entry (CPOE) system that was developed within the hospital to improve patient safety.¹ See the table below for a summary of the information they used.

Calculating investment in the program (denominator). Costs were determined for each stage of practice implementation from 1992 to 2002. First, the capital costs of developing and implementing the CPOE system were estimated to be \$3.7 million, based on internal documents and interviews with the developers. Sixty percent of this cost was attributed to the first year of the study period (development costs) and 20 percent was attributed to each of the next 2 years (startup).

Next, operational costs starting in year 2 of the study period were calculated. These costs included hardware (workstations and printers), software, network, leadership, and training. They did not include costs for the pharmacy system, medication administration system, or clinical data repository. Operational costs ranged from \$600,000 to \$1.1 million per year. Development, implementation, and operation of the CPOE system cost \$11.8 million over 11 years.

Calculating returns from the program (numerator). To estimate the savings generated from the CPOE system, the research team retrospectively identified each way the practice saved money (for a detailed description of each element of the program and its method of cost savings, see Table 1 in Kaushal, et al., 2006). The benefits were determined using published literature, key informant interviews, and internal documents. For many components of the CPOE, the number of estimated adverse drug events (ADE) averted was multiplied by an average cost per ADE.

Other types of cost savings identified included decreased drug costs (decreased use and shift from use of intravenous to oral medications, decreased laboratory tests, reduction in use of inappropriate radiology tests, savings in nursing and physician time by improved workflow). Drugs and tests are valued using charge amounts and applying a 0.2 cost-to-charge ratio).

Because different elements of the CPOE system were introduced at different times during the study, benefits were only calculated for those elements starting on the first day of the month after

¹ Kaushal R, Jha AK, Franz C, et al. Return on investment for a computerized physician order entry system. *J Am Med Inform Assoc* 2006;13(3):261-6.

the element was implemented. This process was repeated for every intervention and area of cost savings; they found that the system saved the hospital \$28.5 million over the 11 years.

Selecting the time horizon. The staff assessed the ROI of the CPOE system over a period of 10 years to allow enough time to see a return. Because the time horizon was longer than 2 years, they needed to make adjustments for the following issues:

- *Inflation:* Dollar values for costs and benefits were converted to a constant dollar basis to adjust for inflation. They used the Bureau of Labor Statistics' Producer Price Index time series for General Medical and Surgical Hospitals to standardize values to 2002 currency.
- *Discounting:* All costs and benefits were discounted at a 7 percent annual percentage rate as recommended by the U.S. Office of Management and Budget for economic analyses performed for the Federal Government, representing a societal discount rate as opposed to a hospital-specific rate. Costs were discounted using a “beginning-of-period” convention and benefits were discounted using an “end-of-period” convention.
- *Annualization:* Annualized values were calculated by converting all the discounted costs and benefits into a series of equal annual payments.

Interpreting the results. The analysis yielded a positive return on investment—the CPOE system saved the hospital about \$2.2 million annually over the 11-year period. It took more than 5 years for the system to have a net benefit.

Information BWH Used To Conduct an ROI Analysis for CPOE Implementation

Element of Analysis	Measure(s) or Values	Description or Inclusions
Costs (denominator)	\$11.8 million total: \$3.7 million in capital costs; \$600,000 to \$1.1 million per year in operational costs	Workstations and printers, software, network, leadership, and training
Returns (numerator)	\$28.5 million	Averted adverse drug events; medication cost savings; decreased laboratory test usage for redundant or unnecessary tests; improved workflow (staff and resource savings); decreased length of stay; streamlined workflow; improved information access for patients at time of discharge; decreased radiological utilization
Discount rate	7% annualized rate	
Consumer Price Index	Bureau of Labor Statistics' Producer Price Index time series for General Medical and Surgical Hospitals to standardize values to a 2002 base year	
Prospective Reimbursement Rate (cost-to-charge ratio)	80%	
Live date (returns)	First day of the month following activation of the intervention or midpoint of	This is the date when they started counting the number of cost-saving events and calculating the associated cost

	the year (July 1) when only annual data were available	savings.
Live date (start of calculating operational costs)	January 1, 1993	This is the date when the practice began to accrue operational costs.
End date	December 31, 2002	This date signifies the end of the study period.

Additional Guidance for Effective ROI Calculation

In this section, several items offer additional suggestions for how to prepare for your ROI calculation and how to work with some key measurement issues. See Appendix II for information about existing ROI calculators.

Understanding the Point of View for ROI Calculations

When performing the ROI calculations described here, you will develop estimates that represent the perspective of the hospital—both the investments and net returns are those of the hospital itself, as is the resulting ROI ratio. It is important to note that the implementation of improvement actions is likely to also have effects on other stakeholders with different points of view. For example, reducing infections will affect costs to insurers from changes in payments made to the hospital, which will depend on the nature of each insurer's payment policy. At the start of each ROI analysis, it will be useful to consider what the effects may be for other stakeholders and to take possible responses on their part into account when designing the improvement actions.

Knowing Who Should Be Involved in Performing the ROI

Four groups of hospital staff should be involved in estimating the ROI. At the beginning, a hospital's quality improvement program needs to engage the hospital's financial officers, who can help track the investment/cost of the program. Second, clinical and other staff (e.g., quality and patient safety staff at the hospital) running the quality improvement program should identify quality indicators that will be affected by the program.

Third, statisticians, data analysts, and programmers can help the clinical staff estimate changes in the identified indicators using data available from the hospital and relevant information from other sources (see details below). Fourth, some hospitals may need to hire consultants for training and statistical analysis related to quality improvement.

Getting Ready To Conduct an ROI Calculation

To use this tool for calculating the ROI of an intervention, the hospital staff needs to know:

- Elements of the program (including practices, technology, process or product);
- Resources needed to implement the intervention;
- Target population;
- Measures of health care quality likely to be affected by the intervention; and
- Measures of health care utilization likely to be affected by the intervention.

Selecting the Time Horizon for ROI Calculation

Because a quality improvement program may continue for a number of years, ROI can be calculated for part of the program period (e.g., the first year of a 5-year program) or for the entire program (e.g., the entire 5 years of a 5-year program). The choice of the time horizon for the ROI calculation will affect results of the calculation in two ways.

First, the costs of a quality improvement program usually are incurred at the beginning of the program while the hospital has to wait for some time to see the return. So, if the ROI is

calculated at the initial stage of the program, the results is likely to be negative. In comparison, if the ROI is calculated in the long run, the chance of having positive results will increase.

Second, if the time horizon is only one year, the cost calculation may not need to consider the issues of inflation, discounting, and depreciation. In comparison, if the time horizon for an ROI analysis is 2 years or longer, the analysis has to adjust for these issues, as described in the next section.

Adjustments That Should Be Made for Future Costs and Savings

- *Inflation* refers to rises in the prices of goods and services over a period of time. The ROI calculation can adjust for inflation by using constant dollars to measure the costs of a program over time.
- *Discounting* is simply the difference between the original amount in the present and the same amount in the future. In other words, \$100 next year is worth less than \$100 this year. Thus, future money has to be discounted to be comparable to current money.
- *Depreciation of equipment* is the reduction in the value of an asset due to usage, passage of time, wear and tear, technological outdating or obsolescence, depletion, inadequacy, or other factors. Among the several methods for calculating depreciation, straight-line depreciation is the simplest and most often used technique, which can be expressed as

$$\text{Annual depreciation} = (\text{Original cost minus salvage value}) / \text{Years of life}$$

Where the salvage value is an estimate of the value of the asset at the time it will be sold or disposed of; it may be zero or even negative.

Difference Between Costs and Charges

Costs represent the amount of resources the hospital needs to use to provide inpatient care services while charges are the amount of money the hospital reports on the bill and expects the patient and the insurer to pay. It is increasingly rare for the insurer to pay the full charges since Medicare, Medicaid, and many private insurers can obtain discounts of 50% or more.

While charges appear on hospital discharge data, costs should be calculated for the ROI analysis. The charges can be translated into costs using the hospital's cost-to-charge ratio, which is usually available at the hospital financial department. Because hospitals need to know their own costs to assess the performance of departments and the merits of specific programs, they typically report a cost-to-charge ratio for the hospital as a whole and cost-to-charge ratios for individual departments. These ratios can be used to calculate the costs of the quality improvement program.

Micro Costing Versus Gross Costing

Micro and gross costing are the two commonly used methods for estimation of health care costs. In micro costing, a cost is derived for each element of an intervention: staff time, supplies and medications, and so on. In comparison, gross costing uses mathematical models to determine the mean cost of a day of inpatient care or an outpatient visit. With gross costing, there is no detail available on the cost of any component of the hospital stay or visit.

Some experts recommend that when detailed data are available, micro costing be used as the method of choice. Other experts suggest that the choice between micro and gross costing be carefully considered and driven by the needs of the analysis and the precision of the estimates.

Other Information Sources To Assist with Calculating ROI

Books

Drummond M, O'Brien B, Stoddart G, et al. Methods for the economic evaluation of health care programmes. 2nd ed. New York, NY: Oxford University Press; 1997.

Wage Rates

The U.S. Bureau of Labor Statistics provides information about wage rates of more than 800 occupations in 50 States and the District of Columbia (<http://www.bls.gov/oes/current/oesrcst.htm>). The information is useful for calculating personnel costs, such as doctors and nurses, which is part of the ROI analysis.

Inflation Rates

The U.S. Bureau of Labor Statistics also provides information about inflation rates across the Nation and over time (<http://www.bls.gov/CPI/>), including price index of medical care (<http://www.bls.gov/cpi/cpifact4.htm>).

Pharmaceutical Prices

The Red Book by Thomson Reuters provides comprehensive drug product and pricing data (<http://www.micromedex.com/products/redbook/database/>).

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Appendix I. Components of Implementation Costs

Stages of Improvement Action Implementation

Implementation of improvement actions may be divided into the following stages:

- **Planning and program development.** This is the first stage of any program. Right from the start, the hospital needs to spend money on planning and program development activities, such as conducting situational analysis, searching the literature, identifying target areas and populations for the quality improvement program, assembling a team to work on the program, purchasing equipment, and setting up an information system.
- **Training.** Some training sessions may be part of planning and program development while other training sessions may happen in later stage of program implementation. It is also common to have training sessions during the implementation process to refresh the hospital staff's knowledge or skills. Therefore, training is listed here as a separate item.
- **Startup.** The hospital needs to pay for running the quality program, including costs of personnel, supplies, equipment, and information system.
- **Ongoing operation, monitoring, and maintenance.** During the implementation process, the hospital needs to make sure its quality program is functioning as planned. Data about quality, utilization, costs, and revenue indicators should be collected to monitor changes in these indicators. The hospital also needs to spend on maintenance services for both the information system and the equipment for the quality improvement program.
- **Shutdown costs for time-limited intervention or failures.** While some quality programs may last a long period and become routine operation for the hospital, other programs might just be temporary, or may fail and have to be shut down after a short time. The hospital needs to pay the costs of shutting down the program.

Categories of Costs for Program Planning, Implementation, and Maintenance

- **Personnel** includes all the people involved in developing and implementing the practice or quality improvement program, such as doctors, nurses, assistants, and administrators.
- **Supplies** include both office and medical supplies needed for development and implementation of the program.
- **Equipment** includes medical equipment purchased for use by the program.
- **Training** includes training of clinical and financial staff both before the program starts and during different stages of program implementation.
- **Information systems** include computers, software, and information technology professionals to set up a database of clinical and financial records.
- **Outreach and communication** includes communications among different professional groups, such as doctors, nurses, and administrators, and across different hospital departments, such as clinical and financial departments, and the hospital's board of directors.
- **External consultant costs** may include external trainers for developing and implementing the program, or an external statistician for analyzing data to estimate the changes in quality and utilization of hospital inpatient care.

Appendix II.Examples of Existing ROI Calculators

ROI Forecasting Calculator for Quality Initiatives

The ROI Forecasting Calculator for Quality Initiatives was developed by the Center for Health Care Strategies, which is a nonprofit health policy center. It is a Web-based tool designed to help state Medicaid agencies, health plans, and other stakeholders assess and demonstrate the cost-savings potential of efforts to improve quality. It provides step-by-step instructions for users to calculate ROI for the proposed quality initiatives. It can be used online at <http://www.chcsroi.org/Welcome.aspx>. Users enter a variety of assumptions before starting the calculation, including target population characteristics, program costs, and expected changes in health care utilization, to estimate potential savings.

Events Prevented Calculator

Developed by the Institute for Healthcare Improvement, this tool allows users to track the change in rate of any type of adverse event over time. When appropriate data are added, the user also can track the consequent change in unnecessary deaths (“lives saved”), real and additional potential cost savings, and ROI of quality improvement work targeting those adverse events. The tool and its user guides are free for download at <http://www.ihl.org/knowledge/Pages/Tools/AdverseEventsPreventedCalculator.aspx>.

Available Comprehensive Quality Improvement Guides

What is this tool? This tool provides information on other guides to help support you in effective quality improvement work.

Who are the target audiences? The primary audiences are quality officers and members of the implementation teams responsible for carrying out performance improvements. These resources also might be of interest to hospital senior leadership and managers.

How can it help you? As you work to improve the quality of care in your hospital and use the AHRQ Quality Indicators, these additional resources may help guide the actions you take.

How does this tool relate to others? Additional information on guides to help with specific analytic or action steps is included in *Specific Tools To Support Change* (Tool G.2).

Descriptions of Tools Available Free of Charge

CAHPS® Improvement Guide

<http://www.cahps.ahrq.gov/Quality-Improvement/Improvement-Guide.aspx>

The Consumer Assessment of Healthcare Providers and Systems (CAHPS) program develops a comprehensive and evolving series of standardized patient surveys pertaining to the patient's experiences with the health care system. The surveys cover topics such as access, claims processing, communication with physicians, customer service, communication about costs of care, coordination/integration of care, health promotion/education, preventive services, and shared decisionmaking. The CAHPS Improvement Guide is a comprehensive resource for health care organizations seeking to improve their performance in the domains of quality measured by CAHPS surveys. The guide includes information on assessing whether the hospital is ready to improve, methods for analyzing the CAHPS survey results, steps for quality improvement, interventions designed to improve consumers' and patients' experiences with care, and a list of resources related to quality improvement. Many of the recommended actions apply to hospitals.

A Guide to Achieving High Performance in Multi-Hospital Health Systems

Julie Yonek., Stephen Hines., and Maulik Joshi

Health Research & Educational Trust (HRET)

<http://www.commonwealthfund.org/Publications/Fund-Reports/2010/Mar/A-Guide-to-Achieving-High-Performance-in-MultiHospital-Health-Systems.aspx>

This guide was the product of an effort to identify and disseminate best practices associated with high-performing health systems. The information is organized into four major best practice categories, with 17 specific best practices that have a demonstrated association with high performance in multihospital health systems. The major categories include:

1. Establish a systemwide strategic plan with measurable goals;
2. Create alignment across the health system with goals and incentives;
3. Leverage data and measurement across the organization; and
4. Standardize and spread best practices across the health system.

Putting Practice Guidelines to Work in the Department of Defense Medical System: A Guide for Action

Will Nicholas, Donna O. Farley, Mary E. Vaiana, Shan Cretin
RAND Corporation

http://www.rand.org/pubs/monograph_reports/MR1267.html

This improvement guide was written to assist military treatment facilities (MTFs) in achieving evidence-based practice and contains considerable information of use to civilian hospitals. The guide includes an overview of the stages of the process of achieving evidence-based practice and highlights keys to success that should be implemented during each stage of the process, guidance on how to organize and lead an effective implementation team, a step-by-step process for creating an implementation action plan, strategies for implementing changes outlined in the implementation action plan, and assistance with monitoring these changes and measuring the effects of the implementation strategies. The material has been influenced by lessons learned from hands-on field experience at Army MTFs that participated in the Army Medical Department (AMEDD)/RAND Guideline Implementation Project, which are included in the improvement guide. The goal of this project was to establish a system for implementing selected practice guidelines throughout AMEDD and for monitoring the effects of those guidelines on clinical care and outcomes. AMEDD, RAND, and participating MTFs tested and refined the guideline implementation methods in a “continuous improvement” cycle before systemwide adoption.

Overview of IHI Tools

<http://www.ihl.org/IHI/Topics/Improvement/ImprovementMethods/Tools/#Process%20Analysis%20Tools>

The Institute for Healthcare Improvement has developed and adapted a basic set of tools to help organizations accelerate improvement. These include tools for gathering information (e.g., Walk-through); analyzing processes (e.g., Cause and Effect Diagrams, Pareto Diagrams, Run Charts, Flowcharts); gathering data (e.g., Sampling); working in groups (e.g., Affinity Grouping, Multivoting); and documenting your work (e.g., Project Planning Forms, Plan-Do-Study-Act Worksheets, Storyboards). In addition, many organizations have developed tools in the course of their improvement efforts—for example, successful protocols, order sets and forms, instructions and guidelines for implementing key changes—and are making them available on IHI.org for others to use or adapt in their own organizations.

Specific Tools To Support Change

What is this tool? This tool provides information on tools developed by other organizations that may help support the specific actions you take to improve your performance on the AHRQ Quality Indicators.

Who are the target audiences? The primary audiences are quality officers and members of the implementation teams responsible for carrying out performance improvements. These resources also might be of interest to hospital senior leadership and managers.

How can the tool help you? As you work to improve the quality of care in your hospital and use the AHRQ Quality Indicators, these additional resources may help inform the specific steps you take along the way.

How does this tool relate to others? Additional information on guides that focus more broadly on supporting quality improvement is included in *Available Comprehensive Quality Improvement Guides* (Tool G.1).

On the following pages are descriptions of Tools Available Free of Charge.

Organization	Type of Resource	Name	Description	Source
Agency for Healthcare Research and Quality	Indicator or Measure	CAHPS [®] Hospital Survey: Composite Measures	<p>The survey generates six composite measures of the quality of inpatient care:</p> <ul style="list-style-type: none"> • Communication with nurses • Communication with doctor • Communication about medicines • Responsiveness of hospital staff • Discharge information • Pain management 	https://cahps.ahrq.gov/surveys-guidance/hospital/about/index.html
Agency for Healthcare Research and Quality	Indicator or Measure	CAHPS Hospital Survey: Global Rating	<p>The survey includes one global rating (an overall rating of the hospital):</p> <p>Question 21. Using any number from 0 to 10, where 0 is the worst hospital possible and 10 is the best hospital possible, what number would you use to rate this hospital?</p> <p>In addition, the survey asks respondents about their willingness to recommend the facility:</p> <p>Question 22: Would you recommend this hospital to your family and friends? Possible responses are: Definitely no, Probably no, Probably yes, Definitely yes.</p>	https://cahps.ahrq.gov/surveys-guidance/hospital/about/index.html
Agency for Healthcare Research and Quality	Indicator or Measure	CAHPS Hospital Survey: Individual Items	<p>The survey includes two individual items that can be reported separately:</p> <ul style="list-style-type: none"> • Cleanliness of the hospital environment: Question 8. During this hospital stay, how often were your room and bathroom kept clean? • Quietness of the hospital environment: Question 9. During this hospital stay, how often was the area around your room quiet at night? 	https://cahps.ahrq.gov/surveys-guidance/hospital/about/index.html
Agency for Healthcare Research and Quality	Tool	10 Patient Safety Tips for Hospitals	<p>This 2-page fact sheet provides 10 tips that hospitals can implement to improve patient safety. The tips focus on staffing, resource use, and procedures.</p>	http://www.ahrq.gov/qual/10tips.htm

Organization	Type of Resource	Name	Description	Source
Agency for Healthcare Research and Quality	Tool	Becoming a High Reliability Organization: Operational Advice for Hospital Leaders	This document is written for hospital leaders interested in providing patients with safer and higher quality care. It presents the thoughts, successes, and failures of hospital leaders who have used concepts of high reliability to make patient care better. Creating an organizational culture and set of work processes that reduce system failures and effectively respond when failures do occur is the goal of high reliability thinking.	http://www.ahrq.gov/professionals/quality-patient-safety/quality-resources/tools/hroadvice/hroadvice.pdf
Agency for Healthcare Research and Quality	Tool	CAHPS Pocket Reference Guide	The Consumer Assessment of Healthcare Providers and Systems (CAHPS) Pocket Reference Guide for Adult Surveys is a standardized reference guide that summarizes adult surveys developed by the CAHPS Consortium.	https://cahps.ahrq.gov/consumer-reporting/measures/CAHPS_FAC_PG_041310.pdf
Agency for Healthcare Research and Quality	Tool	HCUPnet	This interactive tool is used for identifying, tracking, analyzing, and comparing statistics on hospital care. It is part of the Healthcare Cost and Utilization Project (HCUP). With HCUPnet, users have easy access to national statistics and trends and selected State statistics about hospital stays. HCUPnet generates statistics using data from the Nationwide Inpatient Sample (NIS), the Kids' Inpatient Database (KID), and State Inpatient Databases (SID) for States that participate. HCUPnet also provides statistics based on the AHRQ Quality Indicators, which have been applied to the HCUP Nationwide Inpatient Sample. These statistics provide insight into potential quality of care problems.	http://hcupnet.ahrq.gov/
Agency for Healthcare Research and Quality	Tool	Health Care Innovations Exchange	This Web site includes a searchable database of innovations with evidence of their effectiveness and includes innovation attempts that did not work as planned.	http://www.innovations.ahrq.gov
Agency for Healthcare Research and Quality	Tool	Hospital Survey of Patient Safety Culture	In 2004, AHRQ released the Hospital Survey on Patient Safety Culture, a staff survey designed to help hospitals assess the culture of safety in their institutions.	http://www.ahrq.gov/qual/patientsafetyculture/hospsurindex.htm

Organization	Type of Resource	Name	Description	Source
Agency for Healthcare Research and Quality	Tool	National Guideline Clearinghouse	The NGC is a Web-based resource that contains guidelines submitted by health care organizations, associations, medical societies, and Federal agencies. Updated weekly with new content, the site provides an accessible and comprehensive source of clinical practice guidelines—in both summary and full text (where available) format—saving users hours of researching to find similar information. Free subscription to weekly "What's New" electronic notices is available. The NGC was originally developed by AHRQ in partnership with the American Medical Association and the American Association of Health Plans	http://www.guideline.gov/
Agency for Healthcare Research and Quality	Tool	National Quality Measures Clearinghouse	Designed as a Web-based one-stop shop for hospitals, health systems, health plans, and others who may be interested in quality measurement and improvement, the NQMC has the most current evidence-based quality measures and measure sets available to evaluate health care quality. Users can search the NQMC for measures that target a particular disease or condition, treatment, age range, gender, vulnerable population, setting of care, or contributing organization. Visitors also can compare attributes of two or more quality measures side by side to determine which measures best suit their needs.	http://www.qualitymeasures.ahrq.gov/
Agency for Healthcare Research and Quality	Tool	QualityTools Web site	Part of the Healthcare Innovations Exchange, this online clearinghouse allows users to search for tools that target a disease/condition, audience, tool category, or vulnerable population. The QualityTools providers' page provides links to resources (including Web sites, benchmarks, guidelines, data, and measures) to help hospitals and other provider organizations assess and improve care delivery. Subscription to a weekly "What's New" service is available.	http://www.innovations.ahrq.gov/innovations_qualitytools.aspx

Organization	Type of Resource	Name	Description	Source
Agency for Healthcare Research and Quality	Tool	TeamSTEPPS	<p>TeamSTEPPS is a teamwork system designed for health care professionals that is:</p> <ul style="list-style-type: none"> • A powerful solution to improve patient safety within your organization. • An evidence-based teamwork system to improve communication and teamwork skills among health care professionals. 	http://teamstepps.ahrq.gov
Agency for Healthcare Research and Quality and National Quality Forum	Tool	30 Safe Practices for Better Health Care	<p>The National Quality Forum has identified 30 safe practices that evidence shows can work to reduce or prevent adverse events and medication errors. These practices can be universally adopted by all health care settings to reduce the risk of harm to patients.</p> <p>The safe practices are organized into the following categories:</p> <ul style="list-style-type: none"> • Creating a culture of safety • Matching health care needs with service delivery capability • Facilitating information transfer and clear communication • Increasing safe medication use <p>Practices are also organized by specific settings or processes of care.</p>	http://www.ahrq.gov/qual/30safe.htm

Organization	Type of Resource	Name	Description	Source
American Hospital Association	Tool	The Hospital Quality Alliance and Hospital Compare	The Hospital Quality Alliance and Hospital Compare. The American Hospital Association (AHA), Federation of American Hospitals (FAH), and Association of American Medical Colleges (AAMC) launched the Hospital Quality Alliance (HQA), a national public-private collaboration to encourage hospitals to voluntarily collect and report hospital quality performance information. This effort is intended to make important information about hospital performance accessible to the public and to inform and invigorate efforts to improve quality. An important element of the collaboration, Hospital Compare, is a Web-based tool for reviewing hospital quality information. More than 4,200 acute care hospitals agreed to provide data on an initial set of 17 quality measures.	http://www.hospitalcompare.hhs.gov/
American Hospital Association	Tool	The Leapfrog Group Hospital and Safety Survey	The Leapfrog Group Hospital Quality and Safety Survey. The Leapfrog Group is a coalition of large public and private purchasers who are leveraging their purchasing power to encourage significant improvements in patient safety and quality of care, and ultimately, cost savings. Leapfrog focuses on computerized physician order entry (CPOE), intensive care unit (ICU) physician staffing, evidence-based hospital referral (track record and experience with certain high-risk procedures), and the National Quality Foundation's endorsed set of practices for safer health care. Almost 1,200 hospitals submitted data to the Leapfrog Group in 2005.	http://www.leapfroggroup.org/cp
Canadian Health Services Research Foundation	Tool	Local opinion leaders: Effects on professional practice and health care outcomes	Identify opinion leaders.	http://www.chsrf.ca/Migrated/PDF/InsightAction/insight_action3_1_e.pdf

Organization	Type of Resource	Name	Description	Source
Center for Health Research, University of California, Berkeley	Tool	Informed Decisions Toolbox	Assess the accuracy, applicability, and actionability of available evidence.	http://www.ahrq.gov/policymakers/measurement/decisiontoolbox
Change Management Toolbook, ChangeSource	Tool	A Matrix for Training Needs Analysis	Conduct a training needs analysis.	http://www.change-management-toolbook.com
Community Tool Box, Kansas University	Tool	Criteria for Choosing Promising Practices and Community Interventions	Adapt an innovation.	http://ctb.ku.edu/en/ablecontents/section_1152.aspx
Department of Veterans Affairs Quality Enhancement Research Initiative (QUERI)	Tool	Implementation Guide	Monitor and evaluate implementation.	http://www.queri.research.va.gov/implementation
Focused Performance	Tool	Taking Advantage of Resistance to Change (and the TOC Thinking Processes) to Improve Improvements	Identify and overcome resistance.	http://www.focusedperformance.com/articles/resistance.html
Free Management Library	Tool	Major Types of Organizational Change	Understand types of organizational change.	http://www.managementhelp.org/misc/types-of-orgl-change.pdf
Free Management Library	Tool	Organizational Change and Development	Manage change.	http://www.managementhelp.org/org_chng/org_chng.htm

Organization	Type of Resource	Name	Description	Source
George Mason University	Tool	Continuous Quality Improvement Guide	Manage change.	http://gunston.gmu.edu/healthscience/708/default.asp
George Mason University	Tool	Leading Change	Manage change.	http://gunston.gmu.edu/healthscience/708/LeadingChange.asp?E=0
Graduate School of Banking at Colorado (University of Colorado)	Tool	Organizational Culture Assessment Instrument	Assess organizational culture.	http://www.uiowa.edu/~nrcfcp/dmcrd/documents/ocai.doc
Health Services Research	Tool	The Quantitative Measurement of Organizational Culture in Health Care: A Review of the Available Instruments	Assess organizational culture.	http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1360923
Health Services Research and Development Service Department of Veterans Affairs	Tool	Organizational Change Primer	Manage change.	http://www.hsrd.rese.arch.va.gov/publications/internal/organizational_change_primer.pdf

Organization	Type of Resource	Name	Description	Source
Health Research & Educational Trust	Tool	Health Research & Educational Trust Disparities Toolkit	This toolkit is designed to help hospitals, health systems, community health centers, medical group practices, health plans, and other users understand the importance of collecting accurate data on race, ethnicity, and primary language of persons with limited English proficiency, deafness, or hearing impairments. By using this toolkit, health care organizations can assess their organizational capacity to collect information and implement a systematic framework designed specifically for obtaining race, ethnicity, and primary language data directly from patients/enrollees or their caregivers in an efficient, effective, and respectful manner.	http://www.hretdisparities.org/index.php
Health Research & Educational Trust	Tool	Pathways for Medication Safety SM	HRET and the Institute for Safe Medication Practices ISMP, in collaboration with the American Hospital Association, have developed three important tools to assist hospitals in reducing medication errors via the Pathways for Medication Safety initiative: <ol style="list-style-type: none"> 1. Leading a Strategic Planning Effort 2. Looking Collectively at Risk 3. Assessing Bedside Bar-Coding Readiness 	http://www.ismp.org/tools/pathwaysection1.pdf
Innovation Network Resource Exchange Center	Tool	Evaluation Plan Workbook	Plan evaluation.	http://www.innonet.org/client_docs/File/evaluation_plan_workbook.pdf
Institute for Healthcare Improvement	Tool	Assessment Scale for Collaboratives	This scale gives information on how to assess a team's progress throughout an IHI Breakthrough Series Collaborative improvement project. The Collaborative Assessment Scale was developed at IHI to assess teams participating in IHI Breakthrough Series Collaborative projects. The tool allows collaborative directors and improvement advisors to determine how well teams are doing, on a scale of 1 to 5, in meeting improvement goals and implementing changes.	http://www.ihl.org/knowledge/Pages/Tools/AssessmentScaleforCollaboratives.aspx

Organization	Type of Resource	Name	Description	Source
Institute for Healthcare Improvement	Tool	Cause and Effect Diagram	A cause and effect diagram, also known as an Ishikawa or "fishbone" diagram, is a graphic tool used to explore and display the possible causes of a certain effect. The classic fishbone diagram can be used when causes group naturally under the categories of Materials, Methods, Equipment, Environment, and People. A process-type cause and effect diagram can show causes of problems at each step in the process.	http://www.ihl.org/knowledge/Pages/Tools/CauseandEffectDiagram.aspx
Institute for Healthcare Improvement	Tool	Executive Review of Improvement Projects	Executive reviews of projects can be a powerful method for channeling leadership attention to quality initiatives. This primer helps organizational leaders to do effective project reviews that focus on results, diagnose problems with projects, help projects to succeed, and facilitate spread of good ideas across the organization.	http://www.ihl.org/knowledge/Pages/Tools/ExecutiveReviewofProjectsIHI.aspx
Institute for Healthcare Improvement	Tool	Failure Modes and Effects Analysis	<p>Failure Modes and Effects Analysis (FMEA) is a systematic, proactive method for evaluating a process to identify where and how it might fail and to assess the relative impact of different failures, in order to identify the parts of the process that are most in need of change. FMEA includes review of the following:</p> <ul style="list-style-type: none"> • Steps in the process • Failure modes (What could go wrong?) • Failure causes (Why would the failure happen?) • Failure effects (What would be the consequences of each failure?) 	http://www.ihl.org/knowledge/Pages/Tools/FailureModesandEffectsAnalysisTool.aspx
Institute for Healthcare Improvement	Tool	Flowchart	Flowcharts allow you to draw a picture of the way a process works so that you can understand the existing process and develop ideas about how to improve it. A high-level flowchart, showing 6 to 12 steps, gives a panoramic view of a process. A detailed flowchart is a close-up view of the process, typically showing dozens of steps.	http://www.ihl.org/knowledge/Pages/Tools/Flowchart.aspx

Organization	Type of Resource	Name	Description	Source
Institute for Healthcare Improvement	Tool	Glossary of Improvement Terms	A glossary of common improvement terminology.	http://www.ihl.org/knowledge/Pages/Tools/GlossaryImprovementTerms.aspx
Institute for Healthcare Improvement	Tool	Guidelines for Successful Visiting	Visiting another organization can be a great help to teams working on improvement. Visiting exposes the team to insights unavailable by any other method. The face-to-face nature of visiting allows more interaction and accelerates improvement. These guidelines can help organizations arrange and run a visit.	http://www.ihl.org/knowledge/Pages/Tools/GuidelinesforSuccessfulVisiting.aspx
Institute for Healthcare Improvement	Tool	Histogram	Often, summary statistics alone do not give a complete and informative picture of the performance of a process. A histogram is a special type of bar chart used to display the variation in continuous data such as time, weight, size, or temperature. A histogram enables a team to recognize and analyze patterns in data that are not apparent simply by looking at a table of data, or by finding the average or median.	http://www.ihl.org/knowledge/Pages/Tools/Histogram.aspx
Institute for Healthcare Improvement	Tool	Huddles	The idea of using quick huddles, as opposed to the standard 1-hour meeting, arose from a need to speed up the work of improvement teams. Huddles enable teams to have frequent but short briefings so that they can stay informed, review work, make plans, and move ahead rapidly.	http://www.ihl.org/knowledge/Pages/Tools/Huddles.aspx

Organization	Type of Resource	Name	Description	Source
Institute for Healthcare Improvement	Tool	Idea Generation Tools: Brainstorming, Affinity Grouping, and Multivoting	<p>Brainstorming, affinity grouping, and multivoting are tools for generating, categorizing, and choosing among ideas in a group of people. Using these techniques to generate, categorize, and choose among ideas has a number of benefits:</p> <ul style="list-style-type: none"> • Every group member has a chance to participate. • Many people can contribute, instead of just one or two people. • Group members can get ideas while they listen to the ideas of others. • The group can generate a substantial list of ideas, rather than just the few things that first come to mind; can categorize ideas creatively; and can choose among ideas or options thoughtfully. 	http://www.ihl.org/knowledge/Pages/Tools/BrainstormingAffinityGroupingandMultivoting.aspx
Institute for Healthcare Improvement	Tool	Improvement Tracker	Monitor the impact of an innovation.	http://app.ihl.org/Workspace/tracker/
Institute for Healthcare Improvement	Tool	Interviewing Guide: Using the Interview as a Source of Data, Information, and Learning	<p>This tool will guide users through the process of planning, conducting, and analyzing interviews. It is useful for anyone who plans to conduct interviews to learn about a topic, assess current knowledge around an improvement area, or evaluate an improvement project. It is simple and generic enough to be used in most disciplines. The guide covers how to select subjects to interview and how to construct questions that will generate rich responses. It also discusses how to structure an interview, how to take notes or tape the interview, and how to analyze completed interviews.</p>	http://www.ihl.org/knowledge/Pages/Tools/InterviewGuideUsingtheInterviewasasourceofdatainformationandlearning.aspx

Organization	Type of Resource	Name	Description	Source
Institute for Healthcare Improvement	Tool	Overview of IHI tools	The Institute for Healthcare Improvement has developed and adapted a basic set of tools to help organizations accelerate improvement. These include tools for gathering information (e.g., Walk-through); analyzing processes (e.g., Cause and Effect Diagrams, Pareto Diagrams, Run Charts, Flowcharts); gathering data (e.g., Sampling); working in groups (e.g., Affinity Grouping, Multivoting); and documenting work (e.g., Project Planning Forms, Plan-Do-Study-Act Worksheets, Storyboards). In addition, many organizations have developed tools during their improvement efforts and are making them available on IHI.org for others to use or adapt in their own organizations.	http://www.ihl.org/knowledge/Pages/Tools/default.aspx
Institute for Healthcare Improvement	Tool	Pareto Diagram	According to the "Pareto Principle," in any group of things that contribute to a common effect, a relatively few contributors account for most of the effect. A Pareto diagram is a type of bar chart in which the various factors that contribute to an overall effect are arranged in order according to the magnitude of their effect. This ordering helps identify the "vital few," the factors that warrant the most attention. Using a Pareto diagram helps a team concentrate its efforts on the factors that have the greatest impact. It also helps a team communicate the rationale for focusing on certain areas.	http://www.ihl.org/knowledge/Pages/Tools/ParetoDiagram.aspx
Institute for Healthcare Improvement	Tool	Plan, Do, Study, Act (PDSA) and PDSA Worksheet	PDSA enables people to carry out small tests of change. The PDSA Worksheet is a useful tool for documenting a test of change. The PDSA cycle is shorthand for testing a change by developing a plan to test the change (Plan), carry out the test (Do), observe and learn from the results (Study), and determine what modifications should be made to the test (Act).	http://www.ihl.org/IHI/Topics/Improvement/ImprovementMethods/HowToImprove/testingchanges.htm

Organization	Type of Resource	Name	Description	Source
Institute for Healthcare Improvement	Tool	Project Planning Form	The Project Planning Form is a useful tool for planning an entire improvement project, including a list of all the changes that the team is testing, all the Plan-Do-Study-Act (PDSA) cycles for each change, the person responsible for each test of change, and the timeframe for each test. The form allows a team to see at a glance the overall picture of the project.	http://www.ihp.org/knowledge/Pages/Tools/ProjectPlanningForm.aspx
Institute for Healthcare Improvement	Tool	Rate of Spread	Monitor spread of innovation.	http://www.ihp.org/knowledge/Pages/Measures/RateofSpread.aspx
Institute for Healthcare Improvement	Tool	Run Chart	<p>Improvement takes place over time. Determining if improvement has really happened and if it is lasting requires observing patterns over time. Run charts are graphs of data over time and are one of the single most important tools in performance improvement. Run charts can:</p> <ul style="list-style-type: none"> • Help improvement teams formulate aims by depicting how well (or poorly) a process is performing. • Help in determining when changes are truly improvements by displaying a pattern of data that you can observe as you make changes. • Give direction as you work on improvement and provide information about the value of particular changes. 	http://www.ihp.org/knowledge/Pages/Tools/RunChart.aspx

Organization	Type of Resource	Name	Description	Source
Institute for Healthcare Improvement	Tool	Sampling (links to Simple Data Collection Planning)	<p>Measurement should speed improvement, not slow it down. Often, organizations get bogged down in measurement and delay making changes until they have collected all the data they believe they need. Instead of measuring the entire process (e.g., all patients waiting in the clinic during a month), measuring a sample (e.g., every sixth patient for one week; the next eight patients) is a simple and efficient way to help a team understand how a system is performing. Sampling saves time and resources while accurately tracking performance.</p> <p>Simple data collection planning is a process to ensure that the data collected for performance improvement are useful and reliable, without being unnecessarily costly and time consuming to obtain.</p>	<p>http://www.ih.org/knowledge/Pages/Tools/Sampling.aspx</p> <p>Also refer to Simple Data Collection Planning at: http://www.ih.org/knowledge/Pages/Tools/SimpleDataCollectionPlanning.aspx.</p>
Institute for Healthcare Improvement	Tool	Scatter Diagram	A scatter diagram is a graphic representation of the relationship between two variables. Scatter diagrams help teams identify and understand cause-effect relationships.	http://www.ih.org/knowledge/Pages/Tools/ScatterDiagram.aspx
Institute for Healthcare Improvement	Tool	Short Survey	Short surveys are intended to provide just enough simple and prompt feedback to indicate whether attempts to improve are going in the right direction. Teams can also use them to pinpoint certain areas of interest (e.g., did the patients find the new form easy to understand?). These surveys are useful for answering question 2 in the Model for Improvement (How will we know that a change is an improvement?) and in running Plan-Do-Study-Act (PDSA) cycles.	http://www.ih.org/knowledge/Pages/Tools/ShortSurvey.aspx
Institute for Healthcare Improvement	Tool	Storyboards	Storyboards are a useful tool for effectively presenting a team's work to a variety of audiences—to other groups within the organization, to other organizations, and to the larger community.	http://www.ih.org/knowledge/Pages/Tools/Storyboards.aspx

Organization	Type of Resource	Name	Description	Source
Institute for Healthcare Improvement	Tool	Walk-Through Tool	<p>Walk-throughs enable providers to better understand the experience of care from the patient's and family's points of view by going through the experience themselves. This tool is most useful in answering question 1 in the Model for Improvement (What are we trying to accomplish?). Using the Walk-through tool can:</p> <ul style="list-style-type: none"> • Provide firsthand knowledge of what it is like to be a patient in an organization. • Build the will and provide incentive for an organization to improve care and enhance the patient experience. • Generate data that address the total experience of the patient, including direct observations as well as feelings such as frustration and fear. • Generate ideas for process improvement and innovation. 	http://www.ihp.org/knowledge/Pages/Tools/Walkthrough.aspx
Imperial College London	Tool	Project Stakeholder Analysis	Identify stakeholders and their interest in and influence over the innovation.	http://www.imperial.ac.uk/workspace/projectmanagement/public/Templates%20for%20download/Stakeholder%20analysis.doc
Industrial Relations Victoria (Australia)	Tool	The High Performance Toolkit: Workplace Change	Anticipate staff reactions to innovation.	http://www.business.vic.gov.au/busvicwr/assets/main/lib60037/06_hpt2-1managingchangeintehworkplace.pdf
Institute of Behavioral Research, Texas Christian University	Tool	Organizational Readiness for Change	Assess organizational climate and readiness for change.	http://ibr.tcu.edu/forms/organizational-staff-assessments/

Organization	Type of Resource	Name	Description	Source
Kaiser Permanente	Tool	RE-AIM Planning Tool	Plan for maintenance and sustainability.	http://www.re-aim.hnfe.vt.edu/resources_and_tools/measures/planningtool.pdf
Mind Tools	Tool	Critical Path Analysis and PERT Charts	Use critical path analysis and PERT charts.	http://www.mindtools.com/critpath.html
Mind Tools	Tool	Gantt Charts	Use Gantt charts.	http://www.mindtools.com/pages/article/newPPM_03.htm
National Academy for State Health Policy	Tool	Patient Safety Toolbox for States	This electronic toolbox provides States with tools they can use or modify as they develop or improve adverse event reporting systems. The toolbox includes information (policies, practices, forms, reports, methods, and contracts) related to States' reporting systems, links to other Web resources, and fast facts and issues related to patient safety.	http://www.nashp.org/pst-welcome
National Committee for Quality Assurance	Indicator or Measure	HEDIS [®] measures (Healthcare Effectiveness Data and Information Set)	HEDIS is a tool used by more than 90 percent of America's health plans to measure performance on important dimensions of care and service. Altogether, HEDIS consists of 71 measures across 8 domains of care. Because so many plans collect HEDIS data, and because the measures are so specifically defined, HEDIS makes it possible to compare the performance of health plans on an "apples-to-apples" basis. Health plans also use HEDIS results themselves to see where they need to focus their improvement efforts.	http://www.ncqa.org/t/abid/187/Default.aspx
National Committee for Quality Assurance	Tool	Quality Compass	Quality Compass 2011 is an indispensable tool for selecting a health plan, conducting competitor analysis, examining quality improvement, and benchmarking plan performance.	http://www.ncqa.org/t/abid/177/Default.aspx

Organization	Type of Resource	Name	Description	Source
Oregon Health Policy Commission and Office for Oregon Health Policy and Research	Indicator or Measure	Oregon Hospital Quality Indicators	Volume indicators are simply a count of hospital admissions for a given procedure. The counts presented here are of relatively rare and specialized procedures for which scientific research suggests that performing more of the procedure often leads to better patient outcomes. In the accompanying displays, volumes are shown compared to a “threshold” number identified by AHRQ as the point at which improved patient outcomes have been observed. While volume is not a direct measure of quality of care, it is useful in gauging how much experience a particular hospital has for a given procedure.	http://www.orhospitalquality.org/
Oregon Health Policy Commission and Office for Oregon Health Policy and Research	Indicator or Measure	Oregon Hospital Quality Indicators	Death rate indicators represent the number of patients admitted for a specific procedure or condition who died in the hospital, divided by the total number of patients admitted for that procedure or condition. However, because the patients’ age, sex, or severity of condition may increase their risk of death, the death rates for each hospital are adjusted to account for these factors. Other factors—for example, that some hospitals may transfer out all but the most mild or most severe cases—are not accounted for in the risk-adjustment methods used here. Hence, while death rates constitute a more sensitive indicator of quality than mere procedure counts, they too should be considered in tandem with comments submitted by hospitals, as well as with other information about quality of care.	http://www.orhospitalquality.org/index.php

Organization	Type of Resource	Name	Description	Source
Organisation for Economic Co-operation and Development (OECD)	Indicator or Measure	OECD Health Care Quality Indicators Project: Patient Safety	<p>Several indicators have been identified, including:</p> <ul style="list-style-type: none"> • Hospital-acquired infections: ventilator pneumonia, wound infection, infection due to medical care, decubitus ulcer. • Operative and postoperative complications: complications of anesthesia, postoperative hip fracture, postoperative pulmonary embolism or deep vein thrombosis, postoperative sepsis, technical difficulty with procedure. • Sentinel events: transfusion reaction, wrong blood type, wrong-site surgery, foreign body left in during procedure, medical equipment-related adverse events, medication errors. • Obstetrics: birth trauma - injury to neonate, obstetric trauma – vaginal delivery, obstetric trauma - cesarean section, problems with childbirth. • Other care-related adverse events: patient falls, In-hospital hip fracture or fall 	http://www.oecd.org/dataoecd/53/26/33878001.pdf
SCORE	Tool	5 Tips on Preparing for Change (subtopic on Web page)	Manage change.	http://www.scorerochester.org/help/tips/planning.php
Sharon Martin Community Health Fund	Tool	A SMART Fund Guide to Using Outcomes to Design & Manage Community Health Activities	Select measures.	http://www.smartfund.ca/docs/smart_outcomes_guide.pdf
State of Connecticut	Tool	SMART Objectives	Develop specific, measurable, attainable, relevant, and timely objectives.	http://www.ct.gov/dph/lib/dph/state_health_planning/planning_guide_v2-1_2009.pdf

Organization	Type of Resource	Name	Description	Source
University of Alberta (funded by Institute for Healthcare Improvement)	Tool	Queueing ToolPak 4.0	The Queueing ToolPak (QTP) is a Microsoft Excel add-in that performs basic calculations for waiting line analysis. The functions allow integration of queueing performance measures into spreadsheet models without the limitations imposed by templates with fixed input and output areas that are commonly used for analysis of waiting lines.	http://queueingtoolpak.org/
University of Nebraska Medical Center	Tool	Rural Adapted Survey on Patient Safety Culture	<p>This toolkit includes resources for small rural hospitals to conduct and interpret the AHRQ Hospital Survey on Patient Safety Culture. They can help create an infrastructure for reporting, collecting, and analyzing data about voluntarily reported medication errors.</p> <p>The tools are organized by the four components of a safe, informed culture: reporting culture, just culture, flexible culture, and learning culture.</p> <p>Within each component, tools are provided to:</p> <ul style="list-style-type: none"> • Engage the audience about the importance of the change. • Educate the audience about what they need to do. • Ensure that the audience can execute the change. • Evaluate whether the change made a difference. 	http://www.unmc.edu/patient-safety/surveys/rural-hospital-survey.html
Venture Philanthropy Partners	Tool	McKinsey Capacity Assessment Grid (appendix of a report)	Assess organizational capacity.	http://www.vppartners.org/learning/reports/capacity/assessment.pdf

Organization	Type of Resource	Name	Description	Source
W.K. Kellogg Foundation	Tool	Logic Model Development Guide	Develop a logic model and plan evaluation.	http://www.wkkf.org/knowledge-center/resources/2006/02/WK-Kellogg-Foundation-Logic-Model-Development-Guide.aspx
Washington State Hospital Association	Indicator or Measure	Hospital Quality Measures	Measures include aspirin at arrival, aspirin at discharge, angiotensin-converting enzyme inhibitor for left ventricular systolic dysfunction, smoking cessation advice, beta blocker at discharge, fibrinolytics at arrival, percutaneous coronary intervention at arrival, 30-day mortality, 30-day readmission	http://www.wahospitalquality.org/

INSTRUCTIONS

Case Study of Patient Safety Indicator Improvement Implementation

What is this tool? This tool provides a case study from one hospital that participated in the field test and evaluation of the entire toolkit. It offers a description of the tools the hospital chose to use, as well as several of the key actions it took to improve performance on the Patient Safety Indicators (PSIs).

Who are the target audiences? The primary audiences for this tool are senior hospital leaders and quality leaders.

How can this tool help you? You can use this tool to better understand how other hospitals may use the toolkit.

How does this tool relate to others? This tool should be used together with the Toolkit Roadmap, which provides an overview of all the individual tools and can help in selecting the tools that best meet your hospital's needs.

One Hospital's Experience Using the Toolkit for Quality Improvement

A hospital on the West Coast was an active participant in testing the usefulness of this toolkit. This hospital is a large level I trauma center that had already been working to improve its performance on the AHRQ PSIs for 2 years when the toolkit first became available. Their focus while working with the toolkit was on PSI 12, postoperative deep vein thrombosis or pulmonary embolism (DVT/PE). They had two primary goals in their efforts:

- Identify potential cases of PSI 12 as early as possible.
- Use that information to improve their performance on this indicator.

In working with the toolkit, the hospital used only the tools needed to accomplish its quality improvement goals. One tool they used was A.3, Getting Ready for Change Self-Assessment. This tool revealed that their leadership and board of trustees were fully “on board” and engaged in supporting the project. At the same time, the tool highlighted that a key challenge the hospital would face throughout its improvement efforts was disseminating information about quality and patient safety to staff at all levels of their organization.

During the project, the hospital moved from using quarterly summaries of their PSI rates provided by the University HealthSystem Consortium to running the AHRQ WinQI software at the hospital on a monthly basis to identify cases. (See tool B.2b, IQI and PSI Rates Generated by the AHRQ WinQI Software, for guidance on using this software). They used the Prioritization Matrix (Tool C.1), which helped them identify PSI 12, along with two others, as priority areas for improvement. The project leader and members of the hospital's leadership team presented the rates and information from the Prioritization Matrix to many groups within the hospital: the surgical council, medical executive board, critical care council, hospital board, clinical documentation specialists, and coding department. These presentations focused on educating stakeholders about the PSIs and why the hospital was emphasizing the opportunity to improve their performance as assessed by the PSIs.

As they began to take an indepth look at their data on postoperative DVT/PE, one of the earliest lessons learned was the need to discuss the PSIs with the hospital's coding department. Since the coders needed to use physician documentation to identify cases that met the PSI criteria, several issues needed to be clarified. For example, the hospital wanted to ensure that a "rule out" diagnosis—where the patient is being observed or tested for the presence of a DVT or PE—was never coded as meeting the criteria for PSI 12 unless an actual diagnosis of DVT or PE was established for that patient. The hospital also wanted to validate that DVTs/PEs that were present on admission were coded appropriately.

A number of the other hospitals that participated in the field test and evaluation of this toolkit also had concerns about coding and documentation. These concerns prompted the development of Tool B.4, Documentation and Coding for Patient Safety Indicators, which provides guidance on these issues.

Over the course of the project, the hospital made a number of changes to improve the quality of DVT/PE prevention for its patients. These included providing additional education and resources for nurses and residents on existing prophylaxis guidelines; assisting clinical pharmacists in daily identification of all patients not receiving chemical prophylaxis; and shifting chemical prophylaxis dosing to avoid missed doses due to changes in scheduled surgical procedures. In addition to these changes, the hospital integrated the information from Tool G.2, Specific Tools To Support Change, into a quality and safety intranet page that centralized resources to support clinical staff taking on quality improvement projects.

From the Implementation section of the toolkit, the hospital made particular use of the Project Charter (D.2), Gap Analysis (D.5), and Implementation Plan (D.6). Together, these tools helped chart the course of the project, including setting initial goals, identifying key activities, and tracking progress over time.

Beyond using the AHRQ WinQI software to identify potential incidents of PSI 12, the hospital developed its own system for tracking the review of all DVT/PE events, using internal diagnostic systems. Once each month, the quality improvement team reviewed both PSI 12 and other hospital-acquired DVT/PE events. This included uploading information on these events to an internal database that allowed staff to track and analyze the results. The reviews included assessing potential coding and documentation concerns and reviewing the care that was provided to identify opportunities for clinical improvement.

This review was done by the quality improvement staff and a multidisciplinary clinical task force. The database enabled the quality improvement staff to ensure that a final determination was reached about whether each case suggested the need for changes either to improve coding or documentation or to ensure that the standard of care for anticoagulation prophylaxis was met.

The key lessons that the hospital learned from the project include:

- The need to validate potential PSI cases and work closely with the coding department and physicians who are documenting care.

- The importance of having leadership support, with hospital leaders emphasizing both the importance of the project and the accountability that clinical providers have for improving care.
- The importance of providing timely data to clinicians that provides feedback on progress, with a focus on actual clinical events and outcomes.