Health Care Acquired Infections Advisory Committee
Appointed Roster October 1, 2007

Jim Barnhart
Chief Executive Officer
Peace Harbor Hospital

Paul Cieslack, MD
Manager, Acute & Communicable Disease Prevention
Oregon Public Health Division

Lynn-Marie Crider
Public Policy Director
Service Employees International Union, Local 49

Jim Dameron
Administrator
Oregon Patient Safety Commission

Kathleen Elias, RN
Administrator
Regency Albany

Woody English, MD
Hospital Epidemiologist
Providence St Vincent Medical Center

Ron Jamtgaard
Retired Health Care IT

Mel Kohn, MD
State Epidemiologist
Department of Human Services, Public Health Division, Office of Disease Prevention and Epidemiology

Patricia Martinez, MD
Chief Quality Officer
Asante Health Systems

Laura Mason
Clinical Risk Manager
St. Charles Medical Center-Bend and Cascade Healthcare Community

Jon Pelkey
Quality Improvement & Medical Section Manager
Department of Human Services, DMAP

Mary Post
Manager, Infection Prevention and Control Program
Oregon Health and Sciences University

Barbara Prowe
Executive Director
Oregon Coalition of Health Care Purchasers

Rodger Sleven, MD
Physician
Westhills Gastroenterology Associates, PC

Jeanene Smith, MD, MPH
Administrator
Office for Oregon Health Policy & Research

John Townes, MD
Assistant Professor of Medicine, Division of Infectious Diseases
Oregon Health and Sciences University

Dee Dee Vallier
Consumer

Staff
Sean Kolmer, MPH
Research & Data Manager
Office for Oregon Health Policy & Research

James Oliver, MPH
Research Analyst
Office for Oregon Health Policy and Research

Shawna Kennedy-Walters
Policy & Analysis Assistant
Office for Oregon Health Policy and Research

Enrolled
House Bill 2524

Sponsored by Representatives TOMEI, GREENLICK; Representatives BARKER, BARNHART, BOONE, BUCKLEY, CANNON, CLEM, COWAN, DINGFELDER, GALIZIO, GELSER, GILLIAM, HOLVEY, LIM, NELSON, RILEY, ROSENBAUM, SHIELDS, WITT

CHAPTER .....

AN ACT

Relating to health care facility acquired infections; creating new provisions; amending ORS 442.445; appropriating money; and declaring an emergency.

Be It Enacted by the People of the State of Oregon:

SECTION 1. The Legislative Assembly finds that Oregonians should be free from infections acquired during the delivery of health care. Action taken in this state to prevent health care acquired infections should be trustworthy, effective, transparent and reliable.

SECTION 2. As used in sections 1 to 6 of this 2007 Act:

(1) "Health care facility" has the meaning given that term in ORS 442.015.

(2) "Health care acquired infection" means a localized or systemic condition that:

(a) Results from an adverse reaction to the presence of an infectious agent or its toxin; and

(b) Was not present or incubating at the time of admission to the health care facility.

(3) "Risk-adjusted methodology" means a standardized method used to ensure that intrinsic and extrinsic risk factors for a health care acquired infection are considered in the calculation of health care acquired infection rates.

SECTION 3. (1) There is established in the Office for Oregon Health Policy and Research the Oregon Health Care Acquired Infection Reporting Program. The program shall:

(a) Provide useful and credible infection measures, specific to each health care facility, to consumers;

(b) Promote quality improvement in health care facilities; and

(c) Utilize existing quality improvement efforts to the extent practicable.

(2) The office shall adopt rules to:

(a) Require health care facilities to report to the office health care acquired infection measures, including but not limited to health care acquired infection rates;

(b) Specify the health care acquired infection measures that health care facilities must report; and

(c) Prescribe the form, manner and frequency of reports of health care acquired infection measures by health care facilities.

(3) In prescribing the form, manner and frequency of reports of health care acquired infection measures by health care facilities, to the extent practicable and appropriate to avoid unnecessary duplication of reporting by facilities, the office shall align the requirements with

the requirements for health care facilities to report similar data to the Department of Human Services and to the Centers for Medicare and Medicaid Services.

(4) The office shall utilize, to the extent practicable and appropriate, a credible and reliable risk-adjusted methodology in analyzing the health care acquired infection measures reported by health care facilities.

(5) The office shall provide health care acquired infection measures and related information to health care facilities in a manner that promotes quality improvement in the health care facilities.

(6) The office shall adopt rules prescribing the form, manner and frequency for public disclosure of reported health care acquired infection measures. The office shall disclose updated information to the public no less frequently than every six months beginning January 1, 2010, and no less frequently than every calendar quarter beginning January 1, 2011.

(7) Individually identifiable health information submitted to the office by health care facilities pursuant to this section may not be disclosed to, made subject to subpoena by or used by any state agency for purposes of any enforcement or regulatory action in relation to a participating health care facility.

SECTION 4. (1) There is established the Health Care Acquired Infection Advisory Committee to advise the Administrator of the Office for Oregon Health Policy and Research regarding the Oregon Health Care Acquired Infection Reporting Program. The advisory committee shall consist of 16 members appointed by the administrator as follows:

(a) Seven of the members shall be health care providers or their designees, including:

(A) A hospital administrator who has expertise in infection control and who represents a hospital that contains fewer than 100 beds;

(B) A hospital administrator who has expertise in infection control and who represents a hospital that contains 100 or more beds;

(C) A long term care administrator;

(D) A hospital quality director;

(E) A physician with expertise in infectious disease;

(F) A registered nurse with interest and involvement in infection control; and

(G) A physician who practices in an ambulatory surgical center and who has interest and involvement in infection control.

(b) Nine of the members shall be individuals who do not represent health care providers, including:

(A) A consumer representative;

(B) A labor representative;

(C) An academic researcher;

(D) A health care purchasing representative;

(E) A representative of the Department of Human Services;

(F) A representative of the business community;

(G) A representative of the Oregon Patient Safety Commission who does not represent a health care provider on the commission;

(H) The state epidemiologist; and

(I) A health insurer representative.

(2) The Administrator of the Office for Oregon Health Policy and Research and the advisory committee shall evaluate on a regular basis the quality and accuracy of the data collected and reported by health care facilities under section 3 of this 2007 Act and the methodologies of the Office for Oregon Health Policy and Research for data collection, analysis and public disclosure.

(3) Members of the advisory committee are not entitled to compensation and shall serve as volunteers on the advisory committee.

(4) Each member of the advisory committee shall serve a term of two years.

(5) The advisory committee shall make recommendations to the administrator regarding:

(a) The health care acquired infection measures that health care facilities must report, which may include but are not limited to:

(A) Surgical site infections;

(B) Central line related bloodstream infections;

(C) Urinary tract infections; and

(D) Health care facility process measures designed to ensure quality and to reduce health care acquired infections;

(b) Methods for evaluating and quantifying health care acquired infection measures that align with other data collection and reporting methodologies of health care facilities and that support participation in other quality interventions;

(c) Requiring different reportable health care acquired infection measures for differently situated health care facilities as appropriate;

(d) A method to ensure that infections present upon admission to the health care facility are excluded from the rates of health care acquired infection disclosed to the public for the health care facility under sections 3 and 6 of this 2007 Act;

(e) Establishing a process for evaluating the health care acquired infection measures reported under section 3 of this 2007 Act and for modifying the reporting requirements over time as appropriate;

(f) Establishing a timetable to phase in the reporting and public disclosure of health care acquired infection measures; and

(g) Procedures to protect the confidentiality of patients, health care professionals and health care facility employees.

(6) The Office for Oregon Health Policy and Research shall adopt rules implementing the Oregon Health Care Acquired Infection Reporting Program no later than July 1, 2008. Health care facilities shall begin reporting health care acquired infection measures under section 3 of this 2007 Act no later than January 1, 2009.

SECTION 5. Notwithstanding the term of office specified by section 4 of this 2007 Act, of the members first appointed to the Health Care Acquired Infection Advisory Committee:

(1) Five shall serve for terms ending January 1, 2010.

(2) Five shall serve for terms ending January 1, 2011.

(3) The remaining members shall serve for a term ending January 1, 2012.

SECTION 6. (1) In addition to any report required pursuant to section 3 of this 2007 Act, on or before April 30 of each year, the Administrator of the Office for Oregon Health Policy and Research shall prepare an annual report summarizing the health care facility reports submitted pursuant to section 3 of this 2007 Act. The Office for Oregon Health Policy and Research shall make the reports available to the public in the manner provided in ORS 192.243 and to the Legislative Assembly in the manner provided in ORS 192.245. The first report shall be made available no later than January 1, 2010.

(2) The annual report shall, for each health care facility in the state, compare the health care acquired infection measures reported under section 3 of this 2007 Act. The office, in consultation with the Health Care Acquired Infection Advisory Committee, shall provide the information in the report in a format that is as easily comprehensible as possible.

(3) The annual report may include findings, conclusions and trends concerning the health care acquired infection measures reported under section 3 of this 2007 Act, a comparison to the health care acquired infection measures reported in prior years and any policy recommendations.

(4) The office shall publicize the annual report and its availability to interested persons, including providers, media organizations, health insurers, health maintenance organizations, purchasers of health insurance, organized labor, consumer and patient advocacy groups and individual consumers.

(5) The annual report and quarterly reports under this section and section 3 of this 2007 Act may not contain information that identifies a patient, a licensed health care professional or an employee of a health care facility in connection with a specific infection incident.

SECTION 7. ORS 442.445 is amended to read:

442.445. (1) Any health care facility that fails to perform as required in ORS 442.400 to 442.463 **or section 3 of this 2007 Act** and rules of the Office for Oregon Health Policy and Research may be subject to a civil penalty.

(2) The Administrator of the Office for Oregon Health Policy and Research shall adopt a schedule of penalties not to exceed $500 per day of violation, determined by the severity of the violation.

(3) Civil penalties under this section shall be imposed as provided in ORS 183.745.

(4) Civil penalties imposed under this section may be remitted or mitigated upon such terms and conditions as the administrator considers proper and consistent with the public health and safety.

(5) Civil penalties incurred under any law of this state are not allowable as costs for the purpose of rate determination or for reimbursement by a third-party payer.

SECTION 8. ORS 442.445, as amended by section 7 of this 2007 Act, is amended to read:

442.445. (1) Any health care facility that fails to perform as required in ORS 442.400 to 442.463 [*or section 3 of this 2007 Act*] and rules of the Office for Oregon Health Policy and Research may be subject to a civil penalty.

(2) The Administrator of the Office for Oregon Health Policy and Research shall adopt a schedule of penalties not to exceed $500 per day of violation, determined by the severity of the violation.

(3) Civil penalties under this section shall be imposed as provided in ORS 183.745.

(4) Civil penalties imposed under this section may be remitted or mitigated upon such terms and conditions as the administrator considers proper and consistent with the public health and safety.

(5) Civil penalties incurred under any law of this state are not allowable as costs for the purpose of rate determination or for reimbursement by a third-party payer.

SECTION 9. The amendments to ORS 442.445 by section 8 of this 2007 Act become operative on January 2, 2018.

SECTION 10. Except as provided in section 11 of this 2007 Act, sections 1 to 6 of this 2007 Act and the amendments to ORS 442.445 section 7 of this 2007 Act become operative on January 1, 2008.

SECTION 11. Before the operative date specified in section 10 of this 2007 Act, the Administrator of the Office for Oregon Health Policy and Research may take any action necessary to exercise the duties conferred on the administrator by sections 1 to 6 of this 2007 Act and the amendments to ORS 442.445 by section 7 of this 2007 Act on and after the operative date specified in section 10 of this 2007 Act.

SECTION 12. Sections 1 to 6 of this 2007 Act are repealed on January 2, 2018.

SECTION 13. In addition to and not in lieu of any other appropriation, there is appropriated to the Oregon Department of Administrative Services, for the biennium beginning July 1, 2007, out of the General Fund, the amount of $201,467, which may be expended for carrying out the provisions of sections 1 to 6 and 11 of this 2007 Act.

SECTION 14. This 2007 Act being necessary for the immediate preservation of the public peace, health and safety, an emergency is declared to exist, and this 2007 Act takes effect July 1, 2007.

Passed by House June 22, 2007

.....
Chief Clerk of House

.....
Speaker of House

Passed by Senate June 25, 2007

.....
President of Senate

Received by Governor:

.....M.,....., 2007

Approved:

.....M.,....., 2007

.....
Governor

Filed in Office of Secretary of State:

.....M.,....., 2007

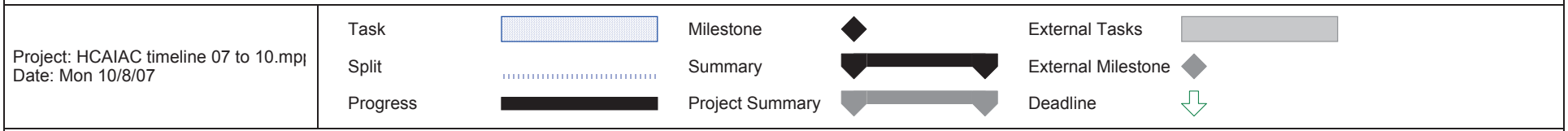
.....
Secretary of State

ID	Task Name	Duration	Start	Finish	Predecessors
1	**Administrative Rules**	**190 days?**	**Tue 10/9/07**	**Mon 6/30/08**	
2	**Prescribe HCAI to report**	**26 days?**	**Tue 10/9/07**	**Tue 11/13/07**	
3	**Outcome measures**	**26 days?**	**Tue 10/9/07**	**Tue 11/13/07**	
4	Surgical Site Infections	26 days?	Tue 10/9/07	Tue 11/13/07	
5	Central line related bloodstream infections	26 days?	Tue 10/9/07	Tue 11/13/07	
6	Urinary tract infections	26 days?	Tue 10/9/07	Tue 11/13/07	
7	Process measures	26 days?	Tue 10/9/07	Tue 11/13/07	
8	Prioritization	20 days?	Wed 11/14/07	Tue 12/11/07	3
9	Rolling reporting	20 days?	Wed 11/14/07	Tue 12/11/07	3
10	**Develop collection methodology**	**1 day?**	**Tue 1/8/08**	**Tue 1/8/08**	**9**
11	Prioritization of facility type	1 day?	Tue 1/8/08	Tue 1/8/08	9
12	**Hospitals**	**1 day?**	**Tue 1/8/08**	**Tue 1/8/08**	
13	Format	1 day?	Tue 1/8/08	Tue 1/8/08	
14	Training development	1 day?	Tue 1/8/08	Tue 1/8/08	
15	Implementation plan	1 day?	Tue 1/8/08	Tue 1/8/08	
16	**Ambulatory surgery centers**	**1 day?**	**Tue 1/8/08**	**Tue 1/8/08**	
17	Format	1 day?	Tue 1/8/08	Tue 1/8/08	
18	Training development	1 day?	Tue 1/8/08	Tue 1/8/08	
19	Implementation plan	1 day?	Tue 1/8/08	Tue 1/8/08	
20	**Long term care facilities**	**1 day?**	**Tue 1/8/08**	**Tue 1/8/08**	
21	Format	1 day?	Tue 1/8/08	Tue 1/8/08	
22	Training development	1 day?	Tue 1/8/08	Tue 1/8/08	
23	Implementation plan	1 day?	Tue 1/8/08	Tue 1/8/08	
24	**Birthing centers**	**1 day?**	**Tue 1/8/08**	**Tue 1/8/08**	
25	Format	1 day?	Tue 1/8/08	Tue 1/8/08	
26	Training development	1 day?	Tue 1/8/08	Tue 1/8/08	
27	Implementation plan	1 day?	Tue 1/8/08	Tue 1/8/08	
28	**Outpatient renal dialysis facility**	**1 day?**	**Tue 1/8/08**	**Tue 1/8/08**	
29	Format	1 day?	Tue 1/8/08	Tue 1/8/08	
30	Training development	1 day?	Tue 1/8/08	Tue 1/8/08	
31	Implementation plan	1 day?	Tue 1/8/08	Tue 1/8/08	
32	**Analysis Methodology**	**1 day?**	**Tue 3/11/08**	**Tue 3/11/08**	**10**

Project: HCAIAC timeline 07 to 10.mpp
Date: Mon 10/8/07

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline

ID	Task Name	Duration	Start	Finish	Predecessors
33	Unit of analysis	1 day?	Tue 3/11/08	Tue 3/11/08	
34	**Outcome measures**	**1 day?**	**Tue 3/11/08**	**Tue 3/11/08**	
35	Risk adjustment methods	1 day?	Tue 3/11/08	Tue 3/11/08	
36	Process Measures	1 day?	Tue 3/11/08	Tue 3/11/08	
37	**Reporting**	**1 day?**	**Tue 5/6/08**	**Tue 5/6/08**	**32**
38	Grouping methods	1 day?	Tue 5/6/08	Tue 5/6/08	
39	Update reports requirements	1 day?	Tue 5/6/08	Tue 5/6/08	
40	Annual report requirements	1 day?	Tue 5/6/08	Tue 5/6/08	
41	Rules public meetings	1 day?	Fri 5/30/08	Fri 5/30/08	37
42	Submit final rules to AG	1 day?	Mon 6/30/08	Mon 6/30/08	41
43	**Implement reporting program**	**67 days?**	**Tue 9/30/08**	**Wed 12/31/08**	**1**
44	Training facilities	1 day?	Tue 9/30/08	Tue 9/30/08	
45	Build/test/beta test reporting	1 day?	Tue 9/30/08	Tue 9/30/08	44SS
46	Finalize reporting system	1 day?	Wed 12/31/08	Wed 12/31/08	45
47	Facilities begin reporting	1 day	Thu 1/1/09	Thu 1/1/09	46
48	**Public reporting (Year 1)**	**260 days**	**Fri 12/4/09**	**Thu 12/2/10**	**47SS**
49	Annual report	1 mon	Fri 12/4/09	Thu 12/31/09	47
50	Update reporting #1	6 mons	Fri 1/1/10	Thu 6/17/10	49
51	Update reporting #2	6 mons	Fri 6/18/10	Thu 12/2/10	50
52	**Public reporting (Year 2)**	**240 days?**	**Fri 12/3/10**	**Thu 11/3/11**	
53	Annual report	1 day?	Fri 4/29/11	Fri 4/29/11	48
54	Update #1	3 mons	Fri 12/3/10	Thu 2/24/11	51
55	Update #2	3 mons	Fri 2/25/11	Thu 5/19/11	54
56	Update #3	3 mons	Fri 5/20/11	Thu 8/11/11	55
57	Update #4	3 mons	Fri 8/12/11	Thu 11/3/11	56



Health Care Acquired Infections Advisory Committee

Charter

Project Name:	Health Care Acquire Infections Reporting Program		
Project Sponsor:	Jeanene Smith, MD, MPH	Estimated Start Date:	10/9/2007
Project Owner:	Sean Kolmer, MPH	Duration:	4 years

Introduction and History

What it is?

- Creates a health care acquired infections reporting program in Oregon and the Health Care Acquired Infections Advisory Committee to advise OHPR in the development of the program.

Why are we doing it?

The U.S. Centers for Disease Control and Prevention (CDC) estimates that healthcare associated infections are one of the top ten leading causes of death in the United States.[1] In Oregon:

- The average estimated cost per stay at Oregon hospitals is approximately $32,000 higher for a patient with a healthcare associated infection compared to a patient without a healthcare associated infection.[2]
- The estimated excess Medicaid costs in Oregon for healthcare associated infections exceeded $2.4 million in 2005.[2]
- The estimated excess costs in Oregon for all payers for healthcare associated infections exceeded $15 million in 2005.[2]
- The excess costs are not explained by differences in age, gender, co morbidities, or severity of illness.[2]

[1] http://www.cdc.gov/ncidod/dhqp/hai.html
[2] http://www.oregon.gov/DAS/OHPPR/RSCH/docs/HAI111406.pdf

Objectives:

The advisory committee shall:

1. Prescribe what health care acquired infection measures that health care facilities must report, which may include but are not limited to:
    - Surgical site infections;
    - Central line related bloodstream infections;
    - Urinary tract infections; and
    - Health care facility process measures designed to ensure quality and to reduce health care acquired infections
2. Develop methods for evaluating and quantifying health care acquired infection measures that align with other data collection and reporting methodologies of health care facilities and that support participation in other quality interventions
3. Requiring different reportable health care acquired infection measures for differently situated health care facilities as appropriate
4. A method to ensure that infections present upon admission to the health care facility are excluded from the rates of health care acquired infection disclosed to the public
5. Establishing a process for evaluating the health care acquired infection measures reported and for modifying the reporting requirements over time as appropriate;
6. Establishing a timetable to phase in the reporting and public disclosure of health care acquired infection measures
7. Procedures to protect the confidentiality of patients, health care professionals and health care facility employees.

Scope of reporting program:

Who

1. All health care facilities defined in ORS 442.015 (means a hospital, a long term care facility, an ambulatory surgical center, a freestanding birthing center or an outpatient renal dialysis facility.)

When

1. First facilities start reporting in no later than January 1, 2009
2. Timetable of introducing type of facility into reporting to be determined by the committee.

How report

1. Updated release of data on biannual and then quarterly basis.
2. Annual report no later than April 31 of year.

Health Care Acquired Infections Advisory Committee

Charter

Completion Criteria:
1. Public meeting held about administrative rule. 2. Administrative rules entered into the state registry. 3. Annual Report # 1 made public no later than 1/1/2010 4. Updated, publicly accessible data available 2 time per year in 2010. 5. Annual Reports due no later than 4/31/XX. 6. Updated, publicly accessible data available 4 times per year in 2011.

Key Milestones / Deliverables:

Milestone / Deliverable	Comp. Date	Completion Criteria
Administrative Rules submitted for public comment	May 2008	Public meeting held
Administrative Rules adopted	July 1, 2008	Submitted to the AG office for registry
HCF begin to report HCAI	January 1, 2009	
First annual report	December 31, 2009	Report release by approved method
Biannual public reporting begins	January 1, 2010	Report release by approved method
Quarterly public reporting begins	January 1, 2011	Report release by approved method
Second annual report	April 30, 2011	Report release by approved method

Project Team Members	Team Role / Responsibilities
Jeanene Smith, MD, MPH	OHPR Administrator (Member for the advisory committee)
Sean Kolmer, MPH	OHPR Research & Data Manager (Lead staff)
James Oliver, MPH	OHPR Research Analyst (Lead data analyst)

Risks	Level (H,M,L)	Mitigation
Center for Medicaid and Medicare Services "never event" policy adoption on 10/1/2008	H	Unclear what impact this will have on the reporting of HCAI

Glossary:

Term		Definition
Health care facility		As defined in ORS 442.015. Means a hospital, a long term care facility, an ambulatory surgical center, a freestanding birthing center or an outpatient renal dialysis facility.
Health care acquired infection		Results from an adverse reaction to the presence of an infectious agent or its toxin; AND was not present or incubating at the time of admission to the health care facility.
Risk-adjusted methodology		A standardized method used to ensure that intrinsic and extrinsic risk factors for a health care acquired infection are considered in the calculation of health care acquired infection rates.

Acronyms

AARP: American Association of Retired Persons
AHA: American Hospital Association
AHRQ: Agency for Healthcare Research and Quality
APIC: Association for Professionals in Infection Control and Epidemiology
ASM: American Society for Microbiology
CABG: Coronary Artery Bypass Graft
CAUTI: Catheter Associated Urinary Tract Infection
CDAD: Clostridium Difficile Associated Disease
CDC-NHSN: Centers for Disease Control and Prevention-National Healthcare Safety Network
CLABI: Central Line Associated Bloodstream Infection
CMS 1533-FC: Centers for Medicare and Medicaid Services, FY 2007 Inpatient Prospective Payment System Final Rule
HQA: Hospital Quality Alliance
IHI: Institute for Healthcare Improvement
MRSA: Methicillin-Resistant Staphylococcus Aureus
NAHDO: National Association of Health Data Organizations
NQF: National Quality Forum
NSH: National Surgical Hospitals
POA: Present On Admission
SCIP: Surgical Care Improvement Project
SEIU: Service Employees International Union
SHEA: Society for Healthcare Epidemiology of America
SSI: Surgical Site Infection
VAP: Ventilator Associated Pneumonia

Measure	Type	AHA	AHRQ	APIC	ASM	CDC-NHSN	CMS 1533-FC	Hospital Compare	HQA	IHI	Joint Comm.	Leap-frog*	NQF	NSH	SHEA
Catheter associated urinary tract infection (CAUTI) rate	Outcome	No		No	No	Yes	Yes				No	Yes		Yes	No
Central line associated bloodstream infection (CLABI) rate	Outcome		Note1	Yes	No	Yes	Yes				No				Yes (note 2)
Clostridium difficile associated disease (CDAD) rate	Outcome			No	No		No				No				No
MRSA infection rate	Outcome				No		No				No	Yes			
Sepsis rate, post-procedure only	Outcome		Yes												Note 3
Staph aureus septicemia rate	Outcome	No		No	No		No				No	Yes		Yes	No
Surgical site infection (SSI) rate,all sites	Outcome		Yes		No	Note 4	No				No				No
SSI rate, CABG only (mediastinitis)	Outcome					Note 5	Yes								Yes
SSI rate, knee, colon, and heart procedures only	Outcome						No								
Ventilator associated pneumonia (VAP) rate	Outcome				No	Yes	No				No				No
SCIP Infection 1: on-time prophylactic antibiotic administration	Process						Yes	Yes	Yes	Yes	Yes		Yes		
SCIP Infection 2: appropriate selection of prophylactic antibiotic	Process						Yes	Yes	Yes	Yes	Yes		Yes		
SCIP Infection 3: prophylactic antibiotic discontinued within 24 hours after surgery	Process						Yes	Yes	Yes	Yes	Yes		Yes		
SCIP Infection 4: cardiac surgery patients with controlled perioperative serum glucose	Process						Yes	Yes	No	No	Yes	Yes	Note 6		
SCIP Infection 6: surgery patients with appropriate hair removal	Process						Yes	Yes	No	Yes	Yes	Yes	Note 6		
SCIP Infection 7: colorectal patients with immediate postoperative normothermia	Process						Yes	Yes	No	Yes	Yes	Yes	Note 6		

* - Also signed by AARP, Consumers Union, General Electric, NAHDO, National Small Business Association, SEIU, and 17 others.

Note 1: CLABI is part of Patient Safety Indicator 07 (Selected Infections Due to Medical Care).
Note 2: Support to implement in FY 2009 is contingent upon the reliability of POA coding.
Note 3: Supported if limited to a specific high-volume procedure code.
Note 4: SSI indicators essentially include all sites if aggregated.
Note 5: Not limited to CABG procedures.
Note 6: Proposed for FY 2008.

THE NATIONAL QUALITY FORUM

TO: NQF Members

FR: NQF Staff

RE: Draft Report for Comment, *National Voluntary Consensus Standards for the Reporting of Healthcare-associated Infections Data*

DA: June 28, 2007

Healthcare-associated infections (HAI) have emerged as a critical topic of interest for consumers, purchasers and those in the healthcare community. About 20 states now require healthcare providers to report infection-related data, and 16 of these states make reports on HAI rates available to the public. Various public and private purchasers and quality oversight organizations require providers to report HAI data.

The draft report is posted for your review and comment. All NQF member comments are due: **July 27, 2007 at 6:00 PM (Eastern).**

We look forward to your comments.

NATIONAL VOLUNTARY CONSENSUS STANDARDS FOR THE REPORTING OF HEALTHCARE-ASSOCIATED INFECTIONS DATA

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THE NATIONAL QUALITY FORUM

EXECUTIVE SUMMARY

Healthcare-associated infections (HAI) have emerged as a critical topic of interest for consumers, purchasers and those in the healthcare community. About 20 states now require healthcare providers to report infection-related data, and 16 of these states make reports on HAI rates available to the public. Various public and private purchasers and quality oversight organizations require providers to report HAI data.

To date, there have been very limited nationals standards for public reporting of HAI data. In the absence of widely agreed upon standards for public reporting, it will be difficult to compare or aggregate the reported data on a regional or national level. The lack of nationally agreed upon standards for reporting infection rates also increases burden on health care providers who must respond to multiple requests.

The National Quality Forum (NQF) is a private sector, national consensus standards setting organization recognized under the National Technology Transfer and Advancement Act. NQF-endorsed performance measures are the measures of "first choice" by federal government and are widely used by state governments, private sector purchasers, quality oversight organizations and others.

This project presents the results of a 15-month project to evaluate and identify "best in class" performance measures for HAI. The project was guided by a Steering Committee and assisted by six Technical Advisory Panels focused on: 1) Intravascular Catheters and Bloodstream Infections; 2) Indwelling Catheters and Urinary Tract Infections; 3) Surgical Site Infections; 4) Ventilator and Respiratory Infections; 5) Pediatric; and 6) Reporting and Implementation Issues.

The report includes 11 recommended measures falling into the five clinical areas as outlined in the table below. Although no suitable measures addressing urinary catheter-associated infections were identified, providers are encourage to adhere to the Centers for Disease Control and Prevention (CDC) guidelines for catheter use including automatic stop orders.

Intravascular Catheter-Associated Bloodstream Infections	
HAI-01	Central Line-associated Blood Stream Infections *Previously endorsed in NQF Hospital Care 2003*[1]
HAI-02[2]	Central Line Bundle Compliance
Surgical Site Infections	
HAI-03	Surgical Site Infection Rate

[1] NQF. *National Voluntary Consensus Standards for Hospital Care: An Initial Performance Measure Set.* Washington, DC: NQF; 2003.

[2] Aligns with NQF-endorsed ™Safe Practices 20 and 22

HAI-04	Prophylactic Antibiotic Received Within One Hour Prior to Surgical Incision *Previously endorsed in NQF Hospital Care 2003*
HAI-05	Prophylactic Antibiotic Selection For Surgical Patients *Previously endorsed in NQF Hospital Care 2003*
HAI-06	Prophylactic Antibiotics Discontinued Within 24 Hours After Surgery End Time (48 hours for CABG and other Cardiac Surgery) *Previously endorsed in NQF Hospital Care 2003*
HAI-07	Cardiac Surgery Patients with Controlled 6AM Postoperative Serum Glucose
HAI-08	Surgery Patients With Appropriate Hair Removal
Catheter-Associated Urinary Tract Infections[3]	
* *See research recommendations below*	Safe Practices for Urinary Catheter Care
Ventilator-associated Pneumonia and Respiratory Illness	
HAI-09	Ventilator Bundle[4]
HAI-10	Number of Healthcare Personnel who receive Influenza Vaccination
Healthcare-Associated Infections in Pediatric Populations	
HAI-11A	Late Sepsis Or Meningitis In Neonates
HAI-11B	Late Sepsis Or Meningitis In Very Low Birth Weight (VLBW) Neonates

Twelve research and development recommendations are included, three of which were considered high priority and should be addressed quickly. Those include: identification of ways to enhance inter-rater reliability of the ventilator-associated pneumonia rate measure; review and updating of the catheter-associated urinary tract infection definition and rate measure; and revision of specifications for measures relevant to the pediatric population. In addition, the report provides a set of principles and guidance for the public reporting of HAI data.

[3] Although no measures evaluated by the Catheter-associated Urinary Tract Infections TAP were advanced for endorsement, Safe Practices for Urinary Catheter Care, a proposed practice for incorporation into the NQF Safe Practices, is included in this table because it was identified by the TAP and Steering Committee as an evidence-based intervention that could be implemented immediately to improve catheter care processes and reduce unnecessarily prolonged catheterization, two significant risk factors for infection.

[4] Aligns with NQF-endorsed ™ Safe Practices 19

NATIONAL VOLUNTARY CONSENSUS STANDARDS FOR REPORTING OF HEALTHCARE-ASSOCIATED INFECTIONS DATA

INTRODUCTION

Healthcare-associated infections (HAIs) are a serious public health issue in the United States. HAIs are the most common complication affecting hospitalized patients, with between 5 and 10 percent of inpatients acquiring one or more infections during their hospitalization.[5] An estimated 2 million HAIs occur each year in the United States, accounting for an estimated 90,000 deaths and adding $4.5 to $5.7 billion in healthcare costs.[6,7]

The risk of contracting a healthcare-associated infection is of great concern to providers, consumers, and purchasers of healthcare. As a result, there has been a growing demand for public reporting of HAI data. To date, sixteen states have enacted legislation mandating public reporting of infection rates; two states require infection rates be reported but not publicly released; and two states require reporting of other infection-related information. Of the remaining states, all but five have introduced but have not yet enacted legislation to measure HAIs.[8]

Although hospitals and other healthcare facilities routinely collect data on HAIs, these data are used to track internal performance over time, to analyze institution-specific quality improvement, and to monitor infection trends for public health surveillance—not to compare rates of infection among facilities. Because methods for diagnosis and data collection on HAIs vary among institutions, the validity of data comparisons between facilities or across geographic areas is questionable. Through endorsed national standards for HAI measurement, states and other organizations gain a valuable resource for implementing nationally comparable standards rather than separate, potentially discordant measurement efforts, and consumers gain access to uniformly reported data that is reliable and useful for decision-making.

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[5] Weinstein RA. Nosocomial infections update. *Emerg Infect Dis* 1998;4:416--20.
[6] Weinstein RA. Nosocomial infections update. *Emerg Infect Dis* 1998;4:416--20.
[7] Stone PW, Larson E, Kawar LN. A systematic audit of economic evidence linking nosocomial infections and infection control interventions: 1990-2000. *Am J Infect Control* 2002;30:145-152.
[8] Consumers Union: Stop Hospital Infections Campaign. Available at: http://www.consumersunion.org/campaigns/learn_more_background/003544indiv.html .Last accessed April 13, 2007.

NATIONAL VOLUNTARY CONSENSUS STANDARDS FOR HEALTHCARE-ASSOCIATED INFECTIONS

This report presents a set of national voluntary consensus standards for HAIs, including a framework for measurement and public reporting, 11 evidence-based performance measures, and 11 recommendations for measure development and research in the following clinical priority areas:

- Intravascular catheter associated bloodstream infections (BSI)
- Surgical site infections (SSI)
- Catheter-associated urinary tract infections (CAUTI)
- Ventilator-associated pneumonia (VAP) and respiratory illnesses
- Healthcare-associated infections in pediatric populations

Relationship to Other NQF-Endorsed™ Consensus Standards

This report does not represent the first foray into measurement of HAIs; metrics of infections and infection prevention processes appear in NQF-endorsed™ measure sets addressing nursing care[9], nursing home quality[10], cardiac surgery[11], and hospital care. [12] In all, nine measures of healthcare-associated infection have been previously endorsed through the NQF process, as shown table below.

Previously Endorsed Measures

Measure Title	Project (s) in which the measures was endorsed
Post-operative Sepsis	Nursing-Sensitive Care
Central Line Catheter-associated Bloodstream Infection Rate for Intensive Care Unit (ICU) Patients	Nursing-Sensitive Care Hospital Care Project
Urinary Catheter-associated Urinary Tract Infection (UTI) for ICU Patients	Nursing-Sensitive Care Hospital Care
Prophylactic antibiotic received within one hour prior to surgical incision	Hospital care
Prophylactic Antibiotic Discontinued Within 24 Hours After Surgery End (48 ours for coronary	Hospital Care

[9] NQF. *National Voluntary Consensus Standards for Nursing-Sensitive Care: An Initial Performance Measure Set.* Washington, DC: NQF; 2004.
[10] NQF. *National Voluntary Consensus Standards for Nursing Home Care.* Washington, DC: NQF; 2004.
[11] NQF. *National Voluntary Consensus Standards for Cardiac Surgery.* Washington, DC: NQF; 2004.
[12] NQF. *National Voluntary Consensus Standards for Hospital Care: An Initial Performance Measure Set.* Washington, DC: NQF; 2003.

Measure Title	Project (s) in which the measures was endorsed
artery bypass graft (CABG) and other Cardiac Surgery	
Prophylactic Antibiotic Selection for Surgical Patients	Hospital Care
Deep Sternal Wound Infection	Cardiac Surgery
Ventilator-associated Pneumonia rates in ICU and High Risk Nursery Patients	Nursing-Sensitive Care Hospital Care

Other Previously Endorsed Measures

Other national voluntary consensus standards have been endorsed to identify best practices of infection prevention and to spur reporting of adverse outcomes resulting from HAIs. *Safe Practices for Better Healthcare: 2006 Update*[13] presents 30 practices that should be universally utilized to reduce the risk of harm to patients; five of these practices are specific to HAIs, and three of the five (i.e., Safe Practice 19: Aspiration and Ventilator Associated Pneumonia Prevention, Safe Practice 20: Central Venous Catheter Associated Bloodstream Infection Prevention, and Safe Practice 21: Surgical Site Infection Prevention) correspond directly to priority areas for measurement identified in this report. These initiatives, along with the performance measures, recommendations, and framework detailed in this report, promote safer, higher-quality patient care and facilitate meaningful, transparent public reporting of HAIs.

Identifying the Initial Set

An NQF Steering Committee (Appendix D) outlined the initial approach to identify, evaluate and recommend measures for endorsement. This approach included defining a specific purpose and scope for performance measures and screening the candidate standards against NQF criteria for selection of standards (Box A). In some instances, the Steering Committee requested that the Technical Advisory Panel (TAP) for a given priority area make recommendations for defining the scope of measurement within that topic (see the Commentary, Appendix B, for further information on Steering Committee and TAP deliberations).

[13] NQF. *Safe Practices for Better Healthcare: 2006 Update*. Washington, DC: NQF; 2007.

For the purposes of this report, the Steering Committee has defined healthcare-associated infections as an infection that develops in a patient who is cared for in any setting where healthcare is delivered and that originates from the delivery of health care (i.e., was not incubating or present at the time healthcare was provided). In ambulatory and home settings, the term 'healthcare-associated infection' would apply to any infection that is associated with a medical or surgical intervention. Since the geographic location of infection acquisition is often uncertain, the preferred term is considered to be 'healthcare-associated' rather than 'healthcare-acquired'.

Purpose

The purpose of this project is to endorse a set of national consensus standards that promote consistent definitions, language and methodology relevant to surveillance and reporting data on infections and that result in information that is useful to the public for making health care choices and are efficient to the health care community for reporting and continuous improvement of infection prevention processes.

Scope

The scope of this project encompasses performance measures to be used across the spectrum of outpatient and inpatient settings, including, but not limited to: dialysis units, trauma centers, ICUs, specialty units, rehabilitation centers, emergency rooms, ambulatory surgical units, hospitals, long-term care, and home health settings. All relevant patient populations, including pediatrics, maternal/perinatal, and immunocompromised patients, should be considered in evaluation of measures' usability. Endorsed measures appropriate for accountability and public reporting and measurement should be at the provider or institution level. To ensure that measures are appropriate for accountability, community-level measurement, community acquired infections, and assisted living facility settings are excluded from the scope.

Priority Areas for Measurement and Reporting

Clinical priority areas for measurement were selected based on the incidence of the relevant infection, the severity of its impact on patient morbidity and mortality outcomes, and the resource burden it places on health systems. TAPs were convened to address measurement in each of these four priority areas:

- intravascular catheters and bloodstream infections;

- surgical site infections;
- indwelling urinary catheters and urinary tract infections; and
- ventilator associated pneumonia and respiratory illness.

A fifth clinical TAP was convened to evaluate how measurement in each of these four clinical areas could be applied to the pediatric population, and a sixth TAP, Reporting and Implementation, was convened to provide guidance and recommendations for measurement implementation in all areas and to develop a framework for public reporting of HAI data.

Identifying Candidate Standards for Evaluation

Candidates for evaluation were identified through several complementary strategies:

- Open solicitation of measures through NQF's "Call for Measures" process. From February 17, 2006 to March 17, 2006, the "Call" was distributed through the following avenues:
  - posted on NQF's website;
  - emailed to NQF's members, all project Steering Committee and TAP members; and
  - emailed to more than 1,300 individuals requesting to be kept apprised of NQF activities.
- Review of NQF-endorsed™ measures and other related, ongoing NQF consensus work to identify infection measures within these other efforts.
- Active search of additional candidate standards from the Agency for Healthcare Research and Quality's (AHRQ) National Quality Measures Clearinghouse and literature searches.

Criteria for Selection of Standards

Standards were evaluated against the criteria derived from the work of the NQF Strategic Framework Board and endorsed by NQF (Box A). The following important measure characteristics were also considered in the selection of potential consensus standards:

- measures that are relevant to identified priority areas;
- measures that address vulnerable populations;
- measures addressing all relevant populations;
- measures resulting in possible negative incentives or unintended consequences;

- clarity and completeness of measure specifications;
- measures that have been pilot tested, validated, or already in use; and
- measures addressing high variation, including overuse and underuse.

The following principles also guided the selection of consensus standards:

- measures of outcomes are of highest priority; process measures shall be considered secondarily; process measures used should be those that have been shown to be linked to the desired outcomes;
- the focus of the measures is primarily accountability as a driver of quality improvement; and
- measures should reflect an aspect of care substantially influenced by established practices of infection prevention.

Box A: Criteria for Evaluation and Selection of Measures

1.Important – the extent to which a measure reflects a variation in quality, low levels of overall performance and represents a significant burden of disease, suffering or financial costs
2. Scientifically Acceptable – the extent to which the measure consistent and credible results when implemented.
3. Useable – the extent to which intended audiences (e.g., consumers, purchasers, providers) can understand the results of the measure and are likely to find them helpful for decision making.
4. Feasible – is generally based on the way in which data can be obtained within the normal flow of clinical care and the extent to which an implementation plan can be achieved.

Ongoing Improvement of Initial Measure Set

This is an initial measure set. As new information becomes available and measure developers continue crafting and improving current measures related to HAIs, new measures will be considered for inclusion in the measure set; updates to those already endorsed will also be reviewed for the set.

PRINCIPLES FOR PUBLIC REPORTING OF HEALTHCARE-ASSOCIATED INFECTIONS DATA

The following principles for public reporting of HAI data outlines recommendations that address issues relevant to both the facility collecting data for measurement and the program reporting data to the public. The majority of measures used for tracking HAI were originally intended for surveillance by healthcare professionals rather than for public reporting, rating of performance and consumer use, the difference being the level of precision in specifications that are preferred for measures to compare performance. Most current HAI measures and reporting programs for accountability are in the earliest stages of development. Implementing initial measures within a carefully designed reporting program will facilitate continued improvement of current measures, identify gaps for future measure development, hone strategies for implementation, and improve the effectiveness of public reports.

Item 1: Principles for Public Reporting of HAI Data

As voluntary and mandatory public reporting programs gain in number, certain principles have emerged that should act as a framework for developing reporting programs that includes elements that programs should plan to incorporate as they gain experience in reporting and seek to continuously improve their reports. For example, the principle of risk-adjustment to support performance comparisons acknowledges that while this is the ideal, risk adjustment is still in its nascence in reporting HAIs but should be explored without preventing or stopping current reporting efforts. Overall, programs for reporting HAI data should encompass the following:

1. **Metrics should be chosen that are fully specified and generally accepted.**
    - *Measures should be applicable across care settings and should assign accountability appropriately.* Measures should be useful in all care settings where patients are at risk of infection and should take into account transitions between settings when assigning accountability.
    - *Measures should rely on feasible and reliable data sources.* Data sources should be valid, yet feasible and usable for collection. ICD-9 codes are an appealing data source due to low

resource burden, but the validity of administrative data for identifying HAIs must be demonstrated before these databases can be used as the sole source of HAI.[14,15]

- *Measures should not create unintended consequences or negative incentives.* Inclusions and exclusions should not create the opportunity for providers to not report relevant cases, which would result in underreporting of infection rates. Similarly, measures of compliance should provide the practitioner with discretion if practices are not in the patient's best interest, e.g., measures of antibiotic use, should not promote over (or under)-prescription of antibiotic agents. Additionally, certain groups of very high risk patients should not be refused treatment based on the likelihood of having increased rates of HAIs.
- *Measures should be reported using risk stratification, where appropriate.* Risk of infection can vary by patient population, the type of care (e.g., surgical vs. medical), the type of healthcare facility or unit within the facility. Further, risk can be amplified by comorbid conditions, immune status, medication use, or the patient's physiology. Adequate risk adjustment ensures that variations in quality are not obscured by variations in risk. While no risk adjuster is currently adequate for programs to implement, programs must compare denominators of similar risk (e.g., compare large academic centers to large academic centers, ICU data to ICU data). As risk adjusters are validated by investigators in the field and become available, programs should have strategies to incorporate them as an improvement to their reporting programs.
- *Measures should be included to address antimicrobial resistance.* When appropriate, include measures to monitor antimicrobial resistant infections and to assess the effectiveness of practices to prevent their transmission. Rates of resistant infections should only be reported with sufficient risk adjustment. Thus, trends in HAIs caused by antimicrobial resistant bacteria will be apparent within each category of HAIs.

2. Those who collect and report data should assist providers in achieving a common understanding of their roles and responsibilities in measurement.

[14] Stone PW, Horan TC, Mooney-Kane C et al. Comparisons of health care-associated infections indentification using two mechanisms for public reporting. *Am J Infect Control* 2007 Apr;35(3):145-9.
[15] Romano PS Chan BK Schembri ME et al. Can administrative data be used to compare postoperative complication rates across hospitals? *Med Care*: 2002 Oct;40(10):856-67.

- *Provide clear guidance for interpretation of measure specifications to increase accuracy of reporting.* When designing a measurement and reporting program, consideration should be given to how interpretation of the measure can affect the validity of results. For example, specifications that rely on clinical judgment as a criterion may yield highly variable data. Providers should receive clear instruction on HAI case finding and definitions as they pertain to measurement.
- *Educate data abstractors on the appropriate data collection methodologies for infection measurement.* Those given the responsibility to abstract HAI data should be trained in identifying infection data and collecting these data. Without clear guidance on how data should be collected, what data should be collected and the importance, different levels of effort and variation in interpreting specifications between institutions could artificially affect reported infection rates. Studies have shown that there is significant variation in the quality and completeness of data collected between abstractors with no or little training and those with training.[16] In most healthcare facilities, trained infection control professionals (ICPs) are the most skilled and provide the most accurate data; however, for smaller programs that do not have an ICP on site, access to this expertise and comprehensive training through consultation or collaboration could facilitate more accurate data collection.
- *The collection time frame should be appropriate to the anticipated infection rate.* Surgical site infection rates require a 30 day follow-up and a 1 year follow-up if prosthetic material is placed during the procedure. Healthcare-associated infections with low incidence rates will require longer data collection time frames. The minimum number of time units (e.g., annual, monthly, weekly) for data collection should be clear and should take into consideration that some programs or institutions may need longer time frames to collect a minimum number of cases.
- *Transitioning to electronic surveillance methodologies will bring greater consistency to data collection.* The use of electronic case finding and surveillance systems can reduce inconsistency in data collection and reduce burden on staffing; however, any implemented measures should yield the same results regardless of data collection

[16] Sherman ER, Heydon KH, St. John KH et al. Administrative data fail to accurately identify cases of healthcare-associated infection. *Infect Control Hosp Epidemiol* 2006;27:332-337.

methodology and should be overseen by trained infection control professionals and health epidemiologists.

- *Participation in measurement is valuable for all institutions.* The minimum number of cases in the denominator should not discourage programs that fall below the threshold from collecting or submitting data for surveillance or quality improvement

3. **Evaluation of the measurement and reporting process—metric definition, data collection, analysis, and reporting—should be occur at regular intervals.**
   - *Adopt an auditing / verification strategy for reported data as standard practice***.** Public reporting programs (state-mandated or voluntary) should pursue third-party verification of submitted data. Auditing/verification improves the accuracy of results, reduces the risk of "gaming the system" for self-reported measures, and increases public trust in reported data. For example, New York State which began data collection of infections in January 2007 for public reporting in 2008 has incorporated mandatory data audits into its reporting program.
   - *As programs evolve, the benefits of public reporting should be evaluated.* The effects of the reporting program should be assessed to determine its utility to consumers, its impact on clinical outcomes and practices, and whether reductions in HAIs and associated costs have been achieved.

4. **Those who report rates for comparison across providers have the responsibility to explain to users the reliability of reported data and the uses that the achieved degree of reliability will support.**
   - *Include potential users in development of reporting programs.* Include a diverse team of stakeholders—particularly consumers and purchasers and individuals with expertise and experience in healthcare epidemiology/infection control—in program development to ensure the usability and accessibility of the reported information.
   - *Consider the end user when developing and selecting metrics.* Experience suggests that patients prefer summary measures; for example, a composite measure of all infection prevention measures and scope of the infection control program for a provider (facility)

could convey to consumers the level of effort on the part of the provider to prevent infections.

- *Consider the readability and interpretability of public reports.* Publicly reported data should be displayed in a manner that is in plain clear language for the public and provides information on how the data are to be used and interpreted.
- *Reliability of data and the uses that the degree of reliability will support should be communicated in reports.* In reports of data, the statistical methodology, level of precision (e.g., width of confidence intervals, when applicable), the risk adjustment and comparability of population being measured, and the extent to which results are predictive of quality of care should be made transparent to users.

5. **Reporting programs should rely on carefully constructed statistical methodologies appropriate to the measurement of HAIs.**

- *Differences in sample sizes between institutions should be considered when analyzing data and designing reports.* The volume of procedures that result in infection may be as important a consideration as the rates of infection when evaluating performance. For example, two hospitals may have the same 10% rate of infection resulting from hip replacements, but one facility may perform ten times as many procedures as the other.

- *As we move towards the goal of zero infections, consider "best in class" for comparative statistic.* In the early stages of measurement and quality improvement, zero percent infection rates may not be attainable; the use of "best in class" (i.e., an external benchmark) for reporting is the appropriate approach to drive quality improvement at this time. For measures of adherence to safe or best practices, 100% compliance should be the goal.

PERFORMANCE MEASURES FOR HEALTHCARE-ASSOCIATED INFECTIONS

The measure set for HAIs consists of 11 performance measures that will facilitate quality improvement efforts to improve infection outcomes in the identified priority areas. Although no measures addressing catheter-associated UTIs were advanced for endorsement, a recommendation for a practice requiring adherence to CDC guidelines of catheter care and use of automatic stop orders for catheters was identified as an intervention that could be

implemented to address quality of care in this area until suitable metrics are developed.[17] Table 1 presents the names of each recommended measure; four of these measures have been previously endorsed in other NQF consensus reports. Because consensus standards must be consistently specified to meet the goal of standardization, detailed measure specifications are provided in Appendix A. Members of the Steering Committee and TAPs were struck by the very limited number of fully suitable measures across all categories of HAIs; recommendations for measure development and research to address these gaps are outlined in the next report section.

[17] An AHRQ 2007 Technical Review identified reduction in unnecessary catheter use, aseptic insertion and catheter care, and hand hygiene as key preventive interventions for CAUTI. Based on reviewed studies, reminders to clinicians appear to be effective at reducing unnecessary catheter usage, particularly when reminder systems incorporate mandated discontinuation of the catheter after a specific time period. Available at http://www.ahrq.gov/downloads/pub/evidence/pdf/qualgap6/hainfgap.pdf Last accessed April 12, 2007.

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380 **TABLE 1—MEASURE LIST**

MEASURE NUMBER	MEASURE NAME	IP OWNER
Intravascular Catheter-Associated Bloodstream Infections		
HAI-01	Central Line-associated Blood Stream Infections *Previously endorsed in NQF Hospital Care 2003*[18]	CDC
HAI-02[19]	Central Line Bundle Compliance	IHI
Surgical Site Infections		
HAI-03	Surgical Site Infection Rate	CMS/CDC
HAI-04	Prophylactic Antibiotic Received Within One Hour Prior to Surgical Incision *Previously endorsed in NQF Hospital Care 2003*	CMS/Joint Commission
HAI-05	Prophylactic Antibiotic Selection For Surgical Patients *Previously endorsed in NQF Hospital Care 2003*	CMS/Joint Commission
HAI-06	Prophylactic Antibiotics Discontinued Within 24 Hours After Surgery End Time (48 hours for CABG and other Cardiac Surgery) *Previously endorsed in NQF Hospital Care 2003*	CMS/Joint Commission
HAI-07	Cardiac Surgery Patients with Controlled 6AM Postoperative Serum Glucose	CMS/Joint Commission
HAI-08	Surgery Patients With Appropriate Hair Removal	CMS/ Joint Commission
Catheter-Associated Urinary Tract Infections[20]		
* *See research recommendations below*	Safe Practices for Urinary Catheter Care	Not Applicable
Ventilator-associated Pneumonia and Respiratory Illness		
HAI-09	Ventilator Bundle[21]	IHI

[18] NQF. *National Voluntary Consensus Standards for Hospital Care: An Initial Performance Measure Set.* Washington, DC: NQF; 2003.

[19] Aligns with NQF-endorsed ™Safe Practices 20 and 22

[20] Although no measures evaluated by the Catheter-associated Urinary Tract Infections TAP were advanced for endorsement, Safe Practices for Urinary Catheter Care, a proposed practice for incorporation into the NQF Safe Practices, is included in this table because it was identified by the TAP and Steering Committee as an evidence-based intervention that could be implemented immediately to improve catheter care processes and reduce unnecessarily prolonged catheterization, two significant risk factors for infection.

MEASURE NUMBER	MEASURE NAME	IP OWNER
HAI-10	Number of Healthcare Personnel who receive Influenza Vaccination	CDC
Healthcare-Associated Infections in Pediatric Populations		
HAI-11A	Late Sepsis Or Meningitis In Neonates	Vermont Oxford Network
HAI-11B	Late Sepsis Or Meningitis In Very Low Birth Weight (VLBW) Neonates	Vermont Oxford Network

RECOMMENDATIONS FOR RESEARCH AND MEASURE DEVELOPMENT

Gaps in available metrics and supporting research were identified in all clinical priority areas; recommendations for measure development and research to supplement the endorsed set are listed below. *The significant need for measure development and supporting research was most striking in the urinary tract infection, pediatric infection, and ventilator-associated pneumonia priority areas.* Further research and measure development in these specific areas should be prioritized.

Recommendation 1: Blood Stream Infections Measure Development

- Develop measures that assess compliance with proper line maintenance procedures. Appropriate maintenance of central lines provides critical leverage for reducing healthcare-associated blood stream infections.
- Develop measures to monitor central line insertions, including data on which inserter places each line, number of insertions for each inserter, the time of the insertion (i.e., time of day and time of year), the patient body mass index (BMI), number of qualified central lines inserters available, whether training is current, and whether established protocols are followed.
- Develop measures of BSI rates that track infections identified after hospital discharge. Pediatric TAP members recommended measures be developed to address central line-associated BSI measures that track infection rates after hospital discharge, since pediatric catheters are often managed in home or community settings.
- Modify the IHI Central Line Bundle to discourage femoral vein insertion in those over 18 years of age

[21] Aligns with NQF-endorsed ™ Safe Practices 19

Recommendation 2: Research to Support Measurement of Blood Stream Infections

- Develop standard care practices for collecting and culturing patient samples. Methods used to collect blood samples may vary between hospitals for the following reasons: samples are often drawn through catheters, which may introduce contaminants; two samples may be obtained from the same draw, rather than at separate occurrences, as recommended; or the frequency of blood draws performed for culture and the reasons for drawing them might be different across institutions. It is important to obtain blood from all ports of all catheters and peripherally and to track time to positivity when available. Also, frequency of line entry should be limited whenever possible.
- Evaluate how lapses in maintenance of intravascular catheters contribute to the risk of developing bloodstream infections.
- Identify guidelines that specify appropriate situations for inserting lines into femoral veins. Frequency of femoral line insertions should be monitored and a benchmark should be established to determine if rates are too high.
- Evaluate the appropriateness of using "central line days" as a denominator calculating catheter-related bloodstream infection rates.
- Implement more efficient mechanisms to count catheter days. Evidence suggests that counting catheter days one time per week has a high degree of validity for denominator data, which would lessen the data collection burden.[22]
- Standardize methods for categorizing ICU groups. While stratification by ICU is an appropriate mechanism to adjust for risk of catheter-related blood stream infections, ICU categorization should be standardized between hospitals.

Recommendation 3: Surgical Site Infections Measure Development

- Develop a composite measure comprised of the three surgical care infection prevention measures (HAI-04, HAI-05, HAI-06) addressing appropriate antibiotic use for surgical patients.

[22] Klevens RM, Tokars JI, Edwards J, et. Al. Sampling for collection of central-line day denominators in surveillance of healthcare-associated bloodstream infections. *Infect Control Hosp Epidemiol*. 2006;27(4):338-42.

- Develop additional surgical site infection measures based on the recommendations with the highest evidence (i.e., level A-1 and A-2 evidence) from the Healthcare Infection Control Practices Advisory Committee (HICPAC) guidance on HAI reporting.[23]
- Modify surgical site infection measures to include patients less than 18 years of age, with the following considerations: antibiotic timing should be consistent with care policies that allow parents to be present during anesthesia induction, and, for children, antibiotic timing prior to surgery should be 30 minutes to one hour prior to the procedure and administration should be completed prior to incision.
- Develop an outcome measure of SSI that includes infections identified through readmissions to capture infections that manifest post-discharge.
- Develop a reliable system for 30-day post-discharge surveillance and 1 year post discharge surveillance when prosthetic material is placed during the procedure.
- Measures should be constructed with exclusions to to address temporary shortages of antibiotics that prevent compliance.

Recommendation 4: Research to Support Measurement of Surgical Site Infections

- Research is needed on risk stratification methods and risk adjustment related to surgical site infections, particularly with regard to co-morbidities and severity of illness at the time of surgery.
- Conduct additional research on the feasibility, reliability and validity of the proposed surgical site infection measures.
- Additional research is needed to identify opportunities for measurement of SSI resulting from procedures in the ambulatory setting.
- Research is needed to identify additional procedures that could be included in the SSI outcomes measure.
- Research is needed on the rate at which surgical patients are readmitted with serious infection at hospitals other than the one where they had their original procedure. In addition, research is needed to determine the validity and reliability of capturing deep

[23] McKibben L, Horan T, Tokars JI, et al. Guidance on Public Reporting of Healthcare-Associated Infections: Recommendations of the Healthcare Infection Control Practices Advisory Committee. American Journal of Infection Control; 33(4):217-226.

incisional and organ/space SSIs upon readmission in general, as well as the proportion of infections diagnosed after discharge within 30 days after the procedure and 1 year after procedures where prosthetic material is placed permanently.

Recommendation 5: Incorporate Best Practices of Urinary Catheter Care into the NQF-endorsed™ Safe Practices for Better Healthcare

Incorporate into the NQF-endorsed Safe Practices™ a practice that includes the following specifications:

- Adhere to Centers for Disease Control and Prevention guidelines for urinary catheter care.
- Implement a written or computer-based reminder system that includes "automatic stop orders" for catheters and regular reminders or prompts to assess catheter status.
- Obtain a urine culture before initiating antimicrobial therapy for UTI in a patient with a urinary catheter.

Recommendation 6: Catheter-Associate Urinary Tract Infections Measure Development Develop measures to assess urinary catheter utilization strategies, such as risk-adjusted rates of utilization.

- Develop measures to assess appropriateness of initial catheterization, such as proportion of catheterized patients with order for insertion documented in the patient record.
- Develop measures to assess appropriateness of continued catheterization, such as frequency with which rationale for continued catheterization is documented in patient record.
- Develop measures to assess the appropriateness and timeliness of catheter removal, such as existence of automatic stop orders for catheters.
- Develop measures to assess compliance with best practices of catheter insertion and care, such as whether institutions have programs in place to train and support caregivers in compliance with best practices.

Recommendation 7: Research to Support Measurement of Catheter-Associated Urinary Tract Infections

- Pursue research to define CAUTI outcomes with a high degree of sensitivity and specificity and to establish a methodology for risk adjustment.
- Pursue research to clarify appropriate indications for catheter use and best practices for catheter care and maintenance, including research to update CDC guidelines; to provide further information about the risks and benefits of new catheter materials and alternative catheterization strategies; and to expand knowledge of the pathogenesis, microbiology, and diagnosis of CAUTI.

Recommendation 8: Ventilator-associated Pneumonia Measure Development

- Develop an outcome measure based on a definition that requires laboratory results (e.g., histopathological exams, semi-quantitative and quantitative cultures, etc), clinical criteria and radiology results consistent with VAP.
- Develop a measure to assess appropriateness of ventilator weaning.
- Develop a measure to evaluate whether antibiotic therapy administered to ventilated patients was appropriate for the organism identified in cultures.
- Develop measures to identify VAP in patients with Acute Respiratory Distress Syndrome (ARDS).

Recommendation 9: Research to Support Measurement of Ventilator-associated Pneumonia

- Evaluate the benefit of including oral care practices and the appropriate frequency of oral care practices in the VAP bundle.
- Trained Infection Control Practitioners or Hospital Epidemiologists, with experience in VAP diagnosis and data abstraction should be responsible for collecting and reporting VAP data. **NOTE**: This was particularly recommended for collecting VAP data, since diagnosis is difficult, but may be relevant for other priority areas.
- Define and measure healthcare-associated pneumonia (HCAP); while VAP is a subset of HCAP, the incidence of HCAP independent of ventilator use is unknown.
- Additional research is needed to determine how frequently blood cultures, pleural fluid growth, and semi-quantitative cultures are used to diagnose VAP.

- Additional research is needed on the utility of elastin fiber (a marker for VAP) detection in lower lung aspirates using potassium hydroxide preparation as a diagnostic tool to identify bacterial VAP.
- Develop methods to assess readiness to extubate in very low birthweight (VLBW) infants. Currently, assessing readiness to extubate in VLBW infants cannot be accurately and reliably evaluated unless a pediatric radiologist is present.
- Evaluate the effectiveness of stress ulcer disease/peptic ulcer disease prophylaxis in preventing VAP.
- Additional research is needed on organisms that cause VAP in children.

Recommendation 10: Pediatric Infections Measure Development

- Develop measures to monitor antimicrobial therapy, including tracking the frequency of appropriate initial selection, duration of agent/therapy, and number of courses given for positive cultures that may be contaminants (e.g., appropriate selection and use of vancomycin).
- Develop outcome measures for healthcare-associated viral infections relevant to pediatrics, including rates of respiratory and GI infections (no symptoms on admission with symptoms manifesting 72+ hours after admission) and rates of worker viral infections compared with patient infection rates.
- Develop SSI outcome measures that include implantable devices, surgery to correct congenital heart conditions, ventriculoperitoneal shunts, scoliosis corrections, and infections resulting from circumcision in the numerator.
- Develop central line-associated BSI measures that track infection rates after hospital discharge, since pediatric catheters are often managed in home or community settings.

Recommendation 11: Research to Support Measurement of Pediatric Infections

- Research is needed to identify appropriate uses of chlorhexidine for cutaneous antisepsis for neonates less than two months of age and to identify if current practices are evidenced-based.

- The endorsed "VAP bundle" measure includes deep vein thrombosis prophylaxis, but its relevance to children is not clear; more research is needed on the incidence of DVT in this population.
- Research is needed regarding the significance of *C. difficile* infections in the pediatric population.
- Research is needed regarding the definition of VAP in children and appropriate prevention strategies.

Recommendation 12: Research to Determine Disparities in HAI Rates and Management

- Research is needed to identify any disparities related to race/ethnicity and gender that are not related to access.
- Evaluation of the validity of reporting infections by race/ethnicity and gender should be performed if research shows that disparities do exist.

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APPENDIX A—SPECIFICATIONS OF THE NQF-ENDORSED™ PERFORMANCE MEASURES FOR HEALTHCARE-ASSOCIATED INFECTIONS

NUMBER	MEASURE NAME	SOURCE	NUMERATOR	DENOMINATOR	EXCLUSIONS AND ADJUSTMENTS	DATA SOURCE
Intravascular Catheter-Associated Bloodstream Infections						
HAI-01	Central Line-associated Blood Stream Infections[1,2,3]	Centers for Disease Control and Prevention (CDC)	Number of Catheter-Associated Infections, defined as follows: • Vascular access device that terminates at or close to the heart or one of the great vessels. An umbilical artery or vein catheter is considered a central line. • BSI is considered to be associated with a central line if the line was in use during the 48-hour period before development of the BSI. If the time interval between onset of infection and device use is >48 hours, there should be compelling evidence that the infection is related to the central line. Laboratory-confirmed bloodstream infection (LCBI) must meet at least one of the following criteria: Criterion 1. Patient has a recognized pathogen cultured from one or more blood cultures and organism cultured from blood is not related to an infection at another site Criterion 2. Patient has at least one of the following signs or symptoms: fever (.38° C), chills, or hypotension and at least one	Number of central-line days in each population at risk, per 1,000, stratified by ICU-type • For ICU locations, the number of patients with one or more central lines is collected daily, at the same time each day, summed at the end of the month and reported • For NICU locations, the number of patients with non-umbilical central lines and those with umbilical central lines are collected daily, at the same time each day. If a patient has both an umbilical and a non-umbilical line, only the umbilical is counted. NICU lines are further stratified by birthweight category:	CDC Definitions that are not used: • Clinical Sepsis (CSEP) in adults and children (only for patients < 12 months old) • LCBI criteria 2b. and 3b.	Medical Record

[1] Public reporting of this measure in adult populations should be based on criteria 1 and 2a of the CDC definition (not criteria 2b); all criteria are recommended for measurement of BSI in pediatric populations.

[2] Previously endorsed in *National Voluntary Consensus Standards for Hospital Care: An Initial Performance Measure Set (2003)* and *National Voluntary Consensus Standards for Nursing Sensitive Care: An Initial Performance Measure Set (2004).* Bloodstream infections are identified using the CDC definition, available at http://www.cdc.gov/ncidod/dhqp/pdf/nnis/NosInfDefinitions.pdf. Last accessed April 9, 2007

[3] Aligns with NQF Safe Practice 20

NUMBER	MEASURE NAME	SOURCE	NUMERATOR	DENOMINATOR	EXCLUSIONS AND ADJUSTMENTS	DATA SOURCE
			of the following: a. common skin contaminant (e.g., diphtheroids, Bacillus sp., Propionibacteriumsp, coagulase-negative staphylococci, or micrococci) is cultured from two or more blood cultures drawn on separate occasions b. common skin contaminant (e.g., diphtheroids, Bacillus sp., Propionibacteriumsp., coagulase-negative staphylococci, or micrococci) is cultured from at least one blood culture from a patient with an intravascular line, and the physician institutes appropriate antimicrobial therapy Criterion 3: Patient ≤1 year of age has at least one of the following signs or symptoms: fever (>38° C), hypothermia (<37° C), apnea, or bradycardia And at least one of the following: a. common skin contaminant (e.g., diphtheroids, Bacillus sp., Propionibacterium sp., coagulase-negative staphylococci, or micrococci) is cultured from two or more blood cultures drawn on separate occasions b. common skin contaminant (e.g., diphtheroids, Bacillus sp., Propionibacteriumsp., coagulase-negative staphylococci, or micrococci) is cultured from at least one blood culture from a patient with an	≤ 750 grams 751-1000 grams 1001-1500 grams 1501-2500 grams >2500 grams		

NUMBER	MEASURE NAME	SOURCE	NUMERATOR	DENOMINATOR	EXCLUSIONS AND ADJUSTMENTS	DATA SOURCE
			intravascular line, and physician institutes appropriate antimicrobial therapy Clinical Sepsis (CSEP) must meet the following criteria: Can only be used for infants (<12 months of age) and neonates (<30 days of age) • Patient ≤ 1 year of age has at least one of the following clinical signs or symptoms with no other recognized cause: fever (>38°C, rectal), hypothermia (<37°C, rectal), apnea, or bradycardia and • blood culture not done or no organisms detected in blood and • no apparent infection at another site and physician institutes treatment for sepsis.			
HAI-02	Central Line Bundle Compliance[4]	Institute for Healthcare Improvement (IHI)	Number of intensive care patients with central lines for whom all elements of the central line bundle are documented and in place.[5] The central line bundle elements include: • Hand hygiene[6]	Total number of intensive care patients with central lines on day of week of sample.	Exclude patients less than 18 years of age at the date of ICU admission and patients outside the intensive care unit and patients whose lines were not placed in the intensive care unit	Medical Record

[4] Aligns with NQF Safe Practices 20 and 22

[5] This is an "all or nothing" indicator. If any of the elements are not documented, do not count the patient in the numerator. If a bundle element is contraindicated for a particular patient and this is documented appropriately on the checklist, then the bundle can still be considered compliant with regards to that element.

[6] Aligns with Joint Commission 2006 NPSG 7A

NUMBER	MEASURE NAME	SOURCE	NUMERATOR	DENOMINATOR	EXCLUSIONS AND ADJUSTMENTS	DATA SOURCE
			• Maximal barrier precautions upon insertion[7] • Chlorhexidine skin antisepsis[8] • Optimal catheter site selection, with subclavian vein as the preferred site for non-tunneled catheters in patients 18 years and older[9] • Daily review of line necessity with prompt removal of unnecessary lines			
Surgical Site Infections						
HAI-03	Surgical Site Infection Rate[10]	CDC	Number of surgical site infections[11] occurring within thirty days after the operative procedure if no implant is left in place or with one year if an implant is in place in patients who had an NHSN operative procedure[12] performed during a specified time period and the infection appears to be related to the operative procedure. Infections are identified on original admission or upon readmission to the facility of original operative procedure within the relevant time frame (30 days for	Number of NHSN operative procedures performed during a specified time period stratified by: • Type of NHSN operative procedure and • NNIS SSI risk index: Every patient having the selected procedure is assigned one (1) risk point for each of the following three factors:	Exclude procedures not included under the definition of NHSN operative procedure and excludes Superficial SSI.	Medical Record

[7] Aligns with CDC Guidelines for the prevention of intravascular catheter-related infections
[8] Aligns with CDC Guidelines for the prevention of intravascular catheter-related infections
[9] Aligns with CDC Guidelines for the prevention of intravascular catheter-related infections
[10] The publicly reported measure output is limited to deep incisional and organ space infections occurring as a result of elective procedures in the following categories: CABG and other cardiac surgery, hip or knee arthroplasty, colectomy, hysterectomy (abdominal or vaginal), and vascular surgery. For surveillance purposes, organizations should collect and submit data on the measure as specified (all surgical site infections as defined by the NHSN SSI Event Protocol resulting from all included NHSN operative procedures).
[11] Refer to NHSN Patient Safety Component Protocol for definitions of SSIs. http://www.cdc.gov/ncidod/dhqp/pdf/nhsn/NHSN_Manual_%20Patient_Safety_Protocol022307.pdf Last accessed May 31, 2007
[12] For ICD-9-CM codes, refer to operative procedure categories in NHSN Patient Safety Component Protocol. Available at http://www.cdc.gov/ncidod/dhqp/pdf/nhsn/ICD9cmCODES_V1_5.pdf Last accessed June 1, 2007.

NUMBER	MEASURE NAME	SOURCE	NUMERATOR	DENOMINATOR	EXCLUSIONS AND ADJUSTMENTS	DATA SOURCE
			no implants; within 1 year for implants). Two types of CDC-defined SSIs are included: (1) A deep incisional SSI must meet the following criteria: • Infection occurs within 30 days after the operative procedure if no implant is left or within one year if implant is in place and the infection appears to be related to the operative procedure and • involves deep soft tissues (e.g., fascial and muscle layers) of the incision and • patient has at least one of the following: a) purulent drainage from the deep incision but not from the organ/space component of the surgical site b) a deep incision spontaneously dehisces or is deliberately opened by a surgeon and is culture-positive or not cultured when the patient has at least one of the following signs or symptoms: fever (>38°C), or localized pain or tenderness. A culture-negative finding does not meet this criterion. c) an abscess or other evidence of infection involving the deep incision is found on direct examination,	○ Surgical wound classification = clean contaminated or dirty ○ American Society of Anesthesiologists (ASA) preoperative severity of illness score = 3, 4, or 5 ○ Duration of operation >t hours, where t varies by type of NHSN operative procedure and is the approximate 75th percentile of the duration of the procedure rounded to the nearest whole number of hours. Note: For operative procedures performed using lapyroscopes and endoscopes the use of a lapyroscope is an additional factor that modifies the risk index.		

NUMBER	MEASURE NAME	SOURCE	NUMERATOR	DENOMINATOR	EXCLUSIONS AND ADJUSTMENTS	DATA SOURCE
			during reoperation, or by histopathologic or radiologic examination d) diagnosis of a deep incisional SSI by a surgeon or attending physician. Note: There are two specific types of deep incisional SSIs: 1) Deep Incisional Primary (DIP) – a deep incisional SSI that is identified in a primary incision in a patient that has had an operation with one or more incisions (e.g., C-section incision or chest incision for CBGB) 2) Deep Incisional Secondary (DIS) - a deep incisional SSI that is identified in the secondary incision in a patient that has had an operation with more than one incision (e.g., donor site [leg] incision for CBGB) (2) An organ/space SSI mustmeet the following critieria: • Infection occurs within 30 days after the operative procedure if no implant is left or within one year if implant is in place and the infection appears to be related to the operative procedure and • infection involves involves any part of the body, excluding the skin incision, fascia, or muscle layers, that is opened			

NUMBER	MEASURE NAME	SOURCE	NUMERATOR	DENOMINATOR	EXCLUSIONS AND ADJUSTMENTS	DATA SOURCE
			or manipulated during the operative procedure and • patient has at least <u>one</u> of the following: a). purulent drainage from a drain that is placed through a stab wound into the organ/space b). organisms isolated from an aseptically obtained culture of fluid or tissue in the organ/space c). an abscess or other evidence of infection involving the organ/space that is found on direct examination, during reoperation, or by histopathologic or radiologic examination d) diagnosis of an organ/space SSI by a surgeon or attending physician. Specific sites of an organ/space SSI may be identified[11]			
HAI-04	Prophylactic antibiotic received within one hour prior to surgical incision	Centers for Medicare and Medicaid Services (CMS)/Joint Commission	Number of surgical patients who received prophylactic antibiotics within one hour prior to surgical incision (two hours if receiving vancomycin or a fluoroquinolone)	All selected surgical patients with no evidence of prior infection The measure covers seven surgical areas: cardiac surgery, vasclar surgery, hip and knee arthroplasty,	Exclude the following patients: • principal or admission diagnosis suggestive of preoperative infectious diseases[14]; • receiving antibiotics within	Administrative data and Medical records

NUMBER	MEASURE NAME	SOURCE	NUMERATOR	DENOMINATOR	EXCLUSIONS AND ADJUSTMENTS	DATA SOURCE
				vaginal and abdominal hysterectomy, and colorectal surgery. Discharges with an ICD-9-CM Principal Procedure Code or ICD-9-CM Other Procedure Code of selected surgeries.[13]	24 hours prior to arrival (except colon surgery patients taking oral prophylactic antibiotics); • colon surgery patients who received oral prophylactic antibiotics only[15] and who received no antibiotics during stay; • less than 18 years of age; • physician documented infection prior to surgical procedure of interest; and • other procedures requiring general or spinal anesthesia that occurred within 24 hours prior to the procedure of interest (during separate surgical episodes) during this hospital stay.	
HAI-05	Prophylactic antibiotic selection for surgical patients[16]	CMS/Joint Commission	Surgical patients who received prophylactic antibiotics consistent with current guidelines[17] (specific to each type of surgical procedure)	All selected surgical patients with no evidence of prior infection. Include Discharges with an ICD-9-	• Patients who had a principal or admission diagnosis suggestive of preoperative infectious diseases.	Administrative data and Medical records

[13] For ICD-9-CM codes, see Tables 5.01-5.08, Appendix A, National Healthcare Quality Measures Specifications Manual. Available at http://www.qualitynet.org/dcs/ContentServer?cid=1163010419895&pagename=QnetPublic%2FPage%2FQnetTier3&c=Page Last accessed April 17, 2007.

[14] For ICD-9-CM codes, see Table 5.09, Appendix A, National Healthcare Quality Measures Specifications Manual. Available at http://www.qualitynet.org/dcs/ContentServer?cid=1163010419895&pagename=QnetPublic%2FPage%2FQnetTier3&c=Page Last accessed April 17, 2007.

[15] Documentation that the only antibiotic combinations administered prior to hospital arrival or more than 24 hours prior to incision were either oral Neomycin Sulfate + Erythromycin Base or oral Neomycin Sulfate + Metronidazole.

[16] Previously endorsed in *National Voluntary Consensus Standards for Hospital Care: An Initial Performance Measure Set* (2003)

NUMBER	MEASURE NAME	SOURCE	NUMERATOR	DENOMINATOR	EXCLUSIONS AND ADJUSTMENTS	DATA SOURCE
				CM Principal Procedure Code or ICD-9-CM Other Procedure Code of selected surgeries[18]	• Patients who were receiving antibiotics within 24 hours prior to arrival (except colon surgery patients taking oral prophylactic antibiotics). • Patients who were receiving antibiotics more than 24 hours prior to surgery (except colon surgery patients). • Patients who did not receive any antibiotics before or during surgery, or within 24 hours after surgery end time (i.e. patient did not receive prophylactic antibiotics). • Patients who did not receive any antibiotics during this hospitalization. • Patients who are less than 18 years of age. • Patients with physician documented infection prior to surgical procedure of interest.	
HAI-06	Prophylactic antibiotic discontinued within 24 hours after surgery end	CMS/Joint Commission	Number of surgical patients whose prophylactic antibiotics were discontinued within 24 hours after surgery end time (48 hours for CABG and Other Cardiac surgery)	All selected surgical patients with no evidence of prior infection Include discharges with an ICD-9-CM Principal Procedure Code or	• Patients who had a principal or admission diagnosis suggestive of preoperative infectious diseases. • Patients who were receiving	Administrative data and Medical records

[17] For guidelines, refer to National Healthcare Quality Measures Specifications Manual, Section 2.4, SCIP-Inf-2. Available at http://www.qualitynet.org/dcs/ContentServer?cid=1163010419895&pagename=QnetPublic%2FPage%2FQnetTier3&c=Page Last accessed April 17, 2007.

[18] See Tables 5.01-5.08, Appendix A, National Healthcare Quality Measures Specifications Manual for ICD-9-CM codes. Available at http://www.qualitynet.org/dcs/ContentServer?cid=1163010419895&pagename=QnetPublic%2FPage%2FQnetTier3&c=Page Last accessed April 17, 2007.

NUMBER	MEASURE NAME	SOURCE	NUMERATOR	DENOMINATOR	EXCLUSIONS AND ADJUSTMENTS	DATA SOURCE
	time (48 hours for CABG and Other Cardiac surgery)[19]			ICD-9-CM Other Procedure Code of selected surgeries[20]	antibiotics within 24 hours prior to arrival (except colon surgery patients taking oral prophylactic antibiotics). • Patients who were receiving antibiotics more than 24 hours prior to surgery (except colon surgery patients). • Patients who did not receive any antibiotics before or during surgery, or within 24 hours after surgery end time (i.e., patient did not receive prophylactic antibiotics). • Patients who were diagnosed with and treated for infections within two days after surgery end date. • Patients who did not receive any antibiotics during this hospitalization. • Patients who are less than 18 years of age. • Patients with physician documented infection prior to surgical procedure of interest. • Patients who had other procedures requiring general or spinal anesthesia that occurred within 24 hours	

[19] Previously endorsed in *National Voluntary Consensus Standards for Hospital Care: An Initial Performance Measure Set* (2003)

[20] For ICD-9-CM codes, see Tables 5.01-5.08, Appendix A, National Healthcare Quality Measures Specifications Manual. Available at http://www.qualitynet.org/dcs/ContentServer?cid=1163010419895&pagename=QnetPublic%2FPage%2FQnetTier3&c=Page Last accessed April 17, 2007.

NUMBER	MEASURE NAME	SOURCE	NUMERATOR	DENOMINATOR	EXCLUSIONS AND ADJUSTMENTS	DATA SOURCE
					after the procedure of interest (during separate surgical episodes) during this hospital stay.	
HAI-07	Cardiac surgery patients with controlled 6AM postoperative serum glucose[21]	CMS/Joint Commission	Surgery patients with controlled 6a.m. serum glucose (</=200 mg/dl) on postoperative day (POD) 1 and POD 2	Cardiac surgery patients with no evidence of prior infection Include patients with an ICD-9-CM Principle Procedure code or ICD-9-CM Other Procedure codes of selected surgeries[22] AND an ICD-9-CM for ICD-9-CM codes Principle Procedure code or ICD-9-CM Other Procedure codes of selected surgeries [23]	Exclude the following patients: • principle or admission diagnosis suggestive of preoperative infectious diseases; • less than 18 years of age; • physician documented infection prior to surgical procedure of interest; and • burn patients or transplant patients.	Administrative data and Medical records
HAI-08	Surgery patients with appropriate hair removal[24]	CMS/Joint Commission	Surgery patients with surgical hair site removal with clippers or depilatory or no surgical site hair removal	All selected surgery patients Include patients with an ICD-9-CM Principal Procedure code or ICD-9-CM Other Procedure Codes of selected surgeries.[25]	Exclude the following patients: • less than 18 years of age; • performed their own hair removal; and • patients whose mode of hair removal could not be determined.	Administrative data and Medical records

[21] Aligns with NQF Safe Practice 21

[22] See Table 5.10, Appendix A, National Healthcare Quality Measures Specifications Manual. Available at http://www.qualitynet.org/dcs/ContentServer?cid=1163010419895&pagename=QnetPublic%2FPage%2FQnetTier3&c=Page Last accessed April 17, 2007.

[23] See Table 5.11, Appendix A, National Healthcare Quality Measures Specifications Manual. Available at http://www.qualitynet.org/dcs/ContentServer?cid=1163010419895&pagename=QnetPublic%2FPage%2FQnetTier3&c=Page Last accessed April 17, 2007.

[24] Aligns with NQF Safe Practice 21

[25] See Table 5.10, Appendix A, National Healthcare Quality Measures Specifications Manual. Available at http://www.qualitynet.org/dcs/ContentServer?cid=1163010419895&pagename=QnetPublic%2FPage%2FQnetTier3&c=Page Last accessed April 17, 2007.

NUMBER	MEASURE NAME	SOURCE	NUMERATOR	DENOMINATOR	EXCLUSIONS AND ADJUSTMENTS	DATA SOURCE
Catheter-Associated Urinary Tract Infections[26]						
No measures were recommended in this area. See research recommendations for measure development agenda.						
Ventilator-associated Pneumonia and Respiratory Illness						
HAI-09	Ventilator Bundle[27]	IHI	Number of intensive care unit patients on mechanical ventilation at time of survey for whom all four elements of the ventilator bundle are documented and in place. The ventilator bundle elements are:[28] • Head of bed (HOB) elevation 30 degrees or greater[29] • Daily "sedation vacation" and daily assessment of readiness to extubate • PUD (peptic ulcer disease) prophylaxis[30] • DVT (deep venous thrombosis) prophylaxis[31]	Total number of intensive care unit patients on mechanical ventilation.	Patients less than 18 years of age at the date of ICU admission.	Medical Record
HAI-10	Influenza vaccination for	CDC	Number of healthcare personnel who receive influenza vaccination	Number of healthcare personnel who work in facility	Healthcare personnel who have medical or religious	Occupational Health Records

[26] Although no measures evaluated by the Catheter-associated Urinary Tract Infections TAP were advanced for endorsement, Safe Practice for Urinary Catheter Care, a recommended practice for incorporation into the NQF Safe Practices, was approved by the Steering Committee for immediate implementation.

[27] Aligns with NQF Safe Practice 19

[28] This is an "all or nothing" indicator. If any of the elements are not documented, do not count the patient in the numerator. If a bundle element is contraindicated for a particular patient (as defined by Joint Commission ICU-1-3) and this is documented appropriately in the medical record, then the bundle can still be considered compliant with regard to that element. Joint Commission definitions and guidelines should be followed for specifications corresponding to Joint Commission ICU-1-3.

[29] Aligns with Joint Commission ICU Measure Set, ICU-1

[30] Aligns with Joint Commission ICU Measure Set, ICU-2

[31] Aligns with Joint Commission ICU Measure Set, ICU-3

NUMBER	MEASURE NAME	SOURCE	NUMERATOR	DENOMINATOR	EXCLUSIONS AND ADJUSTMENTS	DATA SOURCE
	healthcare workers[32,33]				contraindications to vaccination or healthcare personnel who refuse vaccination	
Healthcare-Associated Infections in Pediatric Populations						
HAI-11A	Late sepsis or meningitis in neonates	Vermont Oxford Network	Eligible infants[34] with one or more of the following criteria: **Criterion 1. Bacterial Pathogen[35]** A bacterial pathogen[36] is recovered from a blood and/or cerebral spinal fluid culture obtained after Day 3 of life. **Criterion 2. Coagulase Negative Staphylococcus** Coagulase negative staphylococcus is recovered and the infant has all 3 of the following: • Coagulase negative staphylococcus is recovered from a blood culture obtained from either a central line, or peripheral	• Any infant who is born at the hospital and whose birth weight is between 401 and 1500 grams OR whose gestational age is between 22 weeks 0 days and 29 weeks 6 days (inclusive) is eligible, regardless of where in the hospital the infant receives care. • Any outborn infant who is admitted to any location in the hospital within 28 days of birth, without first having gone home, and whose birth weight is between 401 and 1500 grams OR whose gestational age is between 22 weeks 0 days and 29 weeks 6 days	Exclude patients if: • The infant is discharged home or dies on or before Day 3. • The infant is transferred from your center to another hospital on or before Day 3 and either, a) is not readmitted to the center/hospital before discharge home, death or first birthday, or b) is transferred a second time on or before the Day 3.	Medical Record Review

[32] Aligns with NQF Safe Practice 23

[33] Aligns with Joint Commission NPSG 10A

[34] Each of the late infection items is based on whether the infant had the infection *after* Day 3 of life. In determining the date of Day 3, the date of birth counts as Day 1 regardless of the time of birth. For an infant born at 11:59PM on September 1, Day 3 is September 3rd. Use the criteria below when answering each of the late infection questions.

[35] If a bacterial pathogen and a coagulase negative staphylococcus are recovered during the same sepsis workup performed after Day 3, check only "Bacterial Pathogen" for that episode. If a bacterial pathogen is recovered during one episode of sepsis after Day 3, and coagulase negative staphylococcus is recovered during another episode of sepsis after Day 3 (associated with the three clinical criteria listed below) check both "Bacterial Pathogen" and "Coagulase Negative Staph".

[36] For included pathogens, see Appendix B, Vermont Oxford Network Database Manual of Operations for Infants Born in 2007 (11.0). Available at http://www.vtoxford.org/tools/2007%20Manual%20of%20Operationswithindex.pdf Last accessed April 18, 2007.

NUMBER	MEASURE NAME	SOURCE	NUMERATOR	DENOMINATOR	EXCLUSIONS AND ADJUSTMENTS	DATA SOURCE
			blood sample and/or is recovered from cerebrospinal fluid obtained by lumbar puncture, ventricular tap or ventricular drain. AND • Signs of generalized infection (such as apnea, temperature instability, feeding intolerance, worsening respiratory distress or hemodynamic instability). AND • Treatment with 5 or more days of intravenous antibiotics after the above cultures were obtained. If the infant died, was discharged, or transferred prior to the completion of 5 days of intravenous antibiotics, this condition would still be met if the intention were to treat for 5 or more days. **Criterion 3. Fungal Infection** A fungus was recovered from a blood culture obtained from either a central line or peripheral blood sample after day 3 of life.	(inclusive) is eligible, regardless of where in the hospital the infant receives care. • Any infant whose birth weight is over 1500 grams and who is admitted to a Neonatal Intensive Care Unit (NICU)[37] in your hospital within the first 28 days of life, regardless of gestational age • Any infant whose birth weight is over 1500 grams and who dies at any location in your hospital within 28 days of birth without first having gone home. This includes inborn and outborn infants.		
HAI-11B	Late sepsis or meningitis in Very Low Birth Weight (VLBW) neonates	Vermont Oxford Network	Eligible infants[38] with one or more of the following criteria: **Criterion 1. Bacterial Pathogen[39]**	• Any infant who is born at the hospital and whose birth weight is between 401 and 1500 grams OR whose gestational age is between	Exclude patients if: • The infant is discharged home or dies on or before	Medical Record Review

[37] A NICU is any location within the hospital in which newborn infants receive continuous positive airway pressure (CPAP) or intermittent mandatory ventilation (IMV).

[38] Each of the late infection items is based on whether the infant had the infection *after* Day 3 of life. In determining the date of Day 3, the date of birth counts as Day 1 regardless of the time of birth. For an infant born at 11:59PM on September 1, Day 3 is September 3rd. Use the criteria below when answering each of the late infection questions.

NUMBER	MEASURE NAME	SOURCE	NUMERATOR	DENOMINATOR	EXCLUSIONS AND ADJUSTMENTS	DATA SOURCE
			A bacterial pathogen[40] is recovered from a blood and/or cerebral spinal fluid culture obtained after Day 3 of life. **<u>Criterion 2. Coagulase Negative Staphylococcus</u>** Coagulase negative staphylococcus is recovered and the infant has all 3 of the following: • Coagulase negative staphylococcus is recovered from a blood culture obtained from either a central line, or peripheral blood sample and/or is recovered from cerebrospinal fluid obtained by lumbar puncture, ventricular tap or ventricular drain. AND • Signs of generalized infection (such as apnea, temperature instability, feeding intolerance, worsening respiratory distress or hemodynamic instability). AND • Treatment with 5 or more days of intravenous antibiotics after the above cultures were obtained. If the infant died, was discharged, or transferred prior to the completion of 5 days of	22 weeks 0 days and 29 weeks 6 days (inclusive) is eligible, regardless of where in the hospital the infant receives care. • Any outborn infant who is admitted to any location in the hospital within 28 days of birth, without first having gone home, and whose birth weight is between 401 and 1500 grams OR whose gestational age is between 22 weeks 0 days and 29 weeks 6 days (inclusive) is eligible, regardless of where in the hospital the infant receives care.	Day 3. • The infant is transferred from your center to another hospital on or before Day 3 and either, a) is not readmitted to the center/hospital before discharge home, death or first birthday, or b) is transferred a second time on or before the Day 3.	

[39] If a bacterial pathogen and a coagulase negative staphylococcus are recovered during the same sepsis workup performed after Day 3, check only "Bacterial Pathogen" for that episode. If a bacterial pathogen is recovered during one episode of sepsis after Day 3, and coagulase negative staphylococcus is recovered during another episode of sepsis after Day 3 (associated with the three clinical criteria listed below) check both "Bacterial Pathogen" and "Coagulase Negative Staph".

[40] For included pathogens, see Appendix B, Vermont Oxford Network Database Manual of Operations for Infants Born in 2007 (11.0). Available at http://www.vtoxford.org/tools/2007%20Manual%20of%20Operationswithindex.pdf Last accessed April 18, 2007.

NUMBER	MEASURE NAME	SOURCE	NUMERATOR	DENOMINATOR	EXCLUSIONS AND ADJUSTMENTS	DATA SOURCE
			intravenous antibiotics, this condition would still be met if the intention were to treat for 5 or more days. **<u>Criterion 3. Fungal Infection</u>** A fungus was recovered from a blood culture obtained from either a central line or peripheral blood sample after day 3 of life.			

APPENDIX B—COMMENTARY

INTRODUCTION

In February 2006, the National Quality Forum (NQF) initiated a project to achieve consensus on a comprehensive set of national consensus standards for the public reporting of healthcare-associated infections data in the United States. The Healthcare-Associated Infections Steering Committee (Appendix D) was formed to oversee project activities and was comprised of representatives from key healthcare constituencies—including consumers, providers, purchasers, and researchers. Technical Advisory Panels (TAPs) in each priority area (Appendix D) were formed to assist NQF staff on measure evaluations, advise the Steering Committee on the technical aspects of measures, and make recommendations for endorsement and supplemental research and measure development. This appendix summarizes the deliberations of the Steering Committee and the TAPs, who met in person and via conference call between April 2006 and March 2007.

APPROACH

Before measures could be recommended, an approach for defining the parameters and goals of the project was needed to determine the desired scope of measurement. To clarify terminology, it was necessary to standardize definitions of healthcare associated infections for measurement; the Steering Committee decided on a definition of 'healthcare associated infection' suitable to support accountability measurement and requested that the TAPs make recommendations for condition-specific definitions. The purposes of the project and the resulting set of national voluntary consensus standards were identified, and a scope of measurement was set based on the stated purpose. Once terminology, purpose, and scope had been clarified, measures were identified and evaluated. An overview of the project approach is presented in Figure 1.

Defining Healthcare-associated Infections

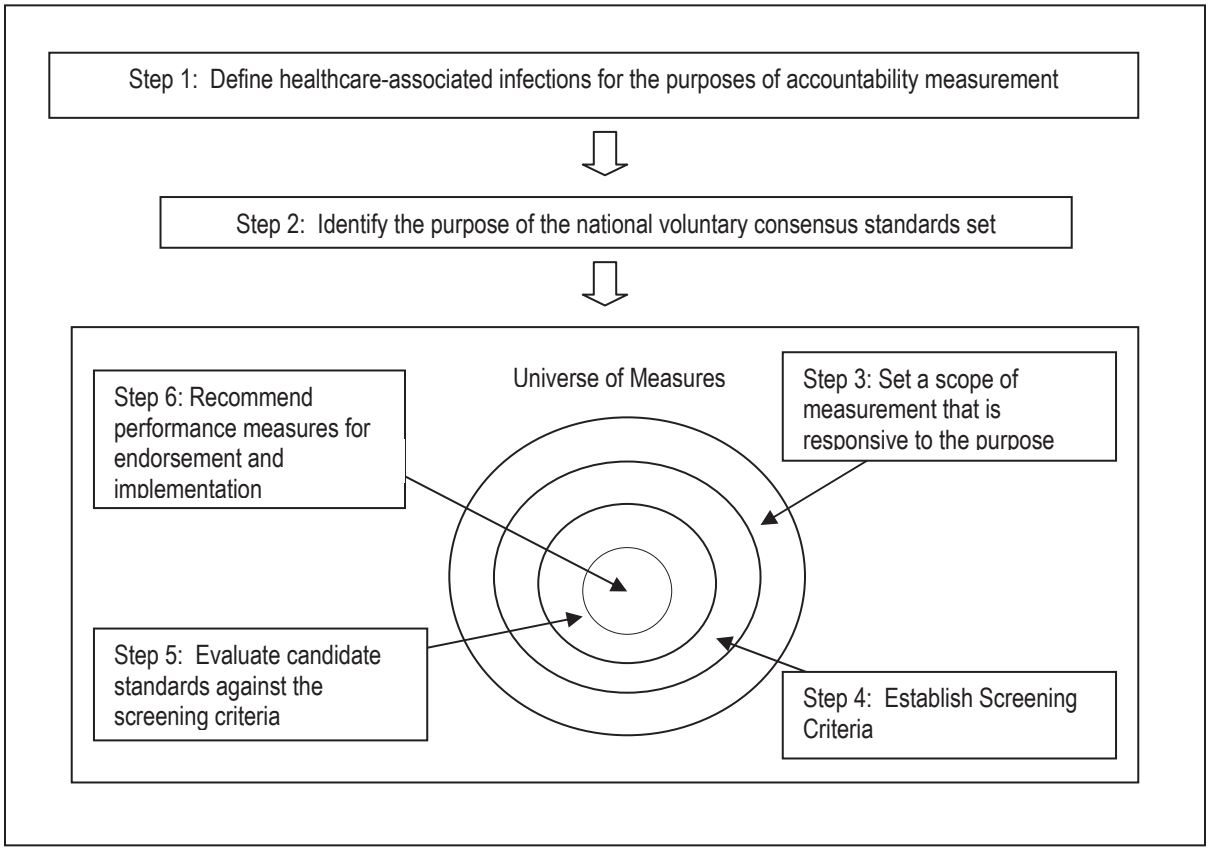
Several different terms for infections resulting from healthcare interventions (i.e., 'healthcare acquired', 'healthcare associated', 'nosocomial') are used by multiple organizations for varying purposes; further, multiple definitions for each term are used interchangeably. To clarify what

is meant when referring to measurement of infections resulting from delivery of healthcare, Steering Committee members identified 'healthcare-associated infection' as the preferred term for accountability measurement; it was noted that due to the difficulty of determining geographic location of the acquisition of infection, the term 'healthcare-associated' is preferred to 'healthcare-acquired'. The following definition was selected to ensure that all settings are included in quality measurement relating to infections:

> *An infection that develops in a patient who is cared for in any setting where healthcare is delivered and that originates from the delivery of health care (i.e., was not incubating or present at the time healthcare was provided). In ambulatory and home settings, the term 'healthcare-associated infection' would apply to any infection that is associated with a medical or surgical intervention.*[1]

Figure 1—Healthcare-Associated Infections Consensus Project Approach

[1] This definition is based on the definition used in the HICPAC Guideline for Management of Multi-Drug Resistant Organisms In Healthcare Settings (2006). Available at http://www.cdc.gov/ncidod/dhqp/pdf/ar/mdroGuideline2006.pdf Last accessed April 17, 2007.



Further definition for specific infections encompassed by the term 'healthcare-associated infection' was necessary to support outcomes measurement of these infections. Outcome measures of healthcare-associated infection have been evaluated and endorsed in previous NQF projects. During these projects, project committee members and NQF members identified shortcomings with the definitions used for HAI case finding (i.e., the numerator and denominator) that had the potential to generate inaccurate HAI rates.

To ensure that condition-specific definitional issues were addressed, an ad hoc meeting of entities that had developed HAI definitions, overseen surveillance, or implemented performance measurement programs was convened to make recommendations regarding definitions to the HAI Steering Committee and TAPs. The group made the following recommendations to the clinical TAPs, which were approved by the Steering Committee:

- *Bloodstream Infections.* It was recommended that the BSI TAP consider how to operationalize a definition of BSIs based on criterion 1 of the CDC definition and assess whether or not this definition/criteria is appropriate for public reporting.

- *Surgical Site Infection.* The ad hoc group recommended that the broad CDC definition of SSI, "an infection occurs within 30 days after an operation", be accepted; however, the group recognized that some types of surgical site infections have little impact on patient outcomes. It was recommended that the SSI TAP determine how the definition could be implemented to optimize benefit for public reporting.
- *Urinary Tract Infections.* The ad hoc group could not come to conclusion on a definition of healthcare-associated UTI appropriate for measurement; they recommended that the UTI TAP review definitions in use and make recommendations for a definition suitable to support accountability measurement.
- *Ventilator-Associated Pneumonia.* The ad hoc group concluded that a definition of VAP suitable to measurement does not exist. They recommended that the VAP TAP review definitions in use and make recommendations for a definition suitable to support accountability measurement.

Condition-Specific Definitions

With guidance from the ad hoc group and Steering Committee, clinical TAPs were asked to evaluate condition-specific definitions currently in use for their respective priority areas and to make recommendations on the definition most suitable for outcomes measurement; if a fully suitable definition could not be identified, TAPs were asked to make recommendations for modifications or subsets of definitions. The Reporting and Implementation TAP noted that modifications to surveillance definitions for reporting purposes could have a negative impact on the level and consistency of surveillance; any recommendations should be accompanied by language stating that definition modifications are for accountability measurement purposes only, and definitions and expectations for surveillance are unchanged. Condition-specific definitions are addressed in the summary of deliberations by priority area at the end of this document.

Purpose

The Steering Committee identified the purpose of the project to be the endorsement of a set of national consensus standards that promote consistent definitions and language relevant to reporting data on infections and that result in information that is useful to the public for making

health care choices and are efficient for the health care community for reporting and continuous improvement of infection prevention processes. This purpose was selected to stress that consistency in definitions and language is critical to harmonize infection prevention efforts and will be necessary for meaningful and actionable measurement.

The Steering Committee elaborated that within the context of endorsing performance measures, the purpose of the project was to focus on measures of outcomes—specifically, rates of infection. Process measures were considered to be valuable, but should have a strong correlation with improving outcomes as measured by an infection rate.

Overarching Scope

The scope of this project encompasses performance measures to be used across the spectrum of outpatient and inpatient settings, including, but not limited to: dialysis units, trauma centers, ICUs, specialty units, rehabilitation centers, emergency rooms, ambulatory surgical units, hospitals, long-term care, and home health settings. All relevant patient populations, including pediatric, maternal/perinatal, and immunocompromised patients, should be considered in evaluation of measures' usability. Endorsed measures should be appropriate for accountability and public reporting and measurement should be at the institution level. (To ensure that measures are appropriate for accountability, community-level measurement, community acquired infections, and assisted living facility care settings are excluded from the scope.)

To arrive at this scope, the Steering Committee discussed settings in which patients are at risk of infection and in which infection can be attributed to healthcare interventions, populations at considerable risk of infection or for whom outcomes of infection are serious, levels of measurement that accurately assign accountability, and consumer expectations of HAI reporting systems. Steering Committee discussions of appropriate care settings, populations, and levels of measurement for HAI are described below.

Though this overarching scope would guide the project as a whole, additional parameters for appropriate measurement within specific clinical areas was needed. The Steering Committee requested that the TAPs identify the scope of measurement for their respective clinical areas, with consideration given to the overarching scope of the project. Scope of measurement for each clinical condition, as identified by the TAPs and approved by the

Steering Committee, is detailed in the condition-specific discussions at the end of this document.

Care Settings

Public reporting initiatives to date have focused on hospital care, specifically intensive care units (ICUs), where a substantial number of healthcare associated infections originate. The Steering Committee agreed that the scope of measurement should include infections arising in multiple care settings to achieve greater transparency of quality practices across all healthcare entities, but acknowledged that the feasibility of data collection and correct attribution becomes problematic beyond the hospital setting. The Steering Committee decided that attributing community-acquired infections to healthcare interventions is not feasible; community-acquired infections and assisted living facilities (a setting in which it would be difficult to determine if an infection was community-acquired or healthcare-associated) were excluded from the scope for this reason.

Populations

Pediatric, maternal/perinatal, and immunocompromised patients were identified as sub-populations that should be included in the scope of this project. They were considered important populations since they are at significant risk for contracting infections and are often excluded from performance measurement. Care for these patients differs significantly from care for traditional patients, yet Steering Committee members decided that this should not serve as a barrier for inclusion and that appropriate risk adjustment or stratification should be considered. Specifically, the Pediatric TAP was given guidance to evaluate the applicability of all measures to pediatric populations and to make recommendations for adjustments or stratification to accommodate inclusion of pediatric patients.

Healthcare workers were considered for inclusion in the scope, but it was decided that safety of healthcare workers might be more fully addressed in a independent project dedicated to the topic; for the HAI project, measures involving healthcare workers should only be included if they are used to evaluate infection prevention processes and patient safety.

Level of Analysis

The Steering Committee recommended that facility level measurement was the appropriate level of analysis for HAI accountability measures; they did not recommend measurement for individual clinicians, ambulatory care centers or health plans as there are confounding factors at these levels (e.g., community-acquired v. healthcare –associated infection). The Steering Committee decided to exclude community level measures of infection due to the absence of an accountable body and the inability to distinguish community-acquired infections from healthcare-associated infections.

EVALUATION OF CANDIDATE STANDARDS

NQF staff prepared detailed measure evaluations using standard criteria established in NQF's *National Framework for Healthcare Quality Measurement and Reporting* and *A Comprehensive Framework for Hospital Care Performance Evaluation*. Information for the measure evaluations was obtained from the measure developers, literature review, and independent research. The five clinical TAPs met in person and by conference calls to review the candidate measures in their respective priority areas. TAPs for each priority area provided preliminary review of the measure evaluations prepared by NQF staff and made graded recommendations to the Steering Committee based on the perceived strengths and weaknesses of each measure, as well as technical reasons why the measure should or should not be recommended. Recommendations were based on the standard criteria for evaluation of measures (see Box A, report), as well as whether measures addressed the overarching scope set out by the Steering Committee and whether measures fell into the specific scope for a priority area as defined by the TAP.

The sixth TAP, Reporting and Implementation, met after the five clinical TAPs to review measure recommendations in all priority areas and develop a strategy to approach reporting and implementation.

Standardized Grading for TAP Recommendations

In September 2005, the NQF Board established an Ad Hoc Advisory Committee on Evidence and Performance Measure Grading to review a draft measure grading instrument. The purpose of the instrument is to standardize TAPs' consideration of candidate voluntary consensus standards, thereby further increasing the transparency and reproducibility of the evaluative

process. The draft grading tool focuses on a standardized grading system for TAP recommendations:

A - TAP strongly recommends this measure advance.

B - TAP recommends this measure advance, but with reservation.

C - TAP makes no recommendation for or against this measure.

D - TAP recommends against advancing this measure.

I - TAP concludes that the evidence is insufficient to make a recommendation for or against this measure.

FRAMEWORK FOR REPORTING AND IMPLEMENTATION

The Reporting & Implementation (R&I) TAP was convened to address strategies for effective reporting of HAI data that would improve usefulness of measurement and reduce the risk of misinterpretation or misuse of public reports. Additionally, the R&I TAP was tasked with evaluation of the clinical TAPs' and Steering Committee's recommendations to formulate implementation guidance for the performance measures set.

R&I TAP members proposed the Framework Principles for Public Reporting to address the interests of all parties with a stake in measurement of HAI. Above all, TAP members stressed that consumers' need for actionable data must be met; although current measures are not ideal, it is through implementation within a carefully constructed program that measures will improve over time to meet the needs of consumers and purchasers of healthcare.

The Framework is also the product of discussions of the specific measures evaluated during this project. Using the evaluations and recommendations of the Steering Committee and clinical TAPs, the Reporting and Implementation TAP distilled overarching issues for implementation and developed a framework that is responsive to the concerns and recommendations specific to this measure set and also serves as guidance for the design of a public reporting program using any measures of HAI. This framework was evaluated by the Steering Committee and approved to advance for endorsement as a national voluntary consensus standard.

GENERAL ISSUES

During evaluation of candidate standards, Steering Committee and TAP members identified several general topics that were particularly important to consider for programs that are beginning public reporting initiatives of healthcare associated infections. These issues include identifying the purpose of the initiative, particularly considering whether their program should be used for accountability or surveillance; incorporating measures of antimicrobial resistant infections; and using electronic surveillance tools.

Surveillance vs. Accountability Measurement

The purpose of this project is to identify HAI measures that can be used for accountability measurement; however many of the HAI measures that were available for review by TAPs were developed for surveillance. Surveillance is defined by the World Health Organization (WHO) as a systematic ongoing collection, collation and analysis of data and the timely dissemination of information to those who need to know so that action can be taken. The rates of disease, infection, or activities provided by surveillance data serve as a basis for decision-making about issues of public health, health education and health policy. While surveillance data may be used to make high level decisions, the data are not intended to be used to assign accountability to an organization, health plan or individual.

In contrast, accountability measures are intended to identify the party responsible for providing quality care. The National Quality Measure Clearinghouse describes an accountability measure as a measure that requires a higher level of reliability and validity by insisting that each provider collect data in the same way using standardized, detailed specifications to ensure that comparisons are fair or that predefined measure performance has been achieved.[2,3] Quality measures can be used for accountability to facilitate decision-making, accreditation, financial incentives and external quality oversight.

Antimicrobial Resistant Infections

Steering Committee and TAP members acknowledged the public health importance of preventing, monitoring and responding to antimicrobial resistant infections. As a consequence

[2] National Quality Measure Clearinghouse. Using Measures. Last accessed on April 17, 2007: http://www.qualitymeasures.ahrq.gov/resources/measure_use.aspx

[3] Refer to the Framework for Public Reporting of Healthcare Associated Infection Data on page 7 of the report body for further guidance on implementation in accordance with this definition.

of recent media attention, rates and outcomes for resistant infections are of increasing interest to consumers. Accordingly, each TAP was asked to consider how to measure antimicrobial resistant infections in a manner that was appropriate for accountability measurement. This project did not identify existing measures of antimicrobial resistant infection rates; however the surgical site infection (SSI) TAP reviewed and recommended three measures from the Surgical Care Improvement Project (SCIP) that addressed appropriate antibiotic use for surgical patients (Appendix A).

While there were no additional measures addressing either appropriate antibiotic use or resistant infections in the BSI, catheter-associated UTI (CAUTI), Pediatric, or VAP TAPs Steering Committee and TAP members identified several principles to guide the development of public reporting measures for antimicrobial resistant infections.

- ***Track rates of antimicrobial resistant infections and identify case-mix adjustment or risk stratification methodologies that permit comparison between facilities.*** Rates of antimicrobial resistant infections vary largely and can be influence by the type of facility, geographic location or unit. Also, while methicillin resistant *Staphylococcus. aureus* (MRSA) and *Clostridium difficile* infections are generally more prevalent in adults, vancomycin resistant enterococci (VRE) and resistant gram negative bacteria infections are more prevalent in children. Given the high variability associated with acquiring an antimicrobial resistant infection, a comparison of raw rates would not be meaningful data for comparison and selection of healthcare facilities. While measuring rates for every type of resistant infection may not be appropriate for accountability purposes due to variable incidence rates, each facility should monitor rates of every antimicrobial resistant infection for internal quality improvement purposes.
- ***Monitor appropriate use of antimicrobial agents.*** Evidence supports the theory that rates of antimicrobial resistant infections have increased due to the practice of prescribing antibiotics inappropriately (i.e., treatment that does not specifically work for the infection of interest).[4,5,6] Measurement initiatives aimed at reducing antimicrobial

[4] Boyce JM, Opal SM, Chow JW, et al. Outbreak of multi-drug resistant Enterococcus faecium with transferable vanB class vancomycin resistance. *J Clin Microbiol* 1994;32:1148-53..

[5] McGowan JE Jr. Antibiotic resistance in hospital organisms and its relation to antibiotic use. *Rev Inf Dis.* 1983;5:1033-1048.

resistant infections should also include a measure to evaluate antimicrobial prescribing practices in order to assure that use is in accordance with guidelines.

- ***Monitor antimicrobial resistance at the community and institution level.*** Tracking rates of antimicrobial resistant infections in the community is important for identifying opportunities to implement interventions for specific organisms and raise awareness about evaluating patients transferred from other hospitals in the same region to determine whether they have an antimicrobial resistant infection.
- ***The target for measuring rates of antimicrobial resistant infections should be zero.*** Steering Committee members agreed that the goal for antimicrobial resistant infection rates should be zero; however, this goal may complicate meaningful comparisons between facilities since risk adjustment would be required due to the high level of variability in antimicrobial resistant infections based on patient population, type of hospital, type of unit, etc.

Electronic Surveillance Systems

Steering Committee and TAP members agreed that electronic surveillance systems are useful as tools for hospital infection control groups to track infections, identify the source of infection and develop interventions to prevent future infections. One electronic surveillance system was evaluated during this project; however, it was felt that at this time, the system was not ready for national endorsement. Steering Committee and TAP members, however, agree that the benefit provided by electronic surveillance should be further explored; that a set of minimum requirements should be identified for electronic surveillance systems that are useful for public reporting; and a comparison of all available electronic surveillance systems could identify which systems are currently appropriate for comparison between healthcare facilities.

RECOMMENDATION OF INDIVIDUAL CONSENSUS STANDARDS

The Steering Committee considered t each candidate consensus standard using the criteria listed below. Evaluations from the TAPs guided the deliberations; the comments and recommendations of each TAP are detailed in the next section. Performance measures and

[6] Olson B, Weinstein RA, Nathan C, et al. Epidemiology of endemic Pseudomonas aeruginosa: why infection control efforts have failed. *J Infect Dis*. 1987; 150:808-816.

recommendations for research were advanced for endorsement by a straight majority of votes among Steering Committee members.

Criteria for Recommending Measures

The Steering Committee selected measures to advance for endorsement using TAP evaluations of measures' technical merits and the standard criteria for selection identified by the NQF Strategic Framework Board and endorsed by NQF (Box A, report). In addition, they evaluated measures against the stated purpose and scope of the project and the following additional principles for selection:

- measures of outcomes are of highest priority; process measures shall be considered secondarily;
- the focus of the measures is primarily accountability as a driver of quality improvement; and
- measures should reflect an aspect of care substantially influenced by established practices of infection prevention.

INTRAVASCULAR CATHETER-ASSOCIATED BLOODSTREAM INFECTIONS

Scope and Definitions

Scope of Measurement

TAP members expanded upon the project scope established by the Steering Committee to identify measurement areas for catheter-related bloodstream infections that had the greatest opportunity for impact, were feasible to implement nationally and were meaningful for consumer decision-making and public accountability.

TAP members determined that only measures addressing primary bloodstream infections would be considered for bloodstream infections that are not related to catheters. Also, peripheral line measures were excluded since the risk of infection from peripheral lines is very low and these infections do not represent a major healthcare problem. While TAP members agreed that intravascular catheter-associated bloodstream infections were an important issue for home health and nursing home settings, research on measurement and data collection for bloodstream infections in the home health care and long-term care settings was unavailable. Since the majority of bloodstream infections with adverse outcomes are related to *Staphylococcus*

and *Candida* species, the TAP felt it may be helpful to pay particular attention to these organisms.

Defining Catheter-associated Bloodstream Infections for Accountability Measurement

The ad hoc definitions group, the Bloodstream Infections Committee Technical Advisory Panel and the Steering Committee members reviewed the CDC definition of catheter-related bloodstream infections used in the National Healthcare Safety Network (NHSN). TAP members agreed that the CDC definition was appropriate and useful for public health surveillance, yet identified concerns about using the entire CDC definition for public reporting. TAP members recommended that a subset of this definition be used for public reporting since the full surveillance definition for catheter-related BSIs may overestimate the true incidence by including infections from an undocumented source (e.g., postoperative surgical sites, urinary tract infections, etc)[7] and complicate comparison between institutions.

The surveillance definition specified that one culture of common skin contaminants and physician administration of antibiotics was as an acceptable criterion[8] to identify bloodstream infections. Evidence suggests that patients with suspected catheter–related infections should have two blood cultures, with at least one culture from a percutaneously drawn blood sample.[9,10,11,12,13] TAP members agreed that this criterion, which relies on physician administration of antibiotics, was not appropriate for use as an accountability measure in adults since one culture is not sufficient to distinguish whether the infection was from a different source (e.g., a wound or respiratory tract) and data are not replicable between institutions.

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[7] O'Grady NP, Alexander M, Patchen Dellinger E, et al. Guidelines for the prevention of intravascular cathether-related infections. *MMWR* 2002;51(R10):1-26.

[8] Criterion 2b of the CDC definition of catheter-related bloodstream infections is: "common skin contaminant (e.g., diphtheroids, Bacillus sp., Propionibacteriumsp., coagulase-negative staphylococci, or micrococci) is cultured from at least one blood culture from a patient with an intravascular line, and the physician institutes appropriate antimicrobial therapy"

[9] DesJardin J. Clinical utility of blood cultures drawn from indwelling central venous catheters in hospitalized patients with cancer. *Ann Intern Med* 1999; 131:641–7.

[10] Siegman-Igra Y, Anglim AM, Shapiro DE, et al. Diagnosis of vascular catheter–related bloodstream infection: a meta-analysis. *J Clin Microbiol* 1997; 35:928–36.

[11] Mermel LA, Maki DG. Infectious complications of Swan-Ganz pulmonary artery catheters and peripheral arterial catheters. In: Seifert H, Jansen B, Farr BM, eds. Catheter-related infections. New York: Marcel Dekker, 1997:259–305.

[12] Dunne WM Jr, Nolte FS, Wilson ML. Blood cultures III. In: Hindler JA, ed. Cumitech 1B. Washington, DC: American Society for Microbiology, 1997:1–21.

[13] Blot F, Schmidt E, Nitenberg G, et al. Earlier positivity of central venous versus peripheral blood cultures is highly predictive of catheter related sepsis. *J Clin Microbiol* 1998; 36:105–9.

The Pediatric TAP recommended, for neonates and children, the criterion that permits diagnosis based on one culture and physician administration of antibiotics should be retained, despite the recommendation by the BSI TAP to exclude this criterion for adults. The Pediatric TAP made this recommendation because coagulase negative staphylococci in the blood culture would be excluded, but it constitutes a relatively more common pathogen in the pediatric population than in adults and even though the amount of blood necessary for culture is less than previously required, fewer children under age five will have two samples drawn. The Pediatric TAP also suggested that the term "vital sign instability" would be more appropriate than "hypotension" in pediatric cases. Furthermore, glucose instability, which is not included in the definition criteria, is an important sign of BSI particularly in the NICU.

Steering Committee members raised concern about the validity of a subset of the definition being used for public reporting and recommended that if this definition is used in a measure, for public reporting, the measure should be monitored to avoid unintended consequences.

Previously Endorsed Measures

TAP members reviewed HAI-01, which was previously endorsed in the NQF hospital and nursing-sensitive care projects. While TAP members recommended including this measure in the HAI measure set, they suggested use of only a subset of the specifications based on implementation experience gained since the measure was initially endorsed.

Recommended Measures

HAI-01: Central Line-Associated Bloodstream Infection (CLAB) (CDC)

This measure was endorsed in both the hospital and nursing-sensitive care projects; it was recommended by the BSI and Pediatric TAP members with reservation since the measure was developed for surveillance rather than accountability and anecdotal use of these data for public reporting indicates that it may not be valid for comparison between hospitals. TAP members recommended that a subset of the CDC definition, as described above, be used for public reporting and comparison between healthcare facilities for adults. While Steering Committee members raised concern about the validity of a subset of the definition being used for public reporting, they ultimately supported the recommendations of the BSI TAP with the caveat that a measure based on this definition should be monitored to avoid unintended consequences.

HAI-02: Central Line Insertion Bundle (Institute for Healthcare Improvement)

The Healthcare-associated Infections in Pediatric Populations (Pediatric) TAP and Steering Committee recommended this measure from the Institute for Healthcare Improvement, despite the recommendation of members of the Bloodstream Infection (BSI) TAP, who preferred a similar measure from the CDC. While the measure from the Institute for Healthcare Improvement applies only to patients age 18 or older, it was recommended by both the Steering Committee and Pediatric TAP since its specifications were more appropriate for adaptation to both adult and pediatric populations. Both measures specified chlorhexidine antiseptic, which requires additional research for children less than 2 years old.

Measures Not Recommended—Intravascular Catheter and Blood Stream Infections

Of the ten measures evaluated by TAP members, eight were not recommended for advancement.

- An additional measure of catheter-related bloodstream infections was not advanced since TAP members preferred the measure based on the CDC definition, which was specified more precisely and more widely used.
- Four measures were not included since the validity of the administrative data could not be confirmed at this time. TAP members recommended additional research, since the efficiencies in data collection would be welcome. The four measures included Selected infections due to medical care (adults and children) and Post-operative Sepsis (adult and children).
- A measure addressing peripheral intravenous catheters was not recommended since it out of scope for this project.
- TAP members recommended that two measures addressing central line insertion practices were suitable for public reporting; the Steering Committee preferred the measure that was more applicable to pediatric patients.
- An electronic surveillance tool to identify nosocomial infections was reviewed by two TAPs and the Steering Committees. While all reviewers agreed that electronic surveillance of healthcare-associated infections should be explored because of its potential value, the tool that was reviewed was not ready for immediate use for public

reporting nationally. Specifically, TAP members questioned whether the tool could produce comparable information between institutions since a risk adjustment methodology was not specified; they also questioned its utility for hospitals of varying sizes.

Research Recommendations

While the Steering Committee recommended two bloodstream infection measures that could be used for public reporting, they also identified gaps in measurement and guidance for implementation of public reporting initiatives.

- ***Develop measures that assess compliance with proper line maintenance procedures.*** Appropriate maintenance of central lines provides critical leverage for reducing healthcare-associated blood stream infections.[14,15,16] Measuring line maintenance may be useful to identify areas, related to bloodstream infection rates, in need of improvement.
- ***Develop measures that assess adherence to evidence-based protocols for ensuring the competency of those inserting and maintaining central lines.*** Healthcare facilities often select certain staff to perform central line insertions; however, we currently do not have measures to determine if those staff perform insertions in accordance with guidelines or if they have continuing education and whether they are routinely evaluated. Measures might include data on line placement, number of insertions for each inserter and whether training is current. Additional measures might include whether a facility has programs to establish competency in appropriate insertion techniques
- ***Develop measures of BSI rates that track infections identified after hospital discharge.*** Pediatric TAP members recommended that measures be developed to address central line-associated BSI measures that track infection rates after hospital discharge, since pediatric catheters are often managed in home or community settings.
- ***Modify the IHI Central Line Bundle to discourage femoral vein insertion in those over 18 years of age.*** The IHI bundle HAI-02 recommends subclavian insertion, which is based on

[14] Mermel LA. Prevention of intravascular catheter-related infections. *Ann Intern Med.* 2000;132:391-402.
[15] Viale P, Politi E, Sisti M, et al. Impact of central venous catheters (CVC) management on infectious risk [Abstract]. J *Hosp Infect*. 1998;40(Suppl A):8.1.8.
[16] Ena J, Cercenado E, Martinez D, Bouza E. Cross-sectional epidemiology of phlebitis and catheter-related infections. Infect Control Hosp Epidemiol. 1992;13:15-20.

observational studies. While the risk of infection at the subclavian site is lower than the internal jugular site, the bundle should state that femoral catheterization should be avoided if at all possible in patients over 18 years of age based on prospective, randomized data in adults showing that this site has higher infection and DVT risks.[17]

In addition to creating a research agenda for measure development, several gaps in research were identified.

- ***Develop clinical care guidelines for culturing patients.*** Methods used to draw samples may vary between hospitals for the following reasons: samples are often drawn through catheters, which may introduce contaminants; two samples may be obtained from the same draw, rather than at separate occurrences, as recommended; or the frequency of blood sampling and the reasons for culturing might be different across institutions. Guidelines from the Infectious Disease Society of America (IDSA), the American College of Critical Care Medicine, and the Society for Healthcare Epidemiology[18] and additional evidence[19,20,21,22,23] recommend that two cultures should be drawn from peripheral veins.
- ***Evaluate how lapses in maintenance of intravascular catheters contribute to the risk of developing bloodstream infections.*** Improper maintenance of intravascular catheters (i.e., breaches in aseptic technique) has been identified as a contributing cause of catheter-associated bloodstream infections, especially for intravascular catheter used for extended periods.[24,25,26] Identifying and measuring appropriate methods for line maintenance will provide leverage points for developing interventions and improving quality care.

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[17] J Merrer, B De Jonghe, F Golliot, et al. Complications of femoral and subclavian venous catheterization in critically ill patients. *JAMA*. 2001;286:700-707.

[18] Mermel LA, Farr BM, Sheretez RJ, et al. Guidelines for the management of intravascular catheter-related infections. *Clinical Infectious Disease*..2001;32(9): 1249-1272.

[19] DesJardin J. Clinical utility of blood cultures drawn from indwelling central venous catheters in hospitalized patients with cancer. *Ann Intern Med* 1999; 131:641–7.

[20] Siegman-Igra Y, Anglim AM, Shapiro DE, et al. Diagnosis of vascular catheter–related bloodstream infection: a meta-analysis. *J Clin Microbiol* 1997; 35:928–36.

[21] Mermel LA, Maki DG. Infectious complications of Swan-Ganz pulmonary artery catheters and peripheral arterial catheters. In: Seifert H, Jansen B, Farr BM, eds. Catheter-related infections. New York: Marcel Dekker, 1997:259–305.

[22] Dunne WM Jr, Nolte FS, Wilson ML. Blood cultures III. In: Hindler JA, ed. Cumitech 1B. Washington, DC: American Society for Microbiology, 1997:1–21.

[23] Blot F, Schmidt E, Nitenberg G, et al. Earlier positivity of central venous versus peripheral blood cultures is highly predictive of catheter related sepsis. *J Clin Microbiol* 1998; 36:105–9.

[24] Mermel LA. Prevention of intravascular catheter-related infections. *Ann Intern Med*. 2000;132:391-402.

- ***Identify guidelines that specify appropriate situations for inserting lines into femoral veins.*** Frequency of femoral line insertions should be monitored and a benchmark should be established to determine if rates are too high.
- ***Evaluate the appropriateness of using "central line days" as a denominator calculating catheter-related bloodstream infection rates.*** While the CDC calculates rates based on *patients* with a central line, i.e., "central line days", regardless of how many lines a patient may have, TAP members suggested that *counting all lines* in each patient may be more suitable for public reporting since each line represents a risk somewhat independently of the other lines inserted.
- ***Implement more efficient mechanisms to count catheter days.*** Evidence suggests that counting catheter days one time per week has a high degree of validity for denominator data, which would lessen the data collection burden.[27]
- ***Standardize methods for categorizing ICU groups.*** While stratification by ICU is an appropriate mechanism to adjust for risk of catheter-related bloodstream infections, ICU categorization should be standardized among hospitals.

SURGICAL SITE INFECTIONS

Scope and Definitions

Scope of Measurement

In addition to the overarching scope for the entire project, the Surgical Site Infection (SSI) TAP suggested that the measures under consideration could be adapted to pediatric patients, with appropriate dosage modifications. TAP members recommended that trauma patients be excluded from SSI measures, due to the wide variation in surgical procedures, confounding factors (high degree of exposure to contaminants) for this population and the difficulty of implementing prophylactic interventions for these patients. Measures that address antibiotic resistance specifically were not identified for SSI in this project. However, the TAP took into consideration antibiotic resistance issues where appropriate when reviewing each measure.

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[25] Viale P, Politi E, Sisti M, et al. Impact of central venous catheters (CVC) management on infectious risk [Abstract]. J *Hosp Infect*. 1998;40(Suppl A):8.1.8.

[26] Ena J, Cercenado E, Martinez D, Bouza E. Cross-sectional epidemiology of phlebitis and catheter-related infections. Infect Control Hosp Epidemiol. 1992;13:15-20.

[27] Klevens RM, Tokars JI, Edwards J, et al. Sampling for collection of central line-day denominators in surveillance of healthcare-associated bloodstream infections. *Infect Control Hosp Epidemiol*. 2006;27(4):338-42.

Definition of Surgical Site Infection for Accountability Measurement

Participants in the ad hoc committee on definitions discussed the definition of surgical site infections used in the NQF-endorsed™ measure, which was developed by the Society of Thoracic Surgeons (STS). Participants recommended TAP members consider the more inclusive CDC definition of surgical site infections rather than the STS definition, which addressed only deep sternal wound infections.

Members of the SSI TAP recommended that for surveillance purposes facilities should continue collecting all data for superficial incisional SSI, deep incisional SSI, and organ/space SSI, as specified by the current CDC definition, but for public reporting only deep incisional and organ/space infections should be included. Deep incisional and organ/space infections were recommended for public reporting because these infections often require hospitalization and are associated with significant morbidity and mortality, in comparison with superficial infections which are often treated in outpatient settings. These infections are high cost, high volume, and more relevant for consumer decisionmaking.

The Centers for Medicare and Medicaid Services (CMS) and the CDC are working toward an agreement on which ICD-9-CM codes will comprise the procedure categories included in the SSI measure. CMS is making plans to use a subset of the CDC SSI measure for public reporting. That subset is to include only deep incisional and organ space infections such as the following procedures: hysterectomy (abdominal and vaginal), coronary artery bypass graft (CABG) and other cardiac surgery, colectomy, joint replacements (hip and knee); and vascular surgeries. In addition, infections related to these procedures can be captured upon readmission to the hospital of the initial operative procedure within the 30-day time period where there were no implanted devices and 1-year for implanted devices (e.g., joint replacements).

Previously Endorsed Measures

Four of the measures reviewed by the SSI TAP were previously endorsed measures—three from the Hospital Care project[28] and one from the Cardiac Surgery project.[29] The three hospital care

[28] NQF. *National Voluntary Consensus Standards for Hospital Care: An Initial Performance Measure Set.* Washington, DC: NQF, 2003.

[29] NQF. *National Voluntary Consensus Standards for Cardiac Surgery.* Washington, DC: NQF, 2004.

measures, which are part of the CMS Surgical Care Improvement Project (SCIP), were advanced. They address antibiotic timing, selection, and discontinuation for surgery patients. The fourth measure, from the Cardiac Surgery project, addresses deep sternal wound infection rate for CABG; it was not recommended for inclusion in this project, but can be captured in the recommended SSI measure. The SSI TAP identified several reasons for excluding this measure from this project:

- The measure counts only deep sternal wound infections that occur during the initial admission and within 30 days of surgery. It does not include patients who are readmitted for deep sternal infection, even if within 30 days. A substantial number of infections develop post-discharge and are found on readmission.
- The measure applies only to CABG patients and does not translate well to general surgery.
- The risk adjustment methodology, which includes the collected 21 variables, has not been validated for procedures other than CABG.
- The numerator includes only deep sternal wound infections, whereas the CDC data can be used to report data on deep incisional and organ/space infections for seven procedures.
- The STS definition requires a positive culture, however, not all surgeons may take a culture (i.e., it may not be necessary or possible).

Members were advised that their recommendation regarding this measure be taken into consideration when the measure is updated by the developer as part of ongoing maintenance of NQF endorsement. The Steering Committee supported the TAP recommendation.

Recommended Measures

HAI-03: Surgical Site Infection Rate (CMS/CDC)

SSI TAP members recommended this measure, as proposed by CMS and CDC, using the definition of SSI for public reporting described above, for endorsement. The TAP also identified areas for further refinement of the measure. The TAP recommended that the risk-adjustment methodology be improved to ensure proper comparisons of institutions and that the definition

be broadened to include SSI identified during hospital readmission to a hospital, in addition to SSI identified during the initial hospital visit. The Pediatric TAP did not specifically review this measure as the SSI TAP had not recommended this measure at the time of the Pediatric TAP meeting. The Pediatric TAP did, however, discuss this measure in context of the antibiotic timing, prophylaxis and discontinuance measures (HAI 04, 05 and 06), noting that the measure specifications did not include persons under age 18 or the codes for pediatric procedures. The Steering Committee supported the SSI TAP recommendation.

HAI-04: Prophylactic Antibiotic Received within One Hour Prior to Surgical Incision (CMS/Joint Commission)

TAP members recommended this measure due to the strength of the data on the relationship between the use of prophylactic antibiotics and surgical site infections for the included procedures categories, though data demonstrating the importance of the specific timing of antibiotics is weak. Noting that the measure specifications did not include persons under age of 18 or the codes for pediatric procedures, the Pediatric TAP supported use of this measure if the specifications were modified appropriately. The Steering Committee supported the SSI TAP recommendation.

HAI-05: Prophylactic Antibiotic Selection for Surgical Patients (CMS/Joint Commission)

TAP members recommended this measure based on the feasibility of data collection and strong supporting evidence for the relationship between the use of the recommended antibiotics and SSI for the specified procedure categories from randomized controlled trials; however, they noted that compliance is high, and therefore room for improvement in this area might be limited. Again, noting that the measure specifications did not include persons under age 18 or the codes for pediatric procedures, the Pediatric TAP supported use of this measure if the specifications were modified appropriately. The Steering Committee supported the TAP recommendation.

SSI TAP Members had concerns about identifying appropriate situations to administer Vancomycin in lieu of other antibiotics (i.e. when patient allergy is present, when high rates of methicillin-resistant *Staphylococcus aureus* (MRSA) or *Staphylococcus epidermidis* are reported).

TAP Members also felt requiring documentation of a reason for use of Vancomycin places an unreasonable burden on the physician. The Steering Committee supported the SSI TAP recommendation.

HAI-06: Prophylactic Antibiotic Discontinued within 24 Hours after Surgery End Time, 48 Hours for CABG and Other Cardiac Surgery (CMS/Joint Commission)

TAP members recommended this measure after considering several factors, including whether administration of antibiotics beyond 24 (or 48) hours decreases infection rates; increases rates of *Clostridium difficile (C. difficile)*; or increases antibiotic resistance. Evidence indicates that prolongation of antibiotics beyond this period does not confer any anti-infection benefit, although the rates of *C. difficile* and antibiotic resistance increase. The specification to allow antibiotic continuation up to 48 hours in cardiac surgery is based on evidence from non-randomized trials with cardiac surgery patients that have shown higher rates of *C. difficile* and higher rates of antibiotic resistance when antibiotics are continued past 48 hours after surgery. Rates for this measure are generally not as high as the rates for the measures of prophylactic antibiotics prior to surgery and antibiotic selection. The Pediatric TAP supported use of this measure if the specifications were modified appropriately as is consistent with the two previous antibiotic timing and selection measures. The Steering Committee supported the SSI TAP recommendation.

HAI-07: Cardiac Surgery Patients with Controlled 6AM Postoperative Serum Glucose (CMS/Joint Commission)

TAP members recommended this measure after the CMS Technical group noted that the measure was the best available measure that was feasible, the 200mg/dL postoperative serum glucose level was obtainable and was correlated with better outcomes. The technical group clarified that the use of 2 glucose determinations in the measure was based on the original tri-state audit which showed the inability to gather data more frequently or to average glucose levels. Pediatric TAP members noted that although an altered measure may be suitable for older children and diabetic patients, this measure could be potentially dangerous for infants and young children. The Steering Committee supported the SSI TAP recommendation.

HAI-08: Appropriate Hair removal (CMS, Surgical Care Improvement Project)

TAP members recommended this measure, yet noted their concern about the conflicting evidence in this area. A Cochrane review included 3 randomized studies that have shown shaving to be inferior to clipping and 7 studies that have shown shaving to be inferior to depilatories. Two other systematic reviews have also shown an advantage to not shaving. Additionally, the studies were all conducted greater than ten years ago (1971-1992) and they aggregated all types of SSI. Some members of the TAP felt the effort to document the type of hair removal process may be considerable, although others noted that hair removal was routinely captured in the operative note. . TAP members indicated that aggregation would obscure the relationship between shaving and deep incisional or organ/space infections, which are most important. CMS noted that in their preliminary testing, use of shaving occurred in up to 30% of facilities, indicating there is significant room for improvement. The Steering Committee supported the SSI TAP recommendation.

Measures Not Recommended—Surgical Site Infections

Two additional measures were evaluated by TAP members, but were not recommended. One a process measure – colorectal surgery patients with immediate post operative normothermia - did not have a sufficient evidence base and applied to a very small population. The second was a surgical site infections rate measure; it was not recommended due to the requirement of having a trained data abstractor, the amount and breadth of quality data required, and the difficulty of collecting the measure for healthcare facilities without electronic data collection systems. Members also felt that risk adjustment algorithms for the measure were inadequate and that the measure was developed and primarily used specifically for general and vascular surgeries in high volume institutions.

Research Recommendations

While several measures were recommended, TAP members identified areas for future measure development and opportunities to improve upon existing measures in future iterations.

- ***Develop a composite measure consisting of the three surgical care infection prevention measures addressing appropriate antibiotic use for surgical patients.*** Three measures from the Surgical Care Infection Prevention (SCIP) project were evaluated for inclusion

in this measure set. The TAP recommended developing a composite measure for these three items since the data are collected at the same time and would increase the feasibility of creating a composite measure.

- ***Include additional procedures in the antibiotic timing measures.*** The recommended antibiotic timing measures were limited to high volume, high impact procedures because evidence is not strong enough to support inclusion of other procedure categories, and because the burden of surveillance for other procedures might be unreasonably high given their importance. TAP members recommended further research to establish evidence for the importance of these measures for other procedures, and development of measures where evidence indicates they are appropriate (e.g., central nervous system (CNS) procedures).
- ***Develop additional surgical site infection measures.*** TAP members recommended using the recommendations with the highest evidence (i.e., level A-1 and A-2 evidence) from the Healthcare Infection Control Practices Advisory Committee (HICPAC) report[30] as a resource to develop additional measures.
- ***Modify surgical site infection measures to include patients less than 18 years of age.*** The measure is currently not specified for patients under 18 years old, however the Pediatric TAP supported the modification of the three surgical infection prevention measures to include children, with the following considerations: antibiotic timing may conflict with care policies which allow parents to be present during anesthesia induction; and, for children, antibiotic timing prior to surgery should be 30 minutes to one hour prior to the procedure and administration should be completed prior to incision, based on the American Academy of Pediatrics Red Book.[31] The pediatric TAP also felt that these three measures should be modified to include the following procedures for pediatric patients: ventricular-peritoneal shunt procedures, circumcision, correction of scoliosis, and congenital cardiac surgery repair.

[30] McKibben L, Horan T, Tokars JI, et al. Guidance on Public Reporting of Healthcare-Associated Infections: Recommendations of the Healthcare Infection Control Practices Advisory Committee. *American Journal of Infection Control*; 33(4):217-226.

[31] American Academy of Pediatrics: Antimicrobial Prophylaxis. In: Pickering LK, Baker CJ, Long SS, McMillan JA, eds. *Red Book: 2006 Report of the Committee on Infectious Diseases*. 27th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2006:824-828.

In the course of their evaluations, TAP members identified several factors that would add value to the information available for each recommended measure. The following TAP recommendations identify areas in need of additional research to facilitate standardized implementation of the measure set.

- ***Identify valid risk stratification and adjustment methodologies for surgical site infections.*** There is little research on risk stratification methods and risk adjustment related to surgical site infections, particularly with regard to co-morbidities and severity of illness at the time of the procedure.
- ***Conduct additional research on the feasibility, reliability and validity of surgical site infection measures.*** As these measures are more widely implemented, TAP members recommend conducting an assessment of the reliability, validity and feasibility of data collection.

CATHETER-ASSOCIATED URINARY TRACT INFECTIONS

Scope and Definitions

Scope of Measurement

In addition to evaluating and recommending measures for endorsement, the Steering Committee requested that the Indwelling Catheters and Urinary Tract Infections TAP set an appropriate scope for outcomes measurement of healthcare-associated UTI. During its deliberations, the TAP identified the parameters of measurement in terms of suitability for public accountability, opportunity for improvement, and burden of disease.

The TAP concluded that outcomes measurement should focus on symptomatic bacteriuria occurring in patients with indwelling urethral catheters. This scope focuses measurement on a defined population at significant risk of contracting a preventable infection. Limiting measurement to this population has the following advantages:

- ***Addresses significant burden of disease.*** The great majority of healthcare-associated UTIs result from instrumentation of the urinary tract, usually catheterization.
- ***Measures a commonly used modifiable risk factor.*** Catheterization is a common practice; approximately 15—25% of hospital patients have a urinary catheter at some time during their stay, with rates of utilization varying by unit type within the

hospital.[32] Indwelling urethral (Foley) catheters are the most frequently utilized catheter type. The risk of contracting catheter associated urinary tract infection (CAUTI) increases with the duration of catheterization.[33] Despite this risk, catheters are often over-utilized and unnecessary, placing these patients at needless risk of contracting infection.[34,35,36]

- ***Permits attribution to healthcare interventions.*** In the absence of a catheter, susceptibility to infection is significantly modified by host defenses and anatomy, making it difficult to attribute infection to processes of care.
- ***Measures a condition for which prevention, screening, and treatment are established.*** Screening and prophylaxis for asymptomatic bacteriuria is generally not recommended, except in some special populations.[37]

Defining Healthcare-Associated Urinary Tract Infection for Accountability Measurement

TAP members were also asked to evaluate current definitions of healthcare-associated UTI for their sensitivity and specificity within the identified scope. Definitions considered were those used by the Association for Professionals in Infection Control and Epidemiology (APIC) for home health[38] and long-term care settings[39], by Centers for Medicare and Medicaid Services

[32] Weinstein JW, Mazon P, Pantelick E, et al. A decade of prevalence surveys in a tertiary-care center: trends in nosocomial infection rates, device utilization, and patient acuity. *Infect Control Hosp Epidemiol.* 1999;20:543-548.

[33] Saint S, Kaufman SR, Thompson M, et al. A reminder reduces urinary catheterization in hospitalized patients. *Jt Comm J Qual Patient Saf.* 2005;31(8):455-62.

[34] Jain P, Parada JP, David A, et al. Overuse of the indwelling urinary tract catheter in hospitalized medical patients. *Arch Intern Med.* 1995;155:1425-1429.

[35] Harstein AI, Garber SB, Ward TT, et al. Nosocomial urinary tract infection: a prospective evaluation of 108 catheterized patients. *Infect Control.* 1981;2:380-386.

[36] Saint S, Wiese J, Amory JK, et al. Are physicians aware of which of their patients have indwelling urinary catheters? *Am J Med.* 2000;109:476-80.

[37] Nicolle LE, Bradley S, Colgan R, et al. Infectious Diseases Society of America guidelines for the diagnosis and treatment of asymptomatic bacteriuria in adults. *Clin Infect Dis.* 2005;40(5):643-54.

[38] Embry FC, Chinnes LF. APIC Special Communication: Draft definitions for surveillance of infections in home health care. *Am J Infect Control.* 2000 Dec;28(6):449-53. Available at http://www.apic.org/AM/Template.cfm?Section=Search&section=Surveillance_Definitions&template=/CM/ContentDisplay.cfm&ContentFileID=23 Last accessed April 9, 2007

[39] McGeer A, Campbell B, Emori TG, et. al. *Definitions of Infection for Surveillance in Long Term Care Facilities.* American Journal of Infection Control 1991;19(1):1-7. Available at http://www.apic.org/AM/Template.cfm?Section=Surveillance_Definitions_Reports_and_Recommendations&Template=/CM/ContentDisplay.cfm&ContentFileID=24 Last accessed April 9, 2007

(CMS) for the Minimum Data Set (MDS) measures of nursing home care[40], by CMS for the Outcome and Assessment Information Set (OASIS) Outcome-based Quality Improvement (OBQI) and Outcome-Based Quality Monitoring (OBQM) measures of home health agencies[41], and by Centers for Disease Control and Prevention (CDC/NHSN) for infection surveillance.[42]

None of these definitions were identified as fully acceptable for supporting outcomes measurement. In general, definitions did not distinguish between infections in catheterized and non-catheterized patients; ideally, definition criteria should be specific to infections arising from a catheter and would be stratified by catheter type (i.e., Foley, condom, suprapubic). TAP members noted that diagnostic criteria listed in definitions may not be specific to CAUTI. Recent literature suggests that diagnostic criteria such as accepted microorganism thresholds, 'traditional' uropathogen designations, and certain symptoms (i.e., urgency, frequency, dysuria, suprabic tenderness, and leukocytosis) are not useful to distinguish between infected and non-infected catheterized patients.[43,44,45] Furthermore, these criteria may arbitrarily exclude a significant proportion of the population at risk— reliance on symptoms requiring patient complaint excludes patients unable to communicate these symptoms, and provisions requiring symptoms to have "no other recognized cause" excludes patients with confounding comorbidities who may nonetheless have a CAUTI. Several definitions included clinician diagnosis of UTI or initiation of treatment for UTI as criteria for case identification, which the TAP agreed were inappropriate for supporting outcomes measurement due to questionable sensitivity and specificity and potential unintended consequences. In addition to concerns about the specificity of criteria, TAP members were uncertain whether definitions would be

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[40] Centers for Medicare and Medicaid Services. Revised Long-Term Care Facility Resident Assessment Instrument User's Manual, Version 2.0, December 2002, Revised January 2006. Chapter 3: Item by Item guide to the MDS. Accessed 05/21/07: http://www.cms.hhs.gov/NursingHomeQualityInits/downloads/MDS20rai1202ch3.pdf

[41] Centers for Medicare and Medicaid Services. Appendix: Guidelines for Reviewing Case Mix and Adverse Event Outcome Reports. Accessed: 05/21/07, http://www.cms.hhs.gov/apps/hha/obqm3.pdf

[42] Horan TC, Gaynes RP. Surveillance of nosocomial infections. In:Hospital Epidemiology and Infection Control, 3rd ed., Mayhall CG, editor. Philadelphia:Lippincott Williams & Wilkins, 2004:1659-1702.Available at http://www.cdc.gov/ncidod/dhqp/pdf/nnis/NosInfDefinitions.pdf Last accessed April 9, 2007.

[43] Maki DG, Tambyah PA. Engineering out the risk of infection with urinary catheters. *Emerg Infect Dis.* 2001;7(2): 342-347.

[44] Stark RP, Maki DG. Bacteriuria in the catheterized patient: What quantitative level of bacteriuria is relevant? *N Engl J Med.* 1984 Aug 30;311(9):560-4.

[45] Tambyah PA, Maki DG. Catheter-associated urinary tract infection is rarely symptomatic: a prospective study of 1497 catheterized patients. *Arch Intern Med.* 2000;160:678-82.

feasible to collect across institutions and whether data collection could be performed with consistent quality.

Of definitions examined, the TAP agreed that the CDC/NHSN definition is the best currently in use and, with additional research and specification, holds the most potential for supporting outcomes measurement. While the TAP acknowledged that the criteria used are suitable for surveillance purposes, the criteria's sensitivity and specificity in measuring CAUTI outcomes for facility-to-facility comparison is not established. Further research on this definition is strongly recommended.

The Pediatric TAP recommended that this area is not a priority for measurement in pediatrics due to the low frequency of catheter use and the difficulty of attributing UTIs in children to the receipt of healthcare.

Measures Not Recommended—Catheter-associated Urinary Tract Infections

During its deliberations, the CAUTI TAP evaluated four measures; none of these measures were recommended to advance for endorsement. Generally, concerns about definitions of CAUTI, absence of risk adjustments, and failure to discriminate between catheter- and non-device associated infections were cited as reasons for measures to be withheld from endorsement. Discussion of specific measures is listed below.

- ***Urinary Catheter Utilization (CDC).*** The numerator for this measure is catheter days and the denominator is patient days, with results stratified by unit type. The TAP concluded that the measure provides no mechanism to distinguish appropriate catheter use from inappropriate catheter use, either by utilization, catheter type, or duration of catheterization—a primary risk factor for infection. In addition, the measure is not risk adjusted for patient populations or comorbidities, and it has not been tested for suitability as a comparative indicator. Absent any risk adjustment, stratification, or thresholds that could differentiate between appropriate and inappropriate care, this measure was deemed not useful for consumer decision-making or meaningful comparison between institutions at this time. Modification of this measure to distinguish between high- and low-quality utilization strategies and to appropriately adjust for risk (beyond stratification by unit type) should be pursued.

- ***Urinary Catheter-Associated Urinary Tract Infection for Intensive Care Unit (ICU) Patients (CDC).***[46] Based on concerns the TAP had expressed with the CDC/NHSN definition of CAUTI used to generate the numerator, the group concluded that this measure is not ready for public reporting. Additionally, this measure is not risk adjusted aside from stratification by unit type, which undercuts its suitability for use in facility to facility comparison. Further research on the sensitivity and specificity of the definition's criteria is necessary before this measure can be determined to be valid for accountability purposes.

  Since this measure is currently being implemented by the state of Pennsylvania, Steering Committee members asked staff to evaluate whether the Pennsylvania implementation has been able to avoid the concerns raised by the TAP. Staff evaluation did not indicate that the Pennsylvania implementation had been able to clarify definitional issues and found that implementation was outside the scope of UTI measurement previously endorsed by the Steering Committee, in that it was inclusive of asymptomatic bacteriuria. This measure was ultimately not advanced for endorsement, although both the TAP and Steering Committee recognize the significant need for an outcomes measure at this time.
- ***Residents with a Urinary Tract Infection (CMS/MDS).*** [47] Numerator inclusions are identified with the MDS definition, which relies on initiation of treatment as a criterion for case identification. The measure neither distinguishes between community-acquired or healthcare-acquired UTI, nor does it differentiate between catheterized and non-catheterized patients. Aside from the definitional issues, the measure lacks appropriate risk adjustment.
- ***Residents Who Frequently Lose Control of their Bowel or Bladder (low-risk) & Residents Who Have a Catheter in their Bladder at any Time During the 14 Day Assessment Period (paired measure) (CMS/MDS)[48].*** While the TAP agreed that the measure appears to be good for assessing continence care and appropriate catheter utilization in low-risk elderly populations, they were unable to conclude whether this is

[46] Previously endorsed in *National Voluntary Consensus Standards for Hospital Care* and *National Voluntary Consensus Standards for Nursing-Sensitive Care*
[47] Previously endorsed in *National Voluntary Consensus Standards for Nursing Home Care*
[48] Previously endorsed in *National Voluntary Consensus Standards for Nursing Home Care.*

a good measure relevant to infections. The group saw the logic in the concept that appropriate catheter utilization in cases of low-risk incontinence is a good proxy for infection prevention, but the measure has not been used or tested for this purpose and would require validation. Because the measure addresses catheter utilization in nursing home residents, a population for whom this is an important issue, the TAP concluded that this measure should be revisited and retested for use as a process measure.

Harmonization with the NQF-Endorsed™ Safe Practices for Better Healthcare

In October 2006, the NQF Board of Directors approved endorsement of the updated NQF Safe Practices for Better Healthcare, which includes five practices aimed at reducing nosocomial infections. While these five practices address important issues in infection prevention, they do not include interventions or specifications addressing CAUTI. The TAP recommended that CDC guidelines for urinary catheter care and a specification for a written or computerized system for catheter automatic stop orders and daily reminders to check catheter status be incorporated into the Healthcare Associated Infections chapter of the NQF Safe Practices. Studies have shown that good catheter care is critical for avoiding infection and that a reminder system or prompt can significantly decrease duration of catheterization, a primary risk factor for CAUTI. [49,50,51]

Recommendations for Measure Development and Research

Recognizing the lack of measures of CAUTI, TAP members generated the following recommendations for measure development. These 'measure concepts' are for process and structure measures to be reported in conjunction with an infection rate outcome measure; measures in any of the following areas could be developed and implemented relatively quickly and could facilitate public reporting and quality improvement while a suitable outcomes measure is developed and refined. Any measure development would require supporting

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[49] Saint S, Kaufman SR, Thompson M, et al. A reminder reduces urinary catheterization in hospitalized patients. *Jt Comm J Qual Patient Saf*. 2005;31(8):455-62.

[50] Cornia PB, Amory JK, Fraser S, Saint S, Lipsky BA. Computer-based order entry decreases duration of indwelling urinary catheterization in hospitalized patients. *Am J Med*. 2003; 114(5):404-7.

[51] Huang WC, Wann SR, Lin SL, et. al. Catheter-associated urinary tract infections in intensive care units can be reduced by prompting physicians to remove unnecessary catheters. *Infect Control Hosp Epidemiol*. 2004;25(11):974-8.

research on risk adjustment and stratification methods to account for patient populations, comorbidities, unit type, and catheter type.

- ***Develop measures to assess urinary catheter utilization.*** Because catheter use is the most significant modifiable risk factor for CAUTI, risk-adjusted, well stratified measures of catheter utilization in all settings where catheters are used will be critical for reducing CAUTI.
- ***Develop measures to assess appropriateness of initial catheterization.*** Overuse of catheters and unnecessary catheterization are significant problems; examples of measures that could address this issue include the proportion of catheterized patients with a documented order for insertion, whether a protocol is in place to assess indications for a catheter, or whether a facility has programs to establish provider competency in appropriate use of catheters.
- ***Develop measures to assess appropriateness of continued catheterization.*** Measures should be developed to ensure that once catheters are placed, they are appropriately documented, maintained, and assessed for removal; for example, measures of whether a facility has a system to track patients with catheters or of the frequency with which catheter status is documented could avoid 'forgotten' catheters.
- ***Develop measures to assess appropriateness and timeliness of catheter removal.*** Measures should be developed to identify institutions with protocols in place to ensure timely removal of catheters and whether these protocols are followed, for example, whether or not a facility has a system for catheter automatic stop orders.
- ***Develop measures to assess compliance with best practices of catheter care.*** Institutions should be measured on compliance with guidelines and whether programs are in place to train and support staff and caregivers on best practices.

Reliable, valid measures of outcomes of care remain an essential focus for quality measurement for accountability; however, TAP evaluations of CAUTI measures were complicated by the lack of information in the literature specific to CAUTI pathogenesis, risk, and diagnosis. In addition to their recommendations for immediate process/structure measure development, the TAP proposed further research to support the development and implementation of outcomes

measures, including research to expand clinical understanding of CAUTI and the means to prevent it.

- ***Pursue research to define outcomes measures of symptomatic CAUTI.*** As noted in the discussions definition above, additional work is needed to clarify the utility of the CDC/NHSN definition for this purpose. The sensitivity and specificity of criteria as they pertain to symptomatic CAUTI should be tested and research into modifications for risk adjustment, special populations, and catheter types should be pursued to maximize the utility of the measure output.
- ***Pursue research to clarify optimal strategies for managing patients who need urinary catheters.*** Best practices, such as the CDC's Guideline for the Prevention of Catheter Associated Urinary Tract Infections (1981), should be re-evaluated and updated regularly to incorporate advancements in technology and care practices. Additional research is needed to identify and standardize practices to improve care, to provide further information about the risks and benefits of new catheters and alternative catheterization strategies, and to expand knowledge of the pathogenesis, microbiology, and diagnosis of CAUTI.

VENTILATOR-ASSOCIATED PNEUMONIA AND RESPIRATORY ILLNESSESS

Scope and Definitions

Scope of Measurement

In addition to the scope established by the Steering Committee members for the entire project, the ventilator-associated pneumonia (VAP) TAP identified a scope of measurement for accountability. TAP members specified the following parameters for VAP measurement:

- ***Consider measures of VAP and Respiratory Illnesses in all care settings.*** While measures in non-inpatient care settings were not identified for this project, TAP members indicated that measurement may be feasible in long-term care settings, yet hospital definitions would not be appropriate due to the different diagnostic criteria, care methods and patient characteristics. For example, long-term care patients are more likely to have non-ventilator-associated, healthcare-acquired pneumonia (HAP), yet the

appropriate method for distinguishing this population from VAP has not been established.

- ***Any outcome measures identified or developed should focus on ICU patients.*** TAP members recommended that the greatest return from measuring VAP would result from measuring VAP in ICUs, to target high risk patients and offering the greatest leverage to improve quality care.

Defining Ventilator-associated Pneumonia for Accountability Measurement

Steering Committee members did not reach an agreement on a definition of VAP that could be used in an outcome measure for accountability. TAP members also did not identify an existing definition for accountability measurement; however, they made recommendations to develop an acceptable VAP definition for public reporting, based on guidelines from the American Thoracic Society (ATS) and Infectious Disease Society of America (IDSA).[52].

TAP members thoroughly discussed the implications of changing a definition that has been the foundation of VAP data collection for more than 30 years. While data for the National Healthcare Safety Network (NHSN) are widely collected, TAP members noted that the data cannot be meaningfully used for accountability measurement because of inconsistencies in the use of the VAP algorithms for diagnoses between institutions; however, they agreed the data are meaningful for diagnostic and surveillance purposes. TAP members suggested that a new definition should be identified for public reporting in order to collect data more accurately in order to compare the incidence of VAP across settings, since the incidence varies from 4% to 48%, depending on which criteria are used to diagnose VAP.[53] While a new definition would preclude comparison with previous data, TAP members indicated that the unintended consequences would be great if data that are not replicable were used for accountability, decision-making and reimbursement.

[52] American Thoracic Society; Infectious Disease Society of America. Guidelines for the management of adults with hospital-acquired, ventilator-associated, and healthcare-associated pneumonia. Am J Respir Crit Care Med. 2005;171(4):388-416.

[53] Minei JP, Hawkins K, Moody B, et al. Alternative case definitions of ventilator-associated pneumonia identify different patients in surgical intensive care units. *Shock.* 2000;14:331-336.

TAP members identified the following criteria to be included in a definition of VAP that would provide objective, meaningful data for an outcome measure that could be used for accountability:

- ***Microbiological test criteria should be a necessary component to define VAP, in addition to radiology results and clinical signs and symptoms, for use in an outcome measure for accountability.*** TAP members agreed that either laboratory data, (e.g., semi-quantitative cultures of endotracheal aspirates, bronchoscopic methods, non-bronchoscopic methods, histopathologic exams, etc) should be enlisted to confirm pneumonia diagnosis and assure a standard, objective definition. Inclusion of laboratory data was recommended for the following reasons:
  - While bronchoscopy and quantitative microscopy will identify nearly all VAP cases, for organizations that either do not have the resources for quantitative methods or prefer non-invasive methods, a spectrum of diagnostic criteria should be available then semi-quantitative analysis of endotracheal aspirates offers an acceptable, less expensive and relatively easy to implement diagnostic criteria. Utilization rates of semi-quantitative cultures have not been studied, although current evidence[54,55,56] states that moderate to heavy growth of a pneumonia-causing organism correlates well with quantitative methods and offers a less expensive and easy to implement diagnostic tool.
  - Categorizations of moderate or heavy growth should be standardized for use across hospital laboratories and using a specific threshold such as 10^5 colony-forming units per sample may result in better agreement between semi-quantitative and quantitative methods.
  - Endotracheal aspirates can be collected even on critically ill patients before any type of antibiotic course is begun, whereas it may not be as feasible to do with bronchoscopic methods.

[54] Middleton R, Broughton WA, Kirkpatrick MB. Comparison of four methods for assessing airway bacteriology in intubated, mechanically ventilated patients. *Am J Med Sci.* 1992304(4):239-245.
[55] Baughman RP. Diagnosis of ventilator-associated pneumonia. *Microbes Infect*. 2005;7(2):262-267.
[56] Fujitani S, Yu VL. Diagnosis of ventilator-associated pneumonia: focus on nonbronchoscopic techniques (nonbronchoscopic broncheoalveolar lavage, including min-BAL, blinded protected specimen brush and blinded bronchial sampling) and endotracheal aspirates. *J Intensive Care Med.* 2006;21(1):17-21.

- If a patient has been on antibiotics for 72 or more hours prior to the development of VAP, then the causative organism is likely to be antimicrobial resistant and a lower threshold should be used to confirm VAP diagnosis.

- ***Exclude positive blood cultures and positive growth in pleural fluid.*** Positive blood cultures and growth in pleural fluid are currently listed in the CDC definition as acceptable methods to confirm VAP diagnosis, yet TAP members agreed that these methods are less reliable since they do not reliably identify the source of infection and should be phased out as an acceptable method to collect data for a publicly reported VAP measure.[57,58]
- ***Include only bacterial pathogens.*** TAP members recommended including only criteria related to bacterial pathogens for diagnosing VAP, even though the CDC definition for diagnosing pneumonia contains criteria for including uncommon pathogens (e.g., spores, virus). The interventions and preventive measures (e.g., the Institute for Healthcare Improvement (IHI) ventilator bundle[59] and appropriate antibiotic use) recommended to decrease VAP rates are primarily effective for reducing rates of bacterial pneumonia, not viral or fungal pneumonia.[60,61,62] These criteria should only be applicable for public reporting, not clinical decision-making.
- ***Include only the first episode of VAP.*** TAP members discussed whether the definition should only include the first episode of VAP in a patient, since subsequent episodes introduce confounding variables.[63] Since the definition would be used in a measure

[57] Luna CM, Videla A, Mattera J, Vay C, Famiglietti A, Vujacich P, Niederman MS. Blood cultures have limited value in predicting severity of illness and as a diagnostic tool in ventilator-associated pneumonia. *Chest* 1999;116:1075–1084.
[58] American Thoracic Society; Infectious Disease Society of America. Guidelines for the management of adults with hospital-acquired, ventilator-associated, and healthcare-associated pneumonia. Am J Respir Crit Care Med. 2005;171(4):388-416.
[59] See HAI-09 in the measure specification table (Appendix A).
[60] Craven DE, Steger KA. Epidemiology of nosocomial pneumonia: new perspectives on an old disease. *Chest* 1995;108:1S–16S.
[61] Tablan OC, Anderson LJ, Besser R, et al. Guidelines for preventing health-care-associated pneumonia, 2003: recommendations of the CDC and the Healthcare Infection Control Practices Advisory Committee. MMWR Morb Mortal Wkly Rep 2004; 53(RR-3):1–36
[62] American Thoracic Society; Infectious Disease Society of America. Guidelines for the management of adults with hospital-acquired, ventilator-associated, and healthcare-associated pneumonia. Am J Respir Crit Care Med. 2005;171(4):388-416.
[63] Eggiman P, Hugonnet S, Sax H, et al. Ventilator-associated pneumonia: caveats for benchmarking. *Intensive Care Med*. 2003;29(:2086-2089.

intended for public reporting, if a patient has multiple cases, only the first case should be counted.

- ***Specify the timeframe for VAP diagnosis.*** A pneumonia case that occurs in a healthcare setting should be defined as "ventilator-associated" only if it occurred ≥ 48 hours after intubation and met all other criteria of the pneumonia definition.

TAP members based their recommendations on the CDC surveillance definition[64] and the ATS/IDSA[65] guidelines on managing VAP the guideline, which was written for use across all types of medical centers with varying resources, so allowances are built in to account for variation in organizations' access to certain diagnostic tests. This guideline is the most recent and incorporates recommendations that address the challenges that were encountered with the implementation of the CDC diagnostic criteria and other VAP definitions.

Pediatric TAP members evaluated whether the recommended definition would be applicable to children and identified a few areas that should be highlighted.

- Diagnosing VAP in neonates is confounded by other pulmonary conditions including respiratory distress syndrome and bronchopulmonary dysplasia.
- Educate clinicians about the risk of collecting tracheal aspirates in neonates. If tracheal aspirates will be used to diagnose VAP in neonates, suctioning should not extend below the endotracheal tube as this can cause damage to the lung tissue
- Identify criteria to differentiate "new," "progressive," and "persistent" infiltrates.
- Use of the term "tracheal aspirate" rather than sputum for neonates should be considered as neonates do not produce sputum.
- Regarding the definition for VAP in children age 1 to 12, it is not clear that the upper age cutoff is the "right" one to differentiate VAP in children versus adults as children some years younger than 13 may manifest VAP similar to adults; there is little to no literature, however, to establish the "right" age cutoff.

[64] Horan TC, Gaynes RP. Surveillance of nosocomial infections. In:Hospital Epidemiology and Infection Control, 3rd ed., Mayhall CG, editor. Philadelphia:Lippincott Williams & Wilkins, 2004:1659-1702. Last accessed on May 16, 2007: http://www.cdc.gov/ncidod/dhqp/pdf/NNIS/NosInfDefinitions.pdf

[65] American Thoracic Society; Infectious Disease Society of America. Guidelines for the management of adults with hospital-acquired, ventilator-associated, and healthcare-associated pneumonia. Am J Respir Crit Care Med. 2005;171(4):388-416.

Members of the Steering Committee could not come to agreement on whether changing the definition to require microbiological results and introducing semi-quantitative cultures as an acceptable diagnostic criterion would help reduce the amount of variability of diagnosis if used in an outcome measure. Moreover, the use of this practice has not been established as a clinical practice guideline and while TAP Members recommended semi-quantitative methods be used more widely, Steering Committee members were hesitant to make the recommendation.. Additionally, Steering Committee members were concerned that no adequate mechanism exists to monitor gaming by auditing whether a culture should have been taken and was not.

Considering the continued debate regarding the diagnosis of VAP (and non-ventilator-associated pneumonia as well) the Steering Committee recommended that NQF convene a meeting of experts in this field including CDC, Joint Commission, CMS, members of the VAP and Reporting and Implementation TAPs. The three organizations are currently completing work to harmonize their definitions for pneumonia and all NQF-endorsed measures potentially affected by any changes to a definition should be suspended until the debate is resolved.

Previously Endorsed Measures

Three of the 10 measures considered by the VAP Technical Panel have been endorsed in previous NQF projects. Two vaccination measures, endorsed in the NQF Hospital Care project (2003), were reviewed by this Technical Panel; both measures were considered to be tools to measure and improve quality care, they were deemed out of scope for this project due to the limited impact patient vaccination has on reducing rates of VAP in hospitals.

Ventilator-associated Pneumonia Rate

A measure of the rate of ventilator-associated pneumonia was previously endorsed in the NQF Hospital Care (2003) and Nursing Sensitive Care (2004) projects. The recommendation to exclude this measure from the HAI measure set was made with reluctance, since one of the priorities of this project was to identify outcome measures for use in statewide, national and facility-level public reporting initiatives. The measure was not recommended based on experience gained during implementation of this measure for public reporting since the measure was initially endorsed.

Recommended Measures—Ventilator-associated Pneumonia and Respiratory Illnesses

HAI-09: Ventilator Bundle

The measure evaluates the number of intensive care unit patients on mechanical ventilation at time of survey for whom all four elements of the ventilator bundle are documented and in place. The ventilator bundle elements are: Head of Bed elevation 30 degrees or greater; daily "sedation vacation" and daily assessment of readiness to extubate; PUD (peptic ulcer disease) prophylaxis; DVT (deep vein thrombosis) prophylaxis. TAP members were divided about recommending this measure. They indicated that the measure should be used in conjunction with a reliable outcome measure in order to evaluate whether compliance with processes measured by the bundle improves VAP rates; however, an outcome measure was not recommended in this measure set. In addition to concerns about using this measure without an outcome measure, TAP members noted that two of the elements that the bundle measures are not directly related to improving VAP incidence (peptic ulcer disease prophylaxis and DVT prophylaxis).[66] The bundle also does not include a measure of appropriate oral care, which has been proven to decrease VAP rates.[67,68,69] Benefits of using this measure for public reporting include an improvement in team work and a reduction in VAP rates in hospitals that have implemented and measured all of the elements of the bundle.

Pediatric TAP members unanimously agreed that this measure should not be used in the NICU and that insufficient evidence is available for use of this measure in the PICU since no evidence exists to examine whether these practices are helpful or harmful to children. Members of the Steering Committee recommended that this measure advance since having process measures for VAP was important and this ventilator bundle, while not entirely related to VAP was correlated with an improvement in VAP rates. The Steering Committee agreed with the VAP TAP recommendation.

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[66] The American Thoracic Society (ATS)/Infectious Disease Society of America (IDSA) guidelines recommend two components of the bundle with good evidence (i.e., weaning and HoB elevation) and recommend one (PUD/stress ulcer disease [SUD] prophylaxis) with less solid evidence and only for use in certain situations.

[67] Rodriquez-Roldan JM, Altuna-Cuestra A, Lopez A, et al. Prevention of nosocomial lung infection in ventilated patients: use of an antimicrobial pharyngeal non-absorbable paste. *Crit Care Med*. 1990;Nov;18(11):1239-1242.

[68] Abele-Horn M, Dauber A, Bauernfeind A, et al. Decrease in nosocomial pneumonia in ventilated patients by selective oropharyngeal contamination (SOD). *Intens Care Med*. 1997;23:187-195.

[69] Bergmans DCJJ, Bonten MJM, Gaillard CA, et al. Prevention of ventilator-associated pneumonia by oral decontamination: a prospective, randomized, double-blind, placebo-controlled study. *Am J Respir Crit Care Med*. 2001;164:382-388.

HAI-10: Vaccination of Healthcare Workers

TAP members recommended that the vaccination measure for healthcare workers be included in this measure set, even though this topic was initially deemed out of scope. Vaccinating healthcare workers[70] is directly related to reducing transmission of VAP in hospitals and a measure of this practice provides a significant opportunity to identify areas in need of improvement. Acknowledging that this measure was deemed out of scope for this project, the Pediatric TAP also noted the importance of monitoring healthcare worker vaccination. The Steering Committee agreed with the VAP TAP recommendation.

Measures Not Recommended—Ventilator-associated Pneumonia and Respiratory Illnesses

Eight of the ten measures evaluated by TAP members were not recommended for inclusion in the HAI measure set; Steering Committee members agreed with the TAP recommendation. One of the measures recommended was the Ventilator Bundle (HAI-09), which was a composite measure that consisted of several measures--four of the measures considered were similar to elements of the Ventilator Bundle and Steering Committee members preferred to recommend the bundle rather than measures addressing individual processes.

Ventilator-associated Pneumonia Infection Rate

While this measure was previously endorsed in the NQF Hospital Care (2003) and Nursing Sensitive Care (2004) projects, Steering Committee members reluctantly did not recommend this measure for inclusion in the HAI measure set. The measure uses the CDC surveillance definition to calculate ventilator-associated pneumonia. The measure was not recommended because diagnoses are based on clinical criteria and radiology results alone, which is not sufficiently reliable to use for comparing VAP incidence between healthcare organizations.

Ventilator Weaning Orders

TAP members did not recommend a process measure evaluating the number of ventilated surgery patients in the ICU whose medical record contained documentation of an order for a

[70] Pearson ML, Bridges CB, Harper SA. Recommendations of the Healthcare Infection Control Practices Advisory Committee and the Advisory Committee on Immunization Practices: Influenza Vaccination of Healthcare Workers. *MMWR*. 2006; 55(RR02):1-16. Accessed on April 12, 2007: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5502a1.htm

ventilator-weaning program (protocol or clinical pathway) any time during the initial episode of ventilation. TAP members strongly agreed that ventilator weaning is a meaningful method to decrease VAP rates and a quality measure should be developed to measure whether the need for ventilation was assessed every day; however the measure considered was clearly specified and documentation of whether or not there is a plan in the medical record may not measure whether the process of interest was actually accomplished. In addition, the measure denominator only includes surgery patients, although it is critical for all ICU patients on ventilators.

Vaccination Measures

Two vaccination measures were reviewed by this Technical Panel; both have been endorsed in the NQF Hospital Care project (2003). While TAP members agreed that this measure is an old and venerable practice and continues to receive support and protect people from infections, the measures were not recommended since vaccinating patients is not directly related to a significant reduction in VAP rates. The Steering Committee supported the TAP recommendation.

Research Recommendations

While only one VAP measure was recommended in this project for use as an accountability measure, TAP members identified four specific areas for measure development. These 'measure concepts' were considered areas that offer leverage to improve quality care and areas where development of valid and reliable measures is feasible.

- ***Develop an outcome measure with a definition of VAP that can be used for accountability measurement***. TAP members recommended that a VAP outcome measure should be based on a definition that requires objective criteria that can be verified (i.e., laboratory results), clinical criteria and radiology results consistent with VAP to assure a standard, objective definition.
- ***Develop a measure of ventilator weaning***. TAP members agreed that the ventilator weaning order measure was not precisely specified and was not reliable, but they recommended a new measure be developed to more accurately capture appropriate weaning for ventilator patients.

- ***Develop a measure evaluating whether appropriate antibiotic therapy was administered to ventilated patients.*** The incidence of microbial resistant infections increases when antimicrobials are not appropriately prescribed.[71,72,73] If appropriate antibiotic administration for ventilated patients is measured, explicit instruction should be included to obtain a diagnosis of an organism prior to adjusting antibiotic therapy to treat pneumonia.
- ***Develop measures to identify VAP in patients with Acute Respiratory Distress Syndrome (ARDS).*** Patients with ARDS have multiple symptoms that may complicate the diagnosis of VAP. A quality measure for patients with ARDS may provide a mechanism to identify VAP in this population, since VAP is often under diagnosed in ARDS patients.

The following areas were identified as areas in need of additional research for quality measurement relating to VAP. Conducting research may provide additional information for future quality measurement endeavors related to ventilator-associated pneumonia.

- ***Evaluate the benefit of including oral care practices in the ventilator bundle.*** Current evidence[74,75,76] suggests that certain oral care practices are correlated with a decrease in the incidence of VAP and an oral care component be considered to add to the ventilator bundle.
- ***Trained Infection Control Practitioners or Hospital Epidemiologists, with experience in VAP diagnosis and data abstraction should be responsible for collecting and reporting VAP data.*** TAP members felt that it was feasible to collect reliable data, provided an infection control practitioner (ICP) or a hospital epidemiologist was responsible for collecting and reporting these data. NOTE: This was particularly recommended for

[71] Boyce JM, Opal SM, Chow JW, et al. Outbreak of multi-drug resistant Enterococcus faecium with transferable vanB class vancomycin resistance. *J Clin Microbiol* 1994;32:1148-53..

[72] McGowan JE Jr. Antibiotic resistance in hospital organisms and its relation to antibiotic use. *Rev Inf Dis.* 1983;5:1033-1048.

[73] Olson B, Weinstein RA, Nathan C, et al. Epidemiology of endemic Pseudomonas aeruginosa: why infection control efforts have failed. *J Infect Dis.* 1987; 150:808-816.

[74] Bergmans DCJJ,Bonten MJM, Gaillard CA, et al. Prevention of ventilator-associated pneumonia by oral decontamination. *Am J Respir Crit Care Med*. 2001;164 (3):382-388.

[75] Treloar DM, Stechmiller JK. Use of a clinical assessment tool for orally intubated patients. *Am J Crit Care*. 1995;4:355-360.

[76] Hideo M, Hiroyuki H, Shigeto O, et al. Oral care reduces incidence of ventilator-associated pneumonia in ICU populations. *Intensive Care Medicine*. 2006;32(2):230-236.

collecting VAP data, since diagnosis is difficult, but may be relevant for other priority areas.

- ***Define and measure healthcare-acquired pneumonia (HCAP).*** While VAP is a subset of HCAP, the incidence of HCAP, unrelated to VAP, is unknown and has not been widely studied.
- ***Additional research is needed to determine how frequently blood cultures, pleural fluid growth, and semi-quantitative cultures are used to diagnose VAP.*** VAP TAP members wanted to know the extent of impact that a recommendation to eliminate the use of blood cultures and pleural fluid to diagnose VAP and whether inclusion of semi-quantitative methods would impact current practice. Quantifying how frequently these procedures are used to diagnose VAP may elucidate potential unintended consequences that may arise from their recommendations.
- ***Explore the efficacy of potassium hydroxide wet preps as a diagnostic tool for VAP.*** Since evidence evaluating the utility of potassium hydroxide preparation is older and conflicted, additional research in this area should explore whether this diagnostic tool can serve as an objective measure for VAP. This laboratory test of lung aspirates had shown promise in detecting elastin fibers which are diagnostic of bacterial VAP and could increase the accuracy of diagnosis.[77]
- ***Develop methods to assess readiness to extubate in very low birthweight (VLBW) infants.*** Currently, assessing readiness to extubate in VLBW infants cannot be accurately and reliably evaluated unless a pediatric radiologist is present.
- ***Evaluate the usage of SUD/PUD prophylaxis and its relation to VAP***. Some evidence[78,79] has shown that organisms causing VAP cannot be tracked back to the stomach, implying that the stomach may not be an important source for VAP.
- ***Identify which organisms are responsible for VAP in children.*** TAP members suggested that non-bacterial pneumonia may be a causative agent in children more frequently than

[77] Cook D and Mandell L. Endotracheal Aspriation in the Diagnosis of Ventilator-Associated Pneumonia. *Chest 2000;117;195-197.* Accessed on May 21, 2007: http://www.chestjournal.org/cgi/reprint/117/4_suppl_2/195S.pdf
[78] Bonten MJ, Gaillard CA, de Leeuw PW, et al. Role of colonization of the upper intestinal tract in the pathogenesis of ventilator-associated pneumonia. *Clin Infect Dis.* 1997;24(3):320-323.
[79] Prod'horm G, Leuenberger P, Koerfer J, et al. Nosocomial pneumonia in mechanically ventilated patients receiving antacid, ranitidine, or sucralfate as prophylaxis for stress ulcer: a randomized controlled trail. Ann Intern Med 1994;120:653-662.

in adults. In light of the recommendation of the VAP TAP to limit a reporting definition to bacterial pathogens, further research should be conducted to determine the how frequently "uncommon" agents are responsible for VAP in children.

HEALTHCARE-ASSOCIATED INFECTIONS IN PEDIATRIC POPULATIONS

Scope and Definitions

Scope of Measurement

The Pediatric TAP was charged with reviewing the pediatric-specific healthcare-associated infection measures and making recommendations to the Steering Committee and reviewing all the candidate measures under consideration in the other content-specific TAP areas. For measures initially reviewed by the Intravascular Catheters and Blood Stream Infections (BS), Indwelling Catheters and Urinary Tract Infections (CAUTI), Surgical Site Infections (SSI), and Ventilator Associated Pneumonia and Respiratory Infections (VAP) TAPs, the Pediatric TAP is charged with reviewing whether the recommended definitions are applicable, in whole or in part, to children and discussing the appropriateness of incorporating children in at least a subset of the measures that will be reviewed for this project, particularly in light of the very few pediatric-specific measures currently identified.

The definitions and measures considered did not account for the different settings in which children with devices (e.g. intravascular catheters) may receive care. Many children are cared for in the community or at home rather than in the hospital. Pediatric TAP members made the following recommendations for measuring pediatric HAIs in various settings of care:

- rates of outpatient surgery utilization are increasing, so this setting should be included in performance measurement;
- step down units, nursing homes and long term care settings should be addressed since these facilities are a significant source for resistant infections to originate and grow; and
- data on transfers from other hospitals and between units are important to track in order to correctly attribute infections.

Several special pediatric sub-populations represent a proportion of patients that are at risk for healthcare-associated infections. Current age cut-offs for reporting HAI may not be optimal.

The age at which children developmentally achieve full immunocompetence may inform the CDC use of the age bands for infants and children, but there does not appear to be a biological basis for the age cut-off of 13 years of age in terms of child immunocompetence. During puberty, there may be some changes that impact HAI and increase their risk (e.g., the rate of meningococcemia is much higher in an adolescent than in infants), although evidence does not exist to substantiate this. Specifying different criteria for children under age one was acceptable since there may be more immune system variance for children under the age of one, with the neonatal period constituting the highest risk.

Several conditions or diseases were suggested by the TAP members where affected children have higher risk for infection and HAIs, including children with cystic fibrosis, suprapubic catheters, severe cerebral palsy (these children often have recurring aspiration pneumonia), central lines in the community (these line infections are not systematically tracked and reported), children with special needs and children who are device dependent (e.g., children on transfusion protocols, home ventilator programs, chelation protocols, etc.)

Pediatric TAP members also recognized several procedures that are performed frequently in children, which are not included in the CDC definition, including insertion of a ventriculo-peritoneal shunt, circumcision, correction of scoliosis, and congenital cardiac surgery repair.

Recommended Measures

Pediatric TAP members reviewed measures that were recommended from the BSI, CAUTI, SSI, and VAP TAP. Specific recommendations related to children for each priority area are discussed in the respective sections. One of the two pediatric-specific measures that were reviewed was recommended by the Pediatric TAP.

HAI-11A and HAI-11B: Late Sepsis or Meningitis in Neonates

TAP members recommended this measure, although they identified several problematic areas, including the numerator exclusion for cerbebrospinal fluid for fungal infection and several aspects of the risk adjustment methodology. The risk adjustment model includes race as a variable in the regression model, but TAP members believed that stratification may be a better method to adjust for race. Also, while the variables included in the model are statistically significant, TAP members questioned the clinical relevance of each factor in calculating a rate of

sepsis and meningitis for neonates. In addition, the birth weight categories used for this measure differ from the categories used by the NHSN. The Steering Committee agreed with the TAP recommendation.

Measures Not Recommended

One of the two pediatric-specific measures was not recommended for inclusion in the HAI measure set. The measure that TAP members did not recommended assessed whether central line infection prevention policies had been adopted in the pediatric intensive care unit setting. TAP members agreed that this measure was not clearly specified and the elements of the measure could be interpreted subjectively. The Steering Committee agreed with the TAP recommendation.

Research Recommendations

TAP members identified several gaps in current research for healthcare-associated infections in children. Recommendations from the Pediatric TAP that specifically address BSI, CAUTI, SSI and VAP appear in the respective section. The following additional pediatric-specific measure recommendations were identified:

- Develop measures to monitor antimicrobial therapy, including tracking the frequency of appropriate selection, duration of agent/therapy, and number of courses given for contaminated cultures (e.g., appropriate selection and use of vancomycin) for children undergoing surgical procedures.
- Develop outcome measures for healthcare-associated infections caused by viruses that are relevant to pediatrics, including rates of respiratory and GI infections (no symptoms on admission with symptoms manifesting 72+ hours after admission) and rates of worker viral infections compared with patient infection rates.

TAP members also identified areas for future research to support measurement of healthcare-associated infections in pediatric TAPs. Similar to the measure development recommendations, research areas specific to BSI, CAUTI, SSI and VAP can be found in the appropriate sections.

- Research is needed to identify appropriate uses of cutaneous antisepsis for children, particularly neonates and infants, and to identify if current practices are evidenced-based.
- The endorsed "VAP bundle" measure includes deep vein thrombosis prophylaxis, but its relevance to children is not clear; more research is needed on the incidence of DVT in this population.
- Research is needed regarding the significance of *C. difficile* infections in the pediatric population.
- Research is needed regarding the definition of VAP in children and appropriate prevention strategies.

APPENDIX C—SELECTED REFERENCES

Intravascular Catheter-associated Blood Stream Infections

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APPENDIX E—CONSENSUS DEVELOPMENT PROCESS: SUMMARY

(Note: Because this project began under CDP version 1.7, that version will for the project)

THE PARTICIPANTS

The National Quality Forum (NQF) is a unique non-profit voluntary consensus standards setting organization. Among other things, the NQF brings together diverse healthcare stakeholders to develop consensus on core measure of healthcare quality and how such information should be reported. The primary participants in the NQF consensus process are NQF member organizations. These include:

- Consumer groups,
- Health care purchasers,
- Health care providers and health plans, and
- Research and quality improvement organizations.

Any organization interested in healthcare quality measurement and improvement may apply to be a member of the NQF. Membership information is available on the NQF web site.

Members of the public with particular expertise in a given topic may also be invited to participate in the early development of draft products, either as technical advisors or Steering Committee members. In addition, the NQF consensus process explicitly recognizes a role for the general public to comment on draft products and to appeal quality measurement standards adopted by NQF. Information on NQF projects, including information on those NQF meetings that are open to the public, is posted on the NQF web site.

THE PROCESS

The NQF process is designed pursuant to the National Technology Transfer and Advancement Act of 1995 and OMB Circular A-119. Each consensus project the NQF undertakes is guided by a Steering Committee (or Review Committee) composed of knowledgeable individuals from each of the four critical stakeholder perspectives. With the assistance of NQF staff and expert advisory panels, as well as the on-going input of NQF members and non-members, the Steering Committee conducts an overall assessment of the state-of-the-field in the particular topic area. The Steering Committee recommends a set of draft measures, indicators, or practices for review, and it may also make recommendations on other matters that may be relevant – e.g., reporting mechanisms or formats, research needed, or key implementation issues. This product is distributed for review and comment, first to NQF members and then to the general public.

Following the review period, a revised product is distributed to NQF members for a vote. The vote need not be unanimous, either within or across all Member Councils, for consensus to be achieved. However, if majority approval within any Council is not achieved on the first ballot, staff will attempt to reconcile differences among members to maximize agreement, and a second round of voting occurs. NQF products that have undergone this process and have been approved by at least two Member Councils after the second round may be forwarded to the

Board of Directors for consideration and approval. Affected parties may appeal standards approved by the NQF Board.

For a detailed description of the NQF consensus process, visit our website at www.qualityforum.org.

AJIC special article

Guidance on Public Reporting of Healthcare-Associated Infections: Recommendations of the Healthcare Infection Control Practices Advisory Committee

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Since 2002, 4 states have enacted legislation that requires health care organizations to publicly disclose health care–associated infection (HAI) rates. Similar legislative efforts are underway in several other states. Advocates of mandatory public reporting of HAIs believe that making such information publicly available will enable consumers to make more informed choices about their health care and improve overall health care quality by reducing HAIs. Further, they believe that patients have a right to know this information. However, others have expressed concern that the reliability of public reporting systems may be compromised by institutional variability in the definitions used for HAIs, or in the methods and resources used to identify HAIs. Presently, there is insufficient evidence on the merits and limitations of an HAI public reporting system. Therefore, the Healthcare Infection Control Practices Advisory Committee (HICPAC) has not recommended for or against mandatory public reporting of HAI rates. However, HICPAC has developed this guidance document based on established principles for public health and HAI reporting systems. This document is intended to assist policymakers, program planners, consumer advocacy organizations, and others tasked with designing and implementing public reporting systems for HAIs. The document provides a framework for legislators, but does not provide model legislation. HICPAC recommends that persons who design and implement such systems 1) use established public health surveillance methods when designing and implementing mandatory HAI reporting systems; 2) create multidisciplinary advisory panels, including persons with expertise in the prevention and control of HAIs, to monitor the planning and oversight of HAI public reporting systems; 3) choose appropriate process and outcome measures based on facility type and phase in measures to allow time for facilities to adapt and to permit ongoing evaluation of data validity; and 4) provide regular and confidential feedback of performance data to healthcare providers. Specifically, HICPAC recommends that states establishing public reporting systems for HAIs select one or more of the following process or outcome measures as appropriate for hospitals or long-term care facilities in their jurisdictions: 1) central-line insertion practices; 2) surgical antimicrobial prophylaxis; 3) influenza vaccination coverage among patients and healthcare personnel; 4) central line-associated bloodstream infections; and 5) surgical site infections following selected operations. HICPAC will update these recommendations as more research and experience become available. (Am J Infect Control 2005;33:217-26.)

Consumer demand for health care information, including data about the performance of health care providers, has increased steadily over the past decade. Many state and national initiatives are underway to mandate or induce health care organizations to publicly disclose information regarding institutional and physician performance. Mandatory public reporting of health care performance is intended to enable stakeholders, including consumers, to make more informed choices on health care issues.

Public reporting of health care performance information has taken several forms. Health care performance reports (report cards and honor rolls) typically describe the outcomes of medical care in terms of mortality, selected complications, or medical errors and, to a lesser extent, economic outcomes. Increasingly, process measures (ie, measurement of adherence to recommended health care practices, such as hand hygiene) are being used as an indicator of how well an

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organization adheres to established standards of practice with the implicit assumption that good processes lead to good health care outcomes. National health care quality improvement initiatives, notably those of the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO), the Centers for Medicare & Medicaid Services (CMS), and the Hospital Quality Alliance, use process measures in their public reporting initiatives.

Health care–associated infections (HAIs) are infections that patients acquire during the course of receiving treatment for other conditions (see Appendix 1 for full definition of this and other terms used in this document). In hospitals alone, HAIs account for an estimated 2 million infections, 90,000 deaths, and $4.5 billion in excess health care costs annually[1]; however, few of the existing report cards on hospital performance use HAIs as a quality indicator. Since 2002, 4 states (Illinois, Pennsylvania, Missouri, and Florida) have enacted legislation mandating hospitals and health care organizations to publicly disclose HAI rates. Similar legislative efforts are underway in several other states.

Because of the increasing legislative and regulatory interest in this area, the Healthcare Infection Control Practices Advisory Committee (HICPAC) conducted a scientific literature review to evaluate the merits and limitations of HAI reporting systems. We found no published information on the effectiveness of public reporting systems in reducing HAIs. Therefore, HICPAC has concluded that there is insufficient evidence at this time to recommend for or against public reporting of HAIs.

However, to assist those who will be tasked with designing and implementing such reporting systems, HICPAC presents the following framework for an HAI reporting system and recommendations for process and outcome measures to be included in the system. The framework and recommendations are based on established principles for public health and HAI surveillance. This document is intended primarily for policymakers, program planners, consumer advocacy organizations, and others who will be developing and maintaining public reporting systems for HAI. The document does not provide model legislation.

This document represents the consensus opinion of HICPAC. HICPAC is a federal advisory committee that was established in 1991 to provide advice and guidance to the Department of Health and Human Services and CDC regarding surveillance, prevention, and control of HAIs and related events in healthcare settings (*www.cdc.gov/ncidod/hip/HICPAC/Hicpac.htm*). These recommendations also have been endorsed by the Association for Professionals in Infection Control and Epidemiology, the Council of State and Territorial Epidemiologists, and the Society for Healthcare Epidemiology of America. These recommendations will be updated as new information becomes available.

ESSENTIAL ELEMENTS OF A PUBLIC REPORTING SYSTEM FOR HAIs

As a first step, the goals, objectives, and priorities of a public reporting system should be clearly specified and the information to be monitored should be measurable to ensure that the system can be held accountable by stakeholders. The reporting system should collect and report healthcare data that are useful not only to the public, but also to the facility for its quality improvement efforts. This can be achieved by selection of appropriate measures and patient populations to monitor; use of standardized case-finding methods and data validity checks; adequate support for infrastructure, resources, and infection control professionals; adjustment for underlying infection risk; and production of useful and accessible reports for stakeholders, with feedback to healthcare providers. The planning and oversight of the system should be monitored by a multidisciplinary group composed of public health officials, consumers, health care providers, and health care infection control professionals.

Identifying Appropriate Measures of Health Care Performance

Monitoring both process and outcome measures and assessing their correlation is a comprehensive approach to quality improvement. Standardized process and outcome measures for national health care performance for hospitals, nursing homes, and other settings have been endorsed through the National Quality Forum (NQF) voluntary consensus process.[2-4] NQF also has developed a model policy on the endorsement of proprietary performance measures.[5] Several other agencies and organizations, including CDC, CMS, the Agency for Healthcare Quality and Research, JCAHO, the Leapfrog organization, and the National Committee for Quality Assurance, also have developed health care quality measures. Health care performance reports should identify the sources and endorsers of the measures and the sources of the data used (eg, administrative or clinical).

Process measures. Process measures are desirable for inclusion in a public reporting system because the target adherence rate of 100% to these practices is unambiguous. Furthermore, process measures do not require adjustment for the patient's underlying risk of infection. Process measures that are selected for inclusion in a public reporting system should be those that measure common practices, are valid for a variety of health care settings (eg, small, rural versus large, urban hospitals); and can be clearly specified

(eg, appropriate exclusion and inclusion criteria). Process measures meeting these criteria include adherence rates of central line insertion practices and surgical antimicrobial prophylaxis and coverage rates of influenza vaccination for health care personnel and patients/residents (Table 1). Collection of data on one or more of these process measures already is recommended by the NQF and required by CMS and JCAHO for their purposes.

Outcome measures. Outcome measures should be chosen for reporting based on the frequency, severity, and preventability of the outcomes and the likelihood that they can be detected and reported accurately.[14] Outcome measures meeting these criteria include central line–associated, laboratory-confirmed primary bloodstream infections (CLA-LCBI) in intensive care units (ICU) and surgical site infections (SSI) following selected operations (Table 2). Although CLA-LCBIs and SSIs occur at relatively low rates, they are associated with substantial morbidity and mortality and excess health care costs. Also, there are well-established prevention strategies for CLA-LCBIs and SSIs.[6,10] Therefore, highest priority should be given to monitoring these two HAIs and providers' adherence to the related processes of care (ie, central-line insertion practices for CLA-LCBI and surgical antimicrobial prophylaxis for SSIs).

Use of other HAIs in public reporting systems may be more difficult. For example, catheter-associated urinary tract infections, though they may occur more frequently than CLA-LCBIs or SSIs, are associated with a lower morbidity and mortality; therefore, monitoring these infections likely has less prevention effectiveness relative to the burden of data collection and reporting. On the other hand, HAIs such as ventilator-associated pneumonia, which occur relatively infrequently but have substantial morbidity and mortality, are difficult to detect accurately. Including such HAIs in a reporting system may result in invalid comparisons of infection rates and be misleading to consumers.

Monitoring of process and outcome measures should be phased in gradually to allow time for facilities to adapt and to permit ongoing evaluation of data validity.

Identifying Patient Populations for Monitoring

CDC[16] and other authorities[17] no longer recommend collection or reporting of hospital-wide overall HAI rates because 1) HAI rates are low in many hospital locations (which makes routine inclusion of these units unhelpful), 2) collecting hospital-wide data is labor intensive and may divert resources from prevention activities, and 3) methods for hospital-wide risk adjustment have not been developed. Rather than hospital-wide rates, reporting rates of specific HAI for specific hospital units or operation-specific rates of SSIs is recommended.[16] This practice can help ensure that data collection is concentrated in populations where HAIs are more frequent and that rates are calculated that are more useful for targeting prevention and making comparisons among facilities or within facilities over time.

Case-Finding

Once the population at risk for HAIs has been identified, standardized methods for case-finding should be adopted. Such methods help to reduce surveillance bias (ie, the finding of higher rates at institutions that do a more complete job of case-finding). Incentives to find cases of HAI may be helpful. Conversely, punitive measures for hospitals that report high rates may encourage underreporting.

Traditional case-finding methods for HAIs include review of medical records, laboratory reports, and antibiotic administration records. However, these standard case-finding methods can be enhanced. For example, substantially more SSIs are found when administrative data sources (eg, *International Classification of Diseases, 9th Revision* [ICD-9], discharge codes) are used in combination with antimicrobial receipt to flag charts for careful review.[18,19] However, the accuracy of case-finding using ICD-9 codes alone likely varies by HAI type and by hospital. Therefore, ICD-9 discharge codes should not be relied upon as the sole source of case finding for HAI monitoring systems.

Traditional HAI case-finding methods were developed in an era when patients' lengths of hospitalization were much longer than they are today, allowing most HAIs to be detected during the hospital stay. However, for SSIs in particular, the current climate of short stays and rapid transfers to other facilities makes accurate detection difficult because as many as 50% of SSIs do not become evident until after hospital discharge or transfer.[20] Since there is no consensus on which postdischarge surveillance methods are the most accurate and practical for detection of SSIs,[10] the limitations of current case-finding methods should be recognized if SSIs are selected for inclusion in mandatory reporting systems.

Validation of Data

A method to validate data should be considered in any mandatory reporting system to ensure that HAIs are being accurately and completely reported and that rates are comparable from hospital to hospital or among all hospitals in the reporting system. The importance of validation was emphasized by a CDC study of the accuracy of reporting to the NNIS system, which found that although hospitals identified and

Table 1. Recommended process measures for a mandatory public reporting system on health care–associated infections

Events	Measures	Rationale for inclusion	Potential limitations
Central line insertion (CLI) practices	Two measures (expressed as a percentage)[6]:	Unambiguous target goal (100%)	Methods for data collection not yet standardized
	Numerators: Number of CLIs in which: • Maximal sterile barrier precautions were used • Chlorhexidine gluconate (preferred), tincture of iodine, an iodophor, or 70% alcohol was used as skin antiseptic	Risk-adjustment is unnecessary	Manual data collection likely to be tedious and labor intensive, and data are not included in medical records
	Denominator: Number of CLIs	Proven prevention effectiveness[6]: • Use of maximal barrier precautions during insertion and chlorhexidine skin antisepsis have been shown to be associated with an 84% and 49% reduction in central line–associated bloodstream infection rates, respectively.[7,8]	
Surgical antimicrobial prophylaxis (AMP)	Three measures (expressed as a percentage)[9]:	Unambiguous target goal (100%)	Manual data collection may be tedious and labor intensive, but data can be abstracted from medical records
	Numerators: Number of surgical patients: • Who received AMP within 1 hour prior to surgical incision (or 2 hours if receiving vancomycin or a fluoroquinolone) • Who received AMP recommended for their surgical procedure • Whose prophylactic antibiotics were discontinued within 24 hours after surgery end time	Risk-adjustment is unnecessary	
	Denominator: All selected surgical patients	Proven prevention effectiveness[10]: • Administering the appropriate antimicrobial agent within 1 hour before the incision has been shown to reduce SSIs • Prolonged duration of surgical prophylaxis (>24 hrs) has been associated with increased risk of antimicrobial-resistant SSI	
Influenza vaccination of patients and health care personnel	Two measures (each expressed as a percentage of coverage)[11]:	Proven prevention effectiveness[11-13]: • Vaccination of high-risk patients and health care personnel has been shown to be effective in preventing influenza	Manual data collection may be tedious and labor intensive
	Numerators: Number of influenza vaccinations given to eligible patients or healthcare personnel **Denominators**: Number of patients or healthcare personnel eligible for influenza vaccine		

reported most of the HAIs that occurred, the accuracy varied by infection site.[15]

Resources and Infrastructure Needed for a Reporting System

A reporting system can not produce quality data without adequate resources. At the institution level, trained personnel with dedicated time are required, eg, infection control professionals to conduct HAI surveillance. At the system level, key infrastructure includes instruction manuals, training materials, data collection forms, methods for data entry and submission, databases to receive and aggregate the data, appropriate quality checks, computer programs for data analysis, and standardized reports for dissemination of results. Computer resources within reporting systems must include both hardware and software and a standard user interface. In order to collect detailed data on factors such as use of invasive devises (eg, central lines), patient care location within the facility, type of operation, and extensive data

Table 2. Recommended outcome measures for a mandatory public reporting system on health care–associated infections

Events	Measures	Rationale for inclusion	Potential limitations
Central line–associated laboratory-confirmed primary bloodstream infection (CLA-LCBI)*	**Numerator:** Number of CLA-LCBI	Overall, an infrequent event but one that is associated with substantial cost, morbidity, and mortality	LCBI* can be challenging to diagnose since the definition includes criteria that are difficult to interpret (eg, single-positive blood cultures from skin commensal organisms may not represent true infections). To offset this limitation, a system could include only those CLA-LCBI identified by criterion 1, which will result in smaller numerators and therefore will require longer periods of time for sufficient data accumulation for rates to become stable/meaningful.
	Denominator: Number of central-line days in each population at risk, expressed per 1,000	Reliable laboratory test available for identification (ie, positive blood culture)	Standard definition of central line* requires knowing where the tip of the line terminates, which is not always documented and can therefore lead to misclassification of lines
	Populations at risk: Patients with central lines cared for in different types of intensive care units (ICUs)*	Prevention guidelines exist[6] and insertion processes can be monitored concurrently	
	Risk stratification: By type of ICU	Sensitivity*: 85%; predictive value positive (PVP)*: 75%[15]	
	Frequency of monitoring: 12 months per year for ICU with $\leq$ 5 beds; 6 months per year for ICU with $>$ 5 beds		
	Frequency of rate calculation: Monthly (or quarterly for small ICUs) for internal hospital quality improvement purposes		
	Frequency of rate reporting: Annually using all the data to calculate the rate		
Surgical site infection (SSI)*	**Numerator:** Number of SSI for each specific type of operation*	Low frequency event but one that is associated with substantial cost, morbidity, and mortality	Rates dependent on surveillance intensity, especially completeness of post-discharge surveillance (50% become evident after discharge and may not be detected)
	Denominator: Total number of each specific type of operation, expressed per 100	Prevention guidelines exist[10] and certain important prevention processes can be monitored concurrently	SSI definitions include a "physician diagnosis" criterion, which reduces objectivity
	Risk stratification: Focus on high-volume operations and stratify by type of operation and National Nosocomial Infections Surveillance (NNIS) SSI risk index*	Sensitivity*: 67%; PVP*: 73%[15]	
	Alternate risk adjustment: For low-volume operations, adjust for risk by using the standardized infection ratio*		

*See Glossary (Appendix 1).

dictionaries and coding schema must be developed and maintained.

HAI Rates and Risk Adjustment

For optimal comparison purposes, HAI rates should be adjusted for the potential differences in risk factors. For example, in the NNIS system, device-associated infections are risk adjusted by calculating rates per 1,000 device-days (eg, CLA-LCBI per 1,000 central line–days) and stratifying by unit type.[21-23] For that system, risk adjustment of SSIs is done by calculating of operation-specific rates stratified by a standardized risk index.[23-25] Although these methods do not incorporate

all potential confounding variables, they provide an acceptable level of risk adjustment that avoids the data collection burden that would be required to adjust for all variables.

Risk adjustment is labor intensive because data must be collected on the entire population at risk (the denominator) rather than only the fraction with HAIs (the numerator). Risk adjustment can not correct for variability among data collectors in the accuracy of finding and reporting events. Further, current risk-adjustment methods improve but do not guarantee the validity of inter-hospital comparisons, especially comparisons involving facilities with diverse patient populations (eg, community versus tertiary-care hospitals).

Valid event rates are facilitated by selecting events that occur frequently enough and at-risk populations that are large enough to produce adequate sample sizes. Unfortunately, use of stratification (eg, calculation of rates separately in multiple categories) for risk adjustment may lead to small numbers of HAIs in any one category and thereby yield unstable rates, as is the case of a small hospital with low surgical volume.

Producing Useful Reports and Feedback

Publicly released reports must convey scientific meaning in a manner that is useful and interpretable to a diverse audience. Collaboration between subject matter experts, statisticians, and communicators is necessary in developing these reports. The reports should provide useful information to the various users and highlight potential limitations of both the data and the methods used for risk adjustment. In a new reporting system, data should be examined and validated before initial release; in addition, sufficient sample size should be accumulated so that rates are stable at the time of public release. Lastly, feedback of performance data should be given to health care providers regularly so that interventions to improve performance can be implemented as quickly as possible. For example, feedback of SSI rates to surgeons has been shown to be an important component of strategies to reduce SSI risk.[26]

ADAPTING ESTABLISHED METHODS FOR USE IN MANDATORY REPORTING SYSTEMS

Where appropriate, developers of reporting systems should avail themselves of established and proven methods of collecting and reporting surveillance data. For example, many of the methods, attributes, and protocols of CDC's NNIS system may be applicable for public reporting systems. A detailed description of the NNIS methodologies has been described elsewhere,[23] and additional information on NNIS is available at *www.cdc.gov/ncidod/hip/surveill/nnis.htm*.

Most reporting systems, such as NNIS, use manual data collection methods. In most instances, information in computer databases, when available, can be substituted for manually collected data.[27,28] However, when manual data collection is necessary, alternate approaches include limiting reporting to well-defined and readily identifiable events, using simpler and more objective event definitions,[29] and sampling to obtain denominators.[30] These approaches could decrease the burden of data collection and improve the consistency of reporting among facilities. If data collection were simplified, expanding the number of infection types and locations in which they are monitored may become more feasible.

POTENTIAL CONSEQUENCES OF MANDATORY PUBLIC REPORTING SYSTEMS

Mandatory reporting of HAIs will provide consumers and stakeholders with additional information for making informed health care choices. Further, reports from private systems suggest that participation in an organized, ongoing system for monitoring and reporting of HAIs may reduce HAI rates.[31,32] This same beneficial consequence may apply to mandatory public reporting systems. Conversely, as with voluntary private reporting, mandatory public reporting that doesn't incorporate sound surveillance principles and reasonable goals may divert resources to reporting infections and collecting data for risk adjustment and away from patient care and prevention; such reporting also could result in unintended disincentives to treat patients at higher risk for HAI. In addition, current standard methods for HAI surveillance were developed for voluntary use and may need to be modified for mandatory reporting. Lastly, publicly reported HAI rates can mislead stakeholders if inaccurate information is disseminated. Therefore, in a mandatory public report of HAI information, the limitations of current methods should be clearly communicated within the publicly released report.

RESEARCH AND EVALUATION NEEDS

Research and evaluation of existing and future HAI reporting systems will be needed to answer questions about 1) the comparative effectiveness and efficiency of public and private reporting systems and 2) the incidence and prevention of unintended consequences. Ongoing evaluation of each system will be needed to confirm the appropriateness of the methods used and the validity of the results.

RECOMMENDATIONS

The Healthcare Infection Control Practices Advisory Committee proposes four overarching recommendations

regarding the mandatory public reporting of HAIs. These recommendations are intended to guide policymakers in the creation of statewide reporting systems for health care facilities in their jurisdictions.

1. Use established public health surveillance methods when designing and implementing mandatory HAI reporting systems. This process involves:
   a. selection of appropriate process and outcome measures to monitor;
   b. selection of appropriate patient populations to monitor;
   c. use of standardized case-finding methods and data validity checks;
   d. provision of adequate support and resources;
   e. adjustment for underlying infection risk; and
   f. production of useful and accessible reports to stakeholders.

Do not use hospital discharge diagnostic codes as the sole data source for HAI public reporting systems.

2. Create a multidisciplinary advisory panel to monitor the planning and oversight of the operations and products of HAI public reporting systems. This team should include persons with expertise in the prevention and control of HAIs.
3. Choose appropriate process and outcome measures based on facility type, and phase in measures gradually to allow time for facilities to adapt and to permit ongoing evaluation of data validity. States can select from the following measures as appropriate for hospitals or long term care facilities in their jurisdictions.
   a. Three process measures are appropriate for hospitals and one (iii below) is appropriate for long term care facilities participating in a mandatory HAI reporting system (Table 1).
      i. Central line insertion practices (with the goal of targeting ICU-specific CLA-LCBIs can be measured by all hospitals that have the type of ICUs selected for monitoring (eg, medical or surgical).
      ii. Surgical antimicrobial prophylaxis (with the goal of targeting SSI rates) can be measured by all hospitals that conduct the operations selected for monitoring.
      iii. Influenza vaccination coverage rates for health care personnel and patients can be measured by all hospitals and long term care facilities. For example:
         - Coverage rates for health care personnel can be measured in all hospitals and long term care facilities.
         - Coverage rates for high-risk patients can be measured in all hospitals.
         - Coverage rates for all residents can be measured in all long term care facilities.
   b. Two outcome measures are appropriate for *some* hospitals participating in a mandatory HAI reporting system (Table 2).
      i. CLA-LCBIs.
      ii. SSIs following selected operations.

Hospitals for which these measures are appropriate are those in which the frequency of the HAI is sufficient to achieve statistically stable rates. To foster performance improvement, the HAI rate to be reported should be coupled with a process measure of adherence to the prevention practice known to lower the rate (see 3ai and 3aii). For example, hospitals in states where reporting of SSIs is mandated should monitor and report adherence to recommended standards for surgical prophylaxis (see 3aii).

4. Provide regular and confidential feedback of performance data to health care providers. This practice may encourage low performers to implement targeted prevention activities and increase the acceptability of the public reporting systems within the health care sector.

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Appendix 1. Glossary

- **Central line**. A vascular infusion device that terminates at or close to the heart or in one of the great vessels. In the National Healthcare Safety Network (NHSN), the system replacing NNIS, the following are considered great vessels for the purpose of reporting central line infections and counting central line days: aorta, pulmonary artery, superior vena cava, inferior vena cava, brachiocephalic veins, internal jugular veins, subclavian veins, external iliac veins, and common femoral veins.

Note. In neonates, the umbilical artery/vein is considered a great vessel.

Note. Neither the location of the insertion site nor the type of device may be used to determine if a line qualifies as a central line. The device must terminate in one of these vessels or in or near the heart to qualify as a central line. *Note:* Pacemaker wires and other non-infusion devices inserted into central blood vessels or the heart are *not* considered central lines.

- **CLA-LCBI**. See *laboratory-confirmed primary bloodstream infection.*
- **Confounding**. The distortion of the apparent effect of an exposure on risk brought about by the association with other factors that can influence the outcome.[33] Risk adjustment is performed to minimize the effects of patient co-morbidities and use of invasive devices (the confounding factors) on the estimate of risk for a unit or facility (the exposure).
- **Device-associated infection**. An infection in a patient with a device (eg, ventilator or central line) that was used within the 48-hour period before the infection's onset. If the time interval was longer than 48 hours, compelling evidence must be present to indicate that the infection was associated with use of the device. For catheter-associated urinary tract

infection (UTI), the indwelling urinary catheter must have been in place within the 7-day period before positive laboratory results or signs and symptoms meeting the criteria for UTI were evident.[23]

- **Health care–associated infection**. A localized or systemic condition resulting from an adverse reaction to the presence of an infectious agent(s) or its toxin(s) that 1) occurs in a patient in a health care setting (eg, a hospital or outpatient clinic), 2) was not found to be present or incubating at the time of admission unless the infection was related to a previous admission to the same setting, and 3) if the setting is a hospital, meets the criteria for a specific infection site as defined by CDC.[23] (See also *Nosocomial*.)
- **Intensive-care unit (ICU).** A hospital unit that provides intensive observation, diagnostic, and therapeutic procedures for adults and/or children who are critically ill. An ICU *excludes* bone marrow transplant units and nursing areas that provide step-down, intermediate care or telemetry only. The type of ICU is determined by the service designation of the majority of patients cared for by the unit (ie, if 80% of the patients are on a certain service [eg, general surgery], then the ICU is designated as that type of unit [eg, surgical ICU]). An ICU with approximately equal numbers of medical and surgical patients is designated as a combined medical/surgical ICU.[23]
- **Laboratory-confirmed primary bloodstream infection (LCBI)**. A primary bloodstream infection identified by laboratory tests with or without clinical signs or symptoms; most often associated with the use of catheters or other invasive medical devices. For the CDC surveillance definition of LCBIs, please see reference 14 or *www.cdc.gov/ncidod/hip/surveill/nnis.htm*.
- **NNIS SSI risk index**. A score used to predict a surgical patient's risk of acquiring a surgical-site infection. The risk index score, ranging from 0 to 3, is the number of risk factors present among the following: 1) a patient with an American Society of Anesthesiologists' physical status classification score of 3, 4, or 5,[34] b) an operation classified as contaminated or dirty infected,[35,36] and c) an operation lasting over *T* hours, where *T* depends upon the operation being performed.[25] Current *T* values can be found in the NNIS Report at *www.cdc.gov/ncidod/hip/surveill/nnis.htm*.
- **Nosocomial**. Originating or taking place in a hospital.
- **Outcomes**. All the possible results that may stem from exposure to a causal factor or from preventive or therapeutic interventions[33] (eg, mortality, cost, and development of a health care–associated infection).
- **Predictive value positive**. The proportion of infections reported by a surveillance or reporting system that are true infections.[14,15]
- **Private reporting system**. A system that provides information about the quality of health services or systems for the purposes of improving the quality of the services or systems. By definition, the general public is not given access to the data; instead, the data are typically provided to the organization or health care workers whose performance is being assessed. The provision of these data is intended as an intervention to improve the performance of that entity or person.
- **Process measure.** A measure of recommended infection control or other practices (eg, adherence with hand hygiene recommendations).
- **Public reporting system.** A system that provides the public with information about the performance or quality of health services or systems for the purpose of improving the performance or quality of the services or systems.
- **Risk adjustment**. A summarizing procedure for a statistical measure in which the effects of differences in composition (eg, confounding factors) of the populations being compared have been minimized by statistical methods (eg, standardization and logistic regression).[33]
- **Sensitivity**. The proportion of true infections that are reported by a surveillance or reporting system. May also refer to the ability of the reporting system to detect outbreaks or unusual clusters of the adverse event (in time or place).[14,15]
- **SSI Risk Index**. See *NNIS SSI Risk Index*.
- **Standardized infection ratio**. The standardized infection ratio as used in this document is an example of indirect standardization in which the observed number of surgical site infections (SSIs) is divided by the expected number of SSIs. The expected number of SSIs is calculated by using NNIS SSI risk index category-specific data from a standard population (eg, the NNIS system data published in the NNIS Report) and the number of operations in each risk index category performed by a surgeon, a surgical subspecialty service, or a hospital. (Detailed explanation and examples can be found in Horan TC, Culver DH. Comparing surgical site infection rates. In: Pfeiffer JA, editor. APIC text of infection control and epidemiology. Washington, DC: Association for Professionals in Infection Control, 2000. p. 1-7.)
- **Surgical site infection (SSI)**. An infection of the incision or organ/space operated on during a surgical procedure. For the CDC surveillance definition of an SSI, see reference 14 or *www.cdc.gov/ncidod/hip/surveill/nnis.htm*.
- **Surveillance**. The ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding a health-related event for use in public health action to reduce morbidity and mortality and to improve health.[14]

F. Hospital-Acquired Conditions, Including Infections

1. General

Medicare's IPPS encourages hospitals to treat patients efficiently. Hospitals receive the same DRG payment for stays that vary in length. In many cases, complications acquired in the hospital do not generate higher payments than the hospital would otherwise receive for other cases in the same DRG. To this extent, the IPPS does encourage hospitals to manage their patients well and to avoid complications, when possible. However, complications, such as infections, acquired in the hospital can lead to higher Medicare payments in two ways. First, the treatment of complications can increase the cost of hospital stays enough to generate outlier payments. However, the outlier payment methodology requires that hospitals experience large losses on outlier cases (for example, in FY 2007, the fixed-loss amount was $24,485 before a case qualified for outlier payments, and the hospital then only received 80 percent of its estimated costs above the fixed-loss cost threshold). Second, under the MS-DRGs we are adopting in this final rule with comment period, there are 258 sets of DRGs that are split into 2 or 3 subgroups based on the presence or absence of a major CC (MCC) or CC. If a condition acquired during the beneficiary's hospital stay is one of the conditions on the MCC or CC list, the result may be a higher payment to the hospital under the MS-DRGs. (We refer readers to section II.D. of this final rule with comment period for a detailed discussion of DRG reforms.)

2. Legislative Requirement

Section 5001(c) of Pub. L. 109-171 requires the Secretary to select, by October 1, 2007, at least two conditions that are (a) high cost or high volume or both, (b) result in the assignment of a case to a DRG that has a higher payment when present as a secondary diagnosis, and (c) could reasonably have been prevented through the application of evidence-based guidelines. For discharges occurring on or after October 1, 2008, hospitals will not receive additional payment for cases in which one of the selected conditions was not present on admission. That is, the case will be paid as though the secondary diagnosis was not present. Section 5001(c) provides that we can revise the list of conditions from time to time, as long as the list contains at least two conditions. Section 5001(c) also requires hospitals to submit the secondary diagnoses that are present at admission when reporting payment information for discharges on or after October 1, 2007.

3. Public Input

In the FY 2007 IPPS proposed rule (71 FR 24100), we sought input from the public regarding conditions with evidence-based guidelines that should be selected in order to implement section 5001(c) of Pub. L. 109-171. The comments that we received were summarized in the FY 2007 IPPS final rule (71 FR 48051 through 48053). In the FY 2008 IPPS proposed rule (72 FR 24716), we again sought formal public comment on conditions that we proposed to select under section 5001(c). As discussed below, in this final rule with comment period, we first summarize the comments we received on the FY 2007 IPPS proposed rule. We then explain our detailed proposals included in the FY

2008 proposed rule, followed by a summary of the public comments on each condition proposed and our responses to those public comments.

In summary, the majority of the comments that we received in response on the FY 2007 IPPS proposed rule addressed conceptual issues concerning the selection, measurement, and prevention of hospital-acquired infections. Many commenters encouraged CMS to engage in a collaborative discussion with relevant experts in designing, evaluating, and implementing this section. The commenters urged CMS to include individuals with expertise in infection control and prevention, as well as representatives from the provider community, in the discussions.

Many commenters supported the statutory requirement for hospitals to submit information regarding secondary diagnoses present on admission beginning in FY 2008, and suggested that it would better enable CMS and health care providers to more accurately differentiate between comorbidities and hospital-acquired complications. MedPAC, in particular, noted that this requirement was recommended in its March 2005 Report to Congress and indicated that this information is important to Medicare's value-based purchasing efforts. Other commenters cautioned us about potential problems with relying on secondary diagnosis codes to identify hospital-acquired complications, and indicated that secondary diagnosis codes may be an inaccurate method for identifying true hospital-acquired complications.

A number of commenters expressed concerns about the data coding requirement for this payment change and asked for detailed guidance from CMS to help them identify and document hospital-acquired complications. Other commenters expressed concern

that not all hospital-acquired infections are preventable and noted that sicker and more complex patients are at greater risk for hospital-acquired infections and complications. Commenters suggested that CMS include standardized infection-prevention process measures, in addition to outcome measures of hospital-acquired infections.

Some commenters proposed that CMS expand the scope of the payment changes beyond the statutory minimum of two conditions. They noted that the death, injury, and cost of hospital-acquired infections are too high to limit this provision to only two conditions. Commenters also recommended that CMS annually select additional hospital-acquired complications for the payment change. Conversely, a number of commenters proposed that CMS initially begin with limited demonstrations to test CMS' methodology before nationwide implementation. One commenter recommended that CMS include appropriate consumer protections to prevent providers from billing patients for the nonreimbursed costs of the hospital-acquired complications and to prevent hospitals from selectively avoiding patients perceived at risk of complications.

In addition to the broad conceptual suggestions, some commenters recommended specific conditions for possible inclusion in the payment changes, which we discussed in detail in the preamble of the proposed rule and in section II.D.4. of this final rule with comment period. We also discuss throughout section II.D. of the preamble of this final rule with comment period other comments that we have considered in developing hospital-acquired conditions that would be subject to reporting.

As it is not addressed elsewhere, we are responding here to the comment about hospitals billing patients for costs of hospital-acquired complications that are not counted

as MCCs and CCs. Section 5001(c) does not make the additional cost of a hospital-acquired complication a noncovered cost. The additional costs that a hospital would incur as a result of a hospital-acquired complication remains a covered Medicare cost that is included in the hospital's IPPS payment. Medicare's payment to the hospital is for all inpatient hospital services provided during the stay. The hospital cannot bill the beneficiary for any charges associated with the hospital-acquired complication. With respect to the concern about a hospital avoiding patients that are at high risk of complications, we note that the policy is selecting only those conditions that are "reasonably preventable." Thus, we are only selecting those conditions where, if hospital personnel are engaging in good medical practice, the additional costs of the hospital-acquired condition will, in most cases, be avoided and the risk of selectively avoiding patients at high risk of complications will be minimized. We further note that Medicare's high cost outlier policy is unaffected by section 5001(c). The hospital's total charges for all inpatient services provided during the stay will continue to be used to determine whether the case qualifies for an outlier payment. Thus, there will continue to be limitations on a hospital's financial risk of treating high cost cases even if, despite the hospital maintaining good medical practice to avoid complications, a reasonably preventable condition occurs after admission. Finally, as stated further below, we are continuing to work to identify exclusions for situations where the policy should not apply for the selected condition.

4. Collaborative Effort

CMS worked with public health and infectious disease experts from the Centers for Disease Control and Prevention (CDC) to identify a list of hospital-acquired conditions, including infections, as required by section 5001(c) of Pub. L. 109-171. As previously stated, the selected conditions must meet the following three criteria: (a) high cost or high volume or both; (b) result in the assignment of the case to a DRG that has a higher payment when present as a secondary diagnosis; and (c) could reasonably have been prevented through the application of evidence-based guidelines. CMS and CDC staff also collaborated on developing a process for hospitals to submit a Present on Admission (POA) indicator with each secondary condition. The statute requires the Secretary to begin collecting this information as of October 1, 2007. The POA indicator is required in order for us to determine which of the selected conditions developed during a hospital stay. The current electronic format used by hospitals to obtain this information (ASC X12N 837, Version 4010) does not provide a field to obtain the POA information. We issued instructions requiring acute care IPPS hospitals to submit the POA indicator for all diagnosis codes, effective October 1, 2007, through Change Request No. 5499, with a release date of May 11, 2007. The instructions specify how hospitals under the IPPS submit this information in segment K3 in the 2300 loop, data element K301 on the ASC X12N 837, Version 4010 claim. Specific instructions on how to select the correct POA indicator for a diagnosis code are included in the ICD-9-CM Official Guidelines for Coding and Reporting. These guidelines can be found at the following Web site: http://www.cdc.gov/nchs/datawh/ftpserv/ftpicd9/ftpicd9.htm

CMS and CDC staff also received input from a number of groups and organizations on hospital-acquired conditions, including infections. Many of these groups and organizations recommended the selection of conditions mentioned in the FY 2007 IPPS final rule, including the following because of the high cost or high volume (frequency) of the condition, or both, and because in some cases preventable guidelines already exist:

- Surgical site infections. The groups and organizations stated that there were evidence-based measures to prevent the occurrence of these infections which are currently measured and reported as part of the Surgical Care Improvement Program (SCIP).

- Ventilator-associated pneumonias. The groups and organizations indicated that these conditions are currently measured and reported through SCIP. However, other organizations counseled against selecting these conditions because they believed it was difficult to obtain good definitions and that it was not always clear which ones are hospital-acquired.

- Catheter associated bloodstream infections.

- Pressure ulcers.

- Hospital falls. The injury prevention groups included this condition among a group referred to as "serious preventable events," also commonly referred to as "never events" or "serious reportable events." A serious preventable event is defined as a condition which should not occur during an inpatient stay.

● Bloodstream infections/septicemia. Some commenters suggested that we focus on one specific organism, such as staph aureus septicemia.

● Pneumonia. Some commenters recommended the inclusion of a broader group of pneumonia patients, instead of restricting cases to ventilator-associated pneumonias. Some commenters mentioned that while prevention guidelines exist for pneumonia, it is not clear how effective these guidelines may be in preventing pneumonia.

● Vascular catheter associated infections. Commenters indicated that there are CDC guidelines for these infections. Other commenters stated that while this condition certainly deserves focused attention by health care providers, there is not a unique ICD-9-CM code that identifies vascular catheter-associated infections. Therefore, these commenters suggested that there would be difficulty separately identifying these conditions.

● Clostridium difficile-associated disease (CDAD). Several commenters identified this condition as a significant public health issue. Other commenters indicated that, while prevalence of this condition is emerging as a public health problem, there is not currently a strategy for reasonably preventing these infections.

● Methicillin-resistant staphylococcus aureus (MRSA). Several commenters indicated that MRSA has become a very common bacteria occurring both in and outside the hospital environment. However, other organizations stated that the code for MRSA (V09.0, Infection with microorganism resistant to penicillins Methicillin-resistant staphylococcus aureus) is not currently classified as a CC. Therefore, the commenters stated that MRSA does not lead to a higher reimbursement when the code is reported.

● Serious preventable events. As stated earlier, some commenters representing injury prevention groups suggested including a broader group of conditions than hospital falls which should not be expected to occur during a hospital admission. They noted that these conditions are referred to as "serious preventable events," and include events such as the following: (a) leaving an object in during surgery; (b) operating on the wrong body part or patient, or performing the wrong surgery; (c) air embolism as a result of surgery; and (d) providing incompatible blood or blood products. Other commenters indicated serious preventable events are so rare that they should not be selected as a hospital condition that cannot result in a case being assigned to a higher paying DRG.

5. Criteria for Selection of the Hospital-Acquired Conditions

CMS and CDC staff greatly appreciate the many comments and suggestions offered by organizations and groups that were interested in providing input into the selection of the initial hospital-acquired conditions.

CMS and CDC staff evaluated each recommended condition under the three criteria established by section 1886(d)(4)(D)(iv) of the Act. In order to meet the higher payment criterion, the condition selected must have an ICD-9-CM diagnosis code that clearly identifies the condition and is classified as a CC, or as an MCC (as proposed for the MS-DRGs in the proposed rule). Some conditions recommended for inclusion among the initial hospital-acquired conditions did not have codes that clearly identified the conditions. Because there has not been national reporting of a POA indicator for each diagnosis, there are no Medicare data to determine the incidence of the reported secondary diagnoses occurring after admission. To the extent possible, we used

information from the CDC on the incidence of these conditions. CDC's data reflect the incidence of hospital-acquired conditions in 2002. We also examined FY 2006 Medicare data on the frequency that these conditions were reported as secondary diagnoses. We developed the following criteria to assist in our analysis of the conditions. The conditions described were those recommended for inclusion in the initial hospital-acquired infection provision.

- Coding – Under section 1886(d)(4)(D)(ii)(I) of the Act, a discharge is subject to the payment adjustment if "the discharge includes a condition identified by a diagnosis code" selected by the Secretary under section 1886(d)(4)(D)(iv) of the Act. We only selected conditions that have (or could have) a unique ICD-9-CM code that clearly describes the condition. Some conditions recommended by the commenters would require the use of two or more ICD-9-CM codes to clearly identify the conditions. Although we did not exclude these conditions from further consideration, the need to utilize multiple ICD-9-CM codes to identify them may present operational issues. For instance, the complexities associated with selecting septicemia as a hospital-acquired condition subject to section 5001(c) of the DRA may present operational issues in identifying whether or not the condition was present upon admission. The vast number of clinical scenarios that we would have to account for could complicate implementation of the provision.

- Burden (High Cost/High Volume) – Under section 1886(d)(4)(D)(iv)(I) of the Act, we must select cases that have conditions that are high cost or high volume, or both.

● Prevention guidelines – Under section 1886(d)(4)(D)(iv)(II) of the Act, we must select codes that describe conditions that could reasonably have been prevented through application of evidence-based guidelines. We evaluated whether there is information available for hospitals to follow to prevent the condition from occurring.

● MCC or CC – Under section 1886(d)(4)(D)(iv)(III) of the Act, we must select codes that result in assignment of the case to a DRG that has a higher payment when the code is present as a secondary diagnosis. The condition must be an MCC or a CC that would, in the absence of this provision, result in assignment to a higher paying DRG.

● Considerations – We evaluated each condition above according to how it meets the statutory criteria in light of the potential difficulties that we would face if the condition were selected.

6. Selection of Hospital-Acquired Conditions

We discuss below our analysis of each of the conditions that were raised as possible candidates for selection under section 5001(c) of Pub. L. 109-171 according to the criteria described above in section II.D.5. of the preamble of this final rule with comment period. We also discuss any considerations, which would include any administrative issues surrounding the selection of a proposed condition. For example, the condition may only be able to be identified by multiple codes, thereby requiring the development of special GROUPER logic to also exclude similar or related ICD-9-CM codes from being classified as a CC. Similarly, a condition acquired during a hospital stay may arise from another condition that the patient had prior to admission, making it difficult to determine whether the condition was reasonably preventable. Following a

discussion of each condition, we provide a summary that describes how each condition was considered for the proposed rule, whether we are selecting it to be subject to the provision in this FY 2008 IPPS final rule or if it will continue to be considered for the future. In the proposed rule, we presented 13 conditions. The summary discussion and table reflect changes to the order of the conditions. The summary presents the conditions that best meet the statutory criteria and which conditions we are selecting to be subject to the payment adjustment for hospital-acquired conditions beginning in FY 2009. In the proposed rule, we encouraged comments on these conditions. We asked commenters to recommend how many and which conditions should be selected in the FY 2008 IPPS final rule along with justifications for these selections. We also encouraged additional comments on clinical, coding, and prevention issues that may affect the conditions selected. While, in this final rule with comment period, we present these 13 conditions in the order they were proposed, we have re-ranked these conditions based on how well they meet the statutory criteria according to compelling public health reasons in addition to public comment and internal analysis.

We received approximately 127 timely public comments on this section from hospitals and health care systems, provider associations, consumer groups, purchasers, medical device manufacturers, pharmaceutical companies, information technology companies, and health care research organizations.

Comment: Some commenters urged CMS to use discretion in selecting hospital-acquired conditions that will be subject to the statutory provision and suggested that CMS limit the number of conditions selected. A large majority of commenters strongly

supported the inclusion of three of the serious preventable events (object left in surgery, air embolism and blood incompatibility) and generally commented that the remaining conditions are not always preventable or may not have unique codes established.

A number of commenters both supported and opposed the conditions other than the three serious preventable events mentioned above. The commenters were generally optimistic about considering proposed conditions for the future upon resolution of suggested issues. A few commenters proposed that CMS initially begin with limited demonstrations to test CMS' methodology before nationwide implementation. These commenters specifically mentioned the Michigan Hospital Association Keystone Center.

The commenters who suggested not including conditions other than the three serious preventable events mentioned above noted that sicker and more complex patients are at greater risk for hospital-acquired infections and complications. In particular, the commenters believed some of the conditions proposed are a biological inevitability at a certain predictable rate regardless of safe practice. In addition, the commenters expressed concern about the difficulty of distinguishing between hospital-acquired and community-acquired infections. The commenters also believed that CMS should use incentives to allow hospitals to adopt innovative infection prevention technologies and provide necessary treatments for infections. Finally, a few commenters submitted additional conditions that were not included in the 13 conditions we considered in the proposed rule.

Response: In general, we discuss our responses to each of these comments below in the context of the specific conditions they reference. With respect to the general

comment that we should only select the three serious preventable events, we believe there is a significant public health interest in selecting more than just these conditions. According to the commenters, many of the other conditions we considered are not always preventable and, therefore, should not be selected. The statute indicates that the provision should apply to conditions that "could reasonably have been prevented through the application of evidence-based guidelines." Therefore, for this reason, we are selecting other conditions in addition to the serious preventable events to be subject to this provision in this final rule with comment period. We discuss the application of the statutory criteria to each of the conditions we considered below and why we believe the condition is "reasonably preventable."

(a) Catheter-Associated Urinary Tract Infections

Coding – ICD-9-CM code 996.64 (Infection and inflammatory reaction due to indwelling urinary catheter) clearly identifies this condition. The hospital would also report the code for the specific type of urinary infection. For instance, when a patient develops a catheter associated urinary tract infection during the inpatient stay, the hospital would report code 996.64 and 599.0 (Urinary tract infection, site not specified) to clearly identify the condition. There are also a number of other more specific urinary tract infection codes that could also be coded with code 996.64. These codes are classified as CCs. If we were to select catheter-associated urinary tract infections, we would implement the decision by not counting code 996.64 and any of the urinary tract infection codes listed below when both codes are present and the condition was acquired

after admission. If only code 966.64 were coded on the claim as a secondary diagnosis, we would not count it as a CC.

Burden (High Cost/High Volume) – CDC reports that there are 561,667 catheter-associated urinary tract infections per year. For FY 2006, there were 11,780 reported cases of Medicare patients who had a catheter associated urinary tract infection as a secondary diagnosis. The cases had average charges of $40,347 for the entire hospital stay. According to a study in the American Journal of Medicine, catheter-associated urinary tract infection is the most common nosocomial infection, accounting for more than 1 million cases in hospitals and nursing homes nationwide.[22] Approximately 11.3 million women in the United States had at least one presumed acute community-acquired urinary tract infection resulting in antimicrobial therapy in 1995, with direct costs estimated at $659 million and indirect costs totaling $936 million. Nosocomial urinary tract infection necessitates one extra hospital day per patient, or nearly 1 million extra hospital days per year. It is estimated that each episode of symptomatic urinary tract infection adds $676 to a hospital bill. In total, according to the study, the estimated annual cost of nosocomial urinary tract infection in the United States ranges between $424 and $451 million.

Prevention guidelines – There are widely recognized guidelines for the prevention of catheter-associated urinary tract infections. Guidelines can be found at the following Web site: http://www.cdc.gov/ncidod/dhqp/gl_catheter_assoc.html

[22] Foxman, B.: "Epidemiology of urinary tract infections: incidence, morbidity, and economic costs," The American Journal of Medicine, 113 Suppl 1A, pp. 5s-13s, 2002.

CC - Codes 996.64 and 599.0 are classified as CCs in the CMS DRGs as well as in the MS-DRGs.

Considerations – The primary prevention intervention would be not using catheters or removing catheters as soon as possible, both of which are worthy goals because once catheters are in place for 3 to 4 days, most clinicians and infectious disease/infection control experts do not believe urinary tract infections are preventable. While there may be some concern about the selection of catheter associated urinary tract infections, it is an important public health goal to encourage practices that will reduce urinary tract infections. Approximately 40 percent of Medicare beneficiaries have a urinary catheter during hospitalization based on Medicare Patient Safety Monitoring System (MPSMS) data.

As stated above in the Coding section, this condition is clearly identified through ICD-9-CM code 996.64. Code 996.64 is classified as a CC. The hospital would also report the code for the specific type of urinary infection. For instance, when a patient develops a catheter associated urinary tract infection during the inpatient stay, the hospital would report codes 996.64 and 599.0 or another more specific code that clearly identifies the condition. These codes are classified as CCs under the CMS DRGs as well as the MS-DRGs. To select catheter-associated urinary tract infections as one of the hospital-acquired conditions that would not be counted as a CC, we would not classify code 996.64 as a CC if the condition occurred after admission. Furthermore, we would also not classify any of the codes listed below as CCs if present on the claim with code 996.64 because these additional codes identify the same condition. The following codes

represent specific types of urinary infections. We did not include codes for conditions that could be considered chronic urinary infections, such as code 590.00 (Chronic pyelonephritis, without lesion or renal medullary necrosis). Chronic conditions may indicate that the condition was not acquired during the current stay. We would not count code 996.64 or any of the following codes representing acute urinary infections if they developed after admission and were coded together on the same claim.

- 112.2 (Candidiasis of other urogenital sites)
- 590.10 (Acute pyelonephritis, without lesion of renal medullary necrosis)
- 590.11 (Acute pyelonephritis, with lesion of renal medullary necrosis)
- 590.2 (Renal and perinephric abscess)
- 590.3 (Pyeloureteritis cystica)
- 590.80 (Pyelonephritis, unspecified)
- 590.81 (Pyelitis or pyelonephritis in diseases classified elsewhere)
- 590.9 (Infection of kidney, unspecified)
- 595.0 (Acute cystitis)
- 595.3 (Trigonitis)
- 595.4 (Cystitis in diseases classified elsewhere)
- 595.81 (Cystitis cystica)
- 595.89 (Other specified type of cystitis, other)
- 595.9 (Cystitis, unspecified)
- 597.0 (Urethral abscess)
- 597.80 (Urethritis, unspecified)

- 599.0 (Urinary tract infection, site not specified)

We believe the condition of catheter-associated urinary tract infection meets all of our criteria for selection as one of the initial hospital-acquired conditions. We can easily identify the cases with ICD-9-CM codes. The condition is a CC under both the CMS DRGs and the MS-DRGs. The condition meets our burden criterion with its high cost and high frequency. There are prevention guidelines on which the medical community agrees to avoid catheter-associated urinary tract infections. We believe this condition best meets the criteria discussed. Therefore, we proposed the selection of catheter-associated urinary tract infections as one of the initial hospital-acquired conditions.

We encouraged comments on both the selection of this condition and the related conditions that we proposed to exclude from being counted as CCs.

Comment: Most commenters suggested that a large number of physicians believe urinary tract infections may not be preventable after several days of catheter placement. A few commenters submitted the following statement from the proposed rule (72 FR 24719): "once catheters are in place for 3-4 days, most clinicians and infection control experts do not believe UTIs are preventable." The commenters also noted the potential difficulty in identifying this condition at admission.

Still other commenters believed this condition is difficult to code because the ICD-9-CM codes do not distinguish between catheter-associated inflammation and infection. The commenters asked CMS to consider a new code for "inflammatory

reaction from indwelling catheter" distinct from “catheter associated urinary tract infection.”

In addition, the commenters noted that prevention guidelines are still being debated. The commenters referenced the prevention guideline published in 1981 and posted on the Web site at: http://www.cdc.gov/ncidod/dhqp/gl_catheter_assoc.html.

A few commenters also recommended exceptions for this condition, including patients with immunosuppression, patients who have a catheter placed for therapeutic installation of antimicrobial/chemotherapy agent, patients with sustained urinary tract trauma, and patients in need of permanent use of a catheter.

Commenters stated that Medicare reimbursement does not cover the increased cost of antibiotic-coated catheters which have been shown to reduce the incidence of catheter infections. These same commenters asked CMS to change Medicare payment policy to encourage the application of proven existing technology.

Commenters provided two potential examples of unintended consequences if this condition is to be implemented. First, the commenters believed that physicians and hospitals will increase urinalysis testing to identify urinary tract infections prior to admission. Second, the commenters suggested that physicians and hospitals will use more antibiotics to “clean” the urine of bacteria upon admission.

Response: CMS seeks to reduce the incidence of preventable catheter associated urinary tract infections by reducing unnecessary and inappropriate use of indwelling urinary catheters in hospitalized Medicare patients. There is widespread evidence that catheters may lead to an increased risk of infection if they are in place for several days.

In addition, there are prevention guidelines to assist physicians in determining how long a urinary catheter should be left in place that can prevent catheter-associated urinary tract infections. Therefore, we believe that catheter-associated urinary tract infections are reasonably preventable by following well-established prevention guidelines, and we are selecting this condition.

Concerning the request for the creation of a new code for "inflammatory reaction from indwelling catheter," we recommend the commenter contact the CDC. The CDC is responsible for maintaining the diagnosis part of the ICD-9-CM codes. We encourage commenters to send specific requests for new or revised ICD-9-CM diagnosis codes to Donna Pickett, CDC, at 3311 Toledo Road, Room 2402, Hyattsville, MD 20782, or via e-mail to dfp4@cdc.gov. Additional information on requesting a new ICD-9-CM diagnosis code may be obtained from the Web site at: http://www.cdc.gov/nchs/icd9.htm

The commenters are correct that prevention guidelines for avoiding catheter-associated urinary tract infections are scheduled to be updated by CDC's Healthcare Infection Control Practices Committee (HICPAC). The National Quality Forum (NQF) is currently working to update hospital-acquired infection definitions. The effort currently underway will update prevention guidelines that have been in place since 1981. We believe the ongoing effort to update prevention guidelines for avoiding catheter-associated urinary tract infections provides further evidence that this condition is a strong candidate to be selected because of how well it meets the statutory criteria.

We appreciate the many comments urging CMS to consider implementing exceptions for catheter-associated urinary tract infections when it is a hospital-acquired

condition but is not preventable. We will carefully consider these suggestions as we plan for the implementation of this new requirement in FY 2009.

With respect to the comment about encouraging the use antibiotic-coated catheters, we continue to work in cooperation with device companies and other associations to ensure that Medicare beneficiaries receive the most current therapeutic modalities. We annually update Medicare inpatient hospital payment rates to reflect hospital resource use for the latest medical technology and other innovations in how care is delivered.

We do not agree there will be significant unintended consequences of selecting catheter-associated urinary tract infections. As stated earlier, we believe this condition is generally avoidable if medical professionals carefully follow longstanding prevention guidelines. We believe hospitals, physicians, and others that treat Medicare patients will focus on taking medically appropriate steps to determine the length of time a catheter is in place. We do not believe it is inappropriate to perform a urinalysis upon admission to the hospital if clinically indicated. We would not consider doing so an unintended consequence.

We appreciate all the public comments on this condition, and have considered all of these points of view. We believe this condition meets the criteria of the DRA:

- There are unique codes that identify catheter-associated urinary tract infections that are currently considered to be a CC under the MS-DRGs;

- Prevention guidelines currently exist and will be updated prior to the October 1, 2008 implementation date of this provision; and

- As shown above, catheter-associated urinary tract infections are high cost/high volume conditions.

Therefore, in this final rule with comment period, we are selecting the condition of catheter-associated urinary tract infections to be subject to the provision beginning October 1, 2008.

(b) Pressure Ulcers

Coding – Pressure ulcers are also referred to as decubitus ulcers. The following codes clearly identify pressure ulcers.

- 707.00 (Decubitus ulcer, unspecified site)
- 707.01 (Decubitus ulcer, elbow)
- 707.02 (Decubitus ulcer, upper back)
- 707.03 (Decubitus ulcer, lower back)
- 707.04 (Decubitus ulcer, hip)
- 707.05 (Decubitus ulcer, buttock)
- 707.06 (Decubitus ulcer, ankle)
- 707.07 (Decubitus ulcer, heel)
- 707.09 (Decubitus ulcer, other site)

Burden (High Cost/High Volume) – This condition is both high-cost and high-volume. For FY 2006, there were 322,946 reported cases of Medicare patients who had a pressure ulcer as a secondary diagnosis. These cases had average charges for the hospital stay of $40,381.

Prevention guidelines – Prevention guidelines can be found at the following Web sites: http://www.npuap.org/positn1.html and http://www.ncbi.nlm.nih.gov/books/bv.fcgi?rid=hstat2.chapter.4409.

CC – Decubitus ulcer codes are classified as CCs under the CMS DRGs. Codes 707.00, 707.01, and 707.09 are CCs under the MS-DRGs. Codes 707.02 through 707.07 are considered MCCs under the MS-DRGs. As discussed earlier, MCCs result in even larger payments than CCs.

Considerations – Pressure ulcers are an important hospital-acquired complication. Prevention guidelines exist (non-CDC) and can be implemented by hospitals. Clinicians may state that some pressure ulcers present on admission cannot be identified (skin is not yet broken (Stage I) but damage to tissue is already done and skin will eventually break down). However, by selecting this condition, we would provide hospitals the incentive to perform careful examination of the skin of patients on admission to identify decubitus ulcers. If the condition is present on admission, the provision will not apply. In the proposed rule, we proposed to include pressure ulcers as one of our initial hospital-acquired conditions. This condition can be clearly identified through ICD-9-CM codes. These codes are classified as a CC under the CMS DRGs and as a CC or MCC under the MS-DRGs. Pressure ulcers meet the burden criteria because they are both high cost and high frequency cases. There are clear prevention guidelines. While there is some question as to whether all cases with developing pressure ulcers can be identified on admission, we believe the selection of this condition will result in a

closer examination of the patient's skin on admission and better quality of care. We welcomed comments on the proposed inclusion of this condition.

Comment: A majority of commenters supported the intent of selecting the condition of pressure ulcers, but had concerns about how the provision would be implemented in practice. A large majority of commenters believed hospitals will more carefully examine the skin of patients if this condition is selected. However, many commenters cited difficulty in detecting stage 1 pressure ulcers on admission, particularly in certain patient populations.

The commenters cited the Guidance to Surveyors for Long-Term Care Facilities (CMS Manual System Pub. 100-07, State Operations Provider Certification issued November 2004, page 5), noting CMS' previous acknowledgment that some pressure ulcers are "unavoidable." The commenters cited evidence of an increased risk of pressure ulcer reoccurrence after a patient has had at least one stage IV ulcer.

The commenters expressed concern about how this condition will be coded upon admission. The commenters also suggested that present-on-admission coding of pressure ulcers will rely solely on physicians' notes and diagnoses, according to Medicare coding rules. The commenters were concerned that the current ICD-9-CM codes for pressure ulcers are not precise enough to delineate differences in wound depth, which is an important factor for determining the severity of an ulcer.

The commenters recommended that CMS supplement ICD-9-CM codes for pressure ulcers with severity adjustments for complications and comorbidities that are present on admission. Because patients with pressure ulcers often have other

complicating conditions, the commenters stated that it is unlikely that pressure ulcers would potentially be the only secondary diagnosis that would change the DRG assignment from one without a CC to one with a CC. Lastly, the commenters noted that accurate identification of a pressure ulcer requires the education and expertise of a trained physician.

The commenters suggested that CMS should exclude patients enrolled in the Medicare hospice benefit and patients with certain diagnoses that make them more highly prone to pressure ulcers such as hemiplegia, quadriplegia, wasting syndrome, with advanced AIDS and/or protein malnutrition associated with a variety of serious end-stage illnesses.

Response: We appreciate the overwhelming public support for the intent of selecting this condition, provided we can address the concerns raised in the public comments. We acknowledge the commenters' concern that CMS previously stated some pressure ulcers are "unavoidable." However, we believe improved screening to identify pressure ulcers upon admission for inpatient care will increase the quality of care. By screening patients entering the hospital for pressure ulcers, the ulcers will be discovered earlier and improve treatment of this preventable condition. We agree that the POA coding of pressure ulcers will rely on the attending physician, who has primary responsibility for documenting and diagnosing a patient’s clinical conditions. Pressure ulcers that are identified through screening upon admission that are documented properly will continue to be assigned to a higher paying DRG.

With respect to the comment about patients with pressure ulcers having other complications and comorbidities, we note that many of the new MS-DRGs are subdivided into two or more severity levels. We will continue to evaluate the need for additional severity levels within base MS-DRGs. On the specific issue of the MS-DRGs that include pressure ulcers, we note that these MS-DRGs are already divided into three severity levels as follows:

- MS-DRG 573 (Skin Graft &/or Debridement for Skin Ulcer or Cellulitis with MCC)
- MS-DRG 574 (Skin Graft &/or Debridement for Skin Ulcer or Cellulitis with CC)
- MS-DRG 575 (Skin Graft &/or Debridement for Skin Ulcer or Cellulitis without CC/MCC)

We are aware that many patients with pressure ulcers may also have other comorbid and complicating conditions that will continue to assign the patient to a higher paying DRG. We do not believe this fact should preclude physicians and hospitals from screening patients for pressure ulcers upon admission. As we indicated in the proposed rule (72 FR 24726), we believe only a minority of cases will have one of the selected conditions as the only CC or MCC present on the claim. However, we believe it will continue to lead to improvements in the quality of care. We believe the selection of this condition will lead the physician and hospital to perform a proper skin exam upon admission, leading to earlier identification and treatment of pressure ulcers.

With respect to the comment that accurate identification of a pressure ulcer requires the education and expertise of a trained physician, we agree. Hospitals should be using properly educated and trained physicians to identify and treat pressure ulcers (as well as all other medical conditions).

We appreciate all the public comment on this condition, and have considered all of these points of view. We believe the condition of pressure ulcers meets the criteria of the DRA:

- There are unique codes that identify pressure ulcers that are currently considered to be a CC or an MCC under the MS-DRGs;
- Prevention guidelines to avoid pressure ulcers currently exist; and
- As shown above, pressure ulcers are high-cost/high-volume conditions.

Therefore, in this final rule with comment period, we are selecting the condition of pressure ulcers to be subject to the payment adjustment for hospital-acquired conditions beginning October 1, 2008. We referred the matter concerning the need for additional, detailed ICD-9-CM codes to the CDC. We believe further specificity in the ICD-9-CM codes will aid in distinguishing early from late stage pressure ulcers prior to the implementation date of this provision on October 1, 2008.

Serious Preventable Events

Serious preventable events are events that should not occur in health care. The injury prevention community has developed information on serious preventable events. CMS reviewed the list of serious preventable events and identified those events for which there was an ICD-9-CM code that would assist in identifying them. We identified four

types of serious preventable events to include in our evaluation. These include leaving an object in a patient; performing the wrong surgery (surgery on the wrong body part, wrong patient, or the wrong surgery); air embolism following surgery; and providing incompatible blood or blood products. Three of these serious preventable events have unique ICD-9-CM codes to identify them. There is not a clear and unique code for surgery performed on the wrong body part, wrong patient, or the wrong surgery. Each of these events is discussed separately.

(c) Serious Preventable Event – Object Left in during Surgery

Coding –Retention of a foreign object in a patient after surgery is identified through ICD-9-CM code 998.4 (Foreign body accidentally left during a procedure).

Burden (High Cost/High Volume) – For FY 2006, there were 764 cases reported of Medicare patients who had an object left in during surgery reported as a secondary diagnosis. The average charges for the hospital stay were $61,962. This is a rare event. Therefore, it is not high volume. However, an individual case will likely have high costs, given that the patient will need additional surgery to remove the foreign body. Potential adverse events stemming from the foreign body could further raise costs for an individual case.

Prevention guidelines – There are widely accepted and clear guidelines for the prevention of this event. This event should not occur. Prevention guidelines for avoiding leaving objects in during surgery are located at the following Web site: http://www.qualityindicators.ahrq.gov/psi_download.htm.

CC - This code is a CC under the CMS DRGs as well as under the MS-DRGs.

Considerations – There are no significant considerations for this condition. There is a unique ICD-9-CM code and wide agreement on the prevention guidelines. We proposed to include this condition as one of our initial hospital-acquired conditions. The cases can be clearly identified through an ICD-9-CM code. This code is a CC under both the CMS DRGs and the MS-DRGs. There are clear prevention guidelines. While the cases may not meet the high frequency criterion, they do meet the high-cost criterion. Individual cases can be high cost. In the proposed rule, we welcomed comments on including this condition as one of our initial hospital-acquired conditions.

Comment: A large majority of commenters supported CMS' efforts to identify the condition of "object left in surgery" as one that should not occur in the hospital setting. The commenters supported selecting this condition in this year's IPPS rule.

The commenters applauded CMS for identifying a hospital-acquired condition that has discrete ICD-9-CM codes and known methods of prevention. In addition, a few commenters noted that prevention guidelines for this condition are fully identified and endorsed by the NQF. MedPAC also complimented CMS for its efforts to identify "object left in surgery" and stated that CMS should not allow a case to be classified as a CC/MCC if this "never event" occurs during a patient's stay.

The commenters urged CMS to make exceptions for objects deliberately left in place in surgery as opposed to accidental retained foreign objects. The commenters noted that a patient may return to the hospital months or years after an object was left in during surgery, and it is necessary to have POA codes to identify patients that return to a

different hospital to have the object removed. All of the commenters recognized that this event can cause great harm to patients.

Response: We believe exceptions for this condition are not necessary. The code that identifies this event, 998.4 (Foreign body accidentally left during a procedure) specifically states that the object was accidentally left in during the surgery. This code would not be assigned if a device or implant was deliberately implanted into a patient. In addition, as stated earlier, we recognize the important role of the attending physician in designating whether or not the serious preventable event occurred during the current admission. We agree with the commenters that a patient may return to the hospital months or years after the surgery to have the foreign object removed. In this circumstance, the hospital would code the condition as present on admission and the provision would not apply. By documenting the event early, the correct POA code can be applied. We agree with the commenters that this serious preventable event should be selected as a hospital-acquired condition in this final rule with comment period. Therefore, we are including this condition in the list of those to be implemented in FY 2009.

(d) Serious Preventable Event – Air Embolism

Coding - An air embolism is identified through ICD-9-CM code 999.1 (Complications of medical care, NOS, air embolism).

Burden (High Cost/High Volume) – This event is rare. For FY 2006, there were 45 reported cases of air embolism for Medicare patients. The average charges for the hospital stay were $66,007.

Prevention guidelines – There are clear prevention guidelines for air embolisms. This event should not occur. Serious preventable event guidelines can be found at the following Web site: http://www.qualityindicators.ahrq.gov/psi_download.htm.

CC - This code is a CC under the CMS DRGs and is an MCC under the MS-DRGs.

Considerations – There are no significant considerations for this condition. There is a unique ICD-9-CM code and wide agreement on the prevention guidelines. In addition, as stated earlier, the condition is a CC under the CMS DRGs and an MCC under the MS-DRGs. While the condition is rare, it does meet the cost burden criterion because individual cases can be expensive. Therefore, air embolism is a high-cost condition because average charges per case are high. In the proposed rule, we welcomed comments on the proposal to include this condition.

Comment: A large number of commenters supported CMS' efforts to select this condition as one that should not occur in the hospital setting. The commenters considered this an appropriate condition to include for the final rule. The commenters applauded CMS for identifying a hospital-acquired condition that has discrete ICD-9-CM codes and known methods of prevention.

In addition, the commenters noted that prevention guidelines for this condition are fully identified and endorsed by the NQF. MedPAC also complimented CMS for its efforts to identify "air embolism" and stated that CMS should not allow a case to be classified as a CC/MCC if this "never event" occurs during a patient's stay.

The commenters urged CMS to make exceptions for situations when air embolism is technically unavoidable because of a special surgical procedure. All of the commenters recognized that this event can cause great harm to patients.

Response: We appreciate the support for the selection of this condition. We also welcome specific recommendations that would clearly define an appropriate exception to this condition, including any appropriate ICD-9-CM diagnosis and procedure codes which the commenter believes clearly define such an occurrence and the justification for an exception. At this point, we do not believe such an exception is necessary.

We agree with commenters that this serious preventable event should be included in the FY 2008 final rule. Therefore, we are including the condition of air embolism in the list of those to be implemented in FY 2009.

(e) Serious Preventable Event – Blood Incompatibility

Coding - Delivering ABO-incompatible blood or blood products is identified by ICM-9-CM code 999.6 (Complications of medical care, NOS, ABO incompatibility reaction).

Burden (High Cost/High Volume) – This event is rare. Therefore, it is not high volume. For FY 2006, there were 33 reported cases of blood incompatibility among Medicare patients, with average charges of $46,492 for the hospital stay. Therefore, individual cases have high costs.

Prevention guidelines – There are prevention guidelines for avoiding the delivery of incompatible blood or blood products. The event should not occur. Serious

preventable event guidelines can be found at the following Web site: http://www.qualityindicators.ahrq.gov/psi_download.htm

CC - This code is a CC under the CMS DRGs as well as the MS-DRGs.

Considerations – There are no significant considerations for this condition. There is a unique ICD-9-CM code which is classified as a CC under the CMS DRGs as well as the MS-DRGs. There is wide agreement on the prevention guidelines. While this may not be a high-volume condition, average charges per case are high. Therefore, we believe this condition is a high-cost condition and, therefore, meets our burden criterion. We proposed to include this condition as one of our initial hospital-acquired conditions.

Comment: A large number of commenters supported CMS' efforts to identify "blood incompatibility" as one condition that should not occur in the hospital setting. The commenters considered this an appropriate condition to include for FY 2009. The commenters applauded CMS for identifying a hospital-acquired condition that has discrete ICD-9-CM codes and known methods of prevention. In addition, the commenters noted that prevention guidelines for this condition are fully identified and endorsed by the NQF. MedPAC also complimented CMS for its efforts to identify "blood incompatibility" and stated that CMS should not allow a case to be classified as a CC/MCC if this "never event" occurs during a patient's stay.

The commenters urged CMS to make exceptions for situations when blood incompatibility is technically unavoidable in emergencies when patients deliberately receive unmatched blood. All of the commenters recognized that this event can cause great harm to patients.

Response: As suggested by commenters, hospitals should not be transfusing incompatible blood. The condition meets the criteria for being selected. It is a potential hospital-acquired condition that has discrete ICD-9-CM codes and known methods of prevention. Prevention guidelines for this condition are fully identified and endorsed by the NQF. We acknowledge that there may a rare emergency where a hospital does not have compatible blood available for transfusion. We welcome specific recommendations that would define circumstances where blood incompatibility is unavoidable, including any appropriate ICD-9-CM diagnosis and procedure codes, which the commenters believe clearly define such an occurrence. If providers can provide such a clinical scenario that can be identified by existing or new ICD-9-CM codes, we will consider excluding this situation from the provision. We agree with the commenters that this serious preventable event should be included in the FY 2008 final rule. Therefore, we are including the condition of blood incompatibility in the list of those to be implemented in FY 2009.

(f) Staphylococcus Aureus Bloodstream Infection/Septicemia

Coding – ICD-9-CM Code 038.11 (Staphylococcus aureus septicemia) identifies this condition. However, the codes selected to identify septicemia are somewhat complex. The following ICD-9-CM codes may also be reported to identify septicemia:

- 995.91 (Sepsis) and 995.92 (Severe sepsis). These codes are reported as secondary codes and further define cases with septicemia.

- 998.59 (Other postoperative infections). This code includes septicemia that develops postoperatively.

- 999.3 (Other infection). This code includes but is not limited to sepsis/septicemia resulting from infusion, injection, transfusion, and vaccination (ventilator-associated pneumonia is also included here).

Burden (High Cost/High Volume) – CDC reports that there are 290,000 cases of staphylococcus aureus infection annually in hospitalized patients of which approximately 25 percent are bloodstream infections or sepsis. For FY 2006, there were 29,500 cases of Medicare patients who had staphylococcus aureus infection reported as a secondary diagnosis. The average charges for the hospital stay were $82,678. Inpatient staphylococcus aureus result in an estimated 2.7 million days in excess length of stay, $9.5 billion in excess charges, and approximately 12,000 inpatient deaths per year.

Prevention guidelines – CDC guidelines are located at the following Web site: http://www.cdc.gov/ncidod/dhqp/gl_intravascular.html.

CC – Codes 038.11, 995.91, 998.59, and 999.3 are classified as CCs under the CMS DRGs and as MCCs under the MS-DRGs.

Considerations - Preventive health care associated bloodstream infections/septicemia that are preventable are primarily those that are related to a central venous/vascular catheter, a surgical procedure (postoperative sepsis) or those that are secondary to another preventable infection (for example, sepsis due to catheter-associated urinary tract infection). Otherwise, physicians and other public health experts may argue whether septicemia is reasonably preventable. The septicemia may not be simply a hospital-acquired infection. It may simply be a progression of an infection that occurred prior to admission. Furthermore, physicians cannot always tell whether the condition was

hospital-acquired. We examined whether it might be better to limit the septicemia cases to a specific organism (for example, code 038.11 (Staphylococcus aureus septicemia)). CDC staff recommended that we focus on staphylococcus aureus septicemia because this condition is a significant public health issue. As stated earlier, there is a specific code for staphylococcus aureus septicemia, code 038.11. Therefore, the cases would be easy to identify. However, as stated earlier, while this type of septicemia is identified through code 038.11, coders may also provide sepsis code 995.91 or 995.92 to more fully describe the staphylococcus aureus septicemia. Codes 995.91 and 995.92 are reported as secondary codes and further define cases with septicemia. Codes 995.91 and 995.92 are CCs under the CMS DRGs and MCCs under the MS-DRGs.

- 998.59 (Other postoperative infections). This code includes septicemia that develops postoperatively.

- 999.3 (Other infection). This code includes but is not limited to sepsis/septicemia resulting from infusion, injection, transfusion, and vaccination (ventilator-associated pneumonia is also indexed here).

To implement this condition as one of our initial ones, we would have to exclude the specific code for staphylococcus aureus septicemia, 038.11, and the additional septicemia codes, 995.91, 995.92, 998.59, and 999.3.

We acknowledge that there are additional issues involved with the selection of this condition that may involve developing an exclusion list of conditions present on admission for which we would not apply a CC exclusion to staphylococcus aureus septicemia. For example, a patient may come into the hospital with a staphylococcus

aureus infection such as pneumonia. The pneumonia might develop into staphylococcus aureus septicemia during the admission. It may be appropriate to consider excluding cases such as those of patients admitted with staphylococcus aureus pneumonia that subsequently develop staphylococcus aureus septicemia from the provision. In order to exclude cases that did not have a staphylococcus aureus infection prior to admission, we would have to develop a list of specific codes that identified all types of staphylococcus aureus infections such as code 482.41 (Pneumonia due to staphylococcus aureus). We likely would not apply the new provision to cases of staphylococcus aureus septicemia if a patient were admitted with staphylococcus aureus pneumonia. However, if the patient had other types of infections, not classified as being staphylococcus aureus, and then developed staphylococcus aureus septicemia during the admission, we would apply the provision and exclude the staphylococcus aureus septicemia as a CC. We were not able to identify any other specific ICD-9-CM codes that identify specific infections as being due to staphylococcus aureus.

Other types of infections, such as urinary tract infections, would require the reporting of an additional code, 041.11 (Staphylococcus aureus), to identify the staphylococcus aureus infection. This additional coding presents administrative issues because it will not always be clear which condition code 041.11 (Staphylococcus aureus) is describing. We do not believe it would be appropriate to make code 041.11, in combination with other codes, subject to the hospital-acquired conditions provision until we better understand how to address the administrative issues that would be associated with their selection. Therefore, we would exclude staphylococcus aureus septicemia

cases with code 482.41 reported as being subject to the hospital-acquired conditions provision. Stated conversely, we would allow staphylococcus aureus septicemia to count as a CC if the patient was admitted with staphylococcus aureus pneumonia.

We recognize that there may be other conditions which we should consider for this type of exclusion. We proposed to include staphylococcus aureus bloodstream infection/septicemia (code 038.11) as one of our initial hospital-acquired conditions. We also proposed to exclude codes 995.91, 998.59, and 999.3 from counting as an MCC/CC when they were reported with code 038.11. The condition can be clearly identified through ICD-9-CM codes that are classified as CC under the CMS DRGs and MCCs under the MS-DRGs. The condition meets our burden criterion by being both high cost and high volume. There are prevention guidelines which we acknowledge are subject to some debate among the medical community. We also acknowledge that we would have to exclude this condition if a patient were admitted with a staphylococcus aureus infection of a more limited location, such as pneumonia. In the proposed rule, we encouraged commenters to make suggestions on this issue and to recommend any other appropriate exclusion for staphylococcus aureus septicemia. We also encouraged comments on the appropriateness of selecting staphylococcus aureus septicemia as one of our proposed initial hospital-acquired conditions.

Comment: Many commenters opposed CMS' proposed selection of this condition as part of the FY 2008 final rule. There were a minority of commenters who strongly supported the selection of this condition. These commenters noted the existence of technologies that allow the physician to determine the presence of Staphylococcus

Aureus upon admission. Many more commenters stated that accurately identifying staphylococcus aureus septicemia on admission will be difficult, particularly in patients who may have a staphylococcus aureus infection in a limited location. Several commenters referenced the FY 2008 IPPS proposed rule, which stated "physicians cannot always tell whether the condition was hospital acquired." Other commenters also noted that there is still debate among physicians regarding the prevention guidelines for staphylococcus aureus septicemia. The proliferation of changes in coding guidelines presents coding problems for hospitals to accurately identify present-on-admission status according to some comments. Specifically, the commenters noted that codes to identify sepsis are very complex and have had recent changes. For instance, there is a code that currently includes septicemia that develops postoperatively, but does not clearly distinguish between intravascular and catheter-associated sources of septicemia. The commenters also suggested that additional coding may be necessary to accurately identify this condition in the many forms it often presents upon admission. Some commenters suggested that the addition of codes may create a challenge for coding staff to identify the correct code.

A large majority of commenters urged CMS to narrow the category for staphylococcus aureus septicemia to include only patients for whom it is reasonably clear that the hospital was the source of the infection and that it could have been reasonably prevented.

Response: We appreciate the plethora of comments regarding staphylococcus aureus septicemia. The commenters were very insightful and presented the challenges of selecting this condition in the FY 2008 final rule.

We agree that the recent proliferation of ICD-9-CM codes for this condition will make it difficult to code and could present an administrative burden on hospitals. In addition, we are sensitive to the difficulty of identifying when a disease has progressed to sepsis or septicemia. Given the course of progression to septicemia, it can be very difficult for a clinician to appropriately diagnose staphylococcus aureus septicemia as present on admission.

While we acknowledge the many concerns raised by the commenters, we continue to believe that hospital-acquired staphylococcus aureus septicemia remains a significant public health issue. We are aware of the continued need to prevent Staphylococcus Aureus septicemia in the hospital setting. Therefore, we plan to engage in a collaborative discussion with relevant experts to identify the circumstances when staphylococcus aureus septicemia is preventable. If we can identify when staphylococcus aureus septicemia is a reasonably preventable condition and have codes to distinguish those situations, we will consider this condition for future years. We appreciate the many comments and suggestions as we consider staphylococcus aureus septicemia for selection in the future, and look forward to receiving more public input to identify only instances when this condition is preventable.

Therefore, we are not selecting this condition in this final rule with comment period. We plan to collaborate with the public on this important public health issue and

continue to consider the condition for selection in the FY 2009 final rule. We encourage and welcome public comment to further evaluate this condition.

(g) Ventilator Associated Pneumonia (VAP) and Other Types of Pneumonia

Coding – Pneumonia is identified through the following codes:

- 073.0 (Ornithosis with pneumonia)
- 112.4 (Candidiasis of lung)
- 136.3 (Pneumocystosis)
- 480.0 (Pneumonia due to adenovirus)
- 480.1 (Pneumonia due to respiratory syncytial virus)
- 480.2 (Pneumonia due to parainfluenza virus)
- 480.3 (Pneumonia due to SARS-associated coronavirus)
- 480.8 (Pneumonia due to other virus not elsewhere classified)
- 480.9 (Viral pneumonia, unspecified)
- 481 (Pneumococcal pneumonia [Streptococcus pneumoniae pneumonia])
- 482.0 (Pneumonia due to Klebsiella pneumoniae)
- 482.1 (Pneumonia due to Pseudomonas)
- 482.2 (Pneumonia due to Hemophilus influenzae [H. influenzae])
- 482.30 (Pneumonia due to Streptococcus, unspecified)
- 482.31 (Pneumonia due to Streptococcus, Group A)
- 482.32 (Pneumonia due to Streptococcus, Group B)
- 482.39 (Pneumonia due to other Streptococcus)
- 482.40 (Pneumonia due to Staphylococcus, unspecified)

- 482.41 (Pneumonia due to Staphylococcus aureus)
- 482.49 (Other Staphylococcus pneumonia)
- 482.81 (Pneumonia due to Anaerobes)
- 482.82 (Pneumonia due to Escherichia coli [E. coli])
- 482.83 (Pneumonia due to other gram-negative bacteria)
- 482.84 (Pneumonia due to Legionnaires' disease)
- 482.89 (Pneumonia due to other specified bacteria)
- 482.9 (Bacterial pneumonia unspecified)
- 483.0 (Pneumonia due to Mycoplasma pneumoniae)

There is not a unique code that identifies ventilator associated pneumonia. The creation of a code for ventilator associated pneumonia was discussed at the September 29, 2006 meeting of the ICD-9-CM Coordination and Maintenance Committee meeting. Many issues and concerns were raised at the meeting concerning the creation of this proposed new code. It has been difficult to define ventilator-associated pneumonia. We plan to continue working closely with the CDC to develop a code that can accurately describe this condition for implementation in FY 2009. CDC will address the creation of a unique code for this condition at the September 28-29, 2007 ICD-9-CM Coordination and Maintenance Committee meeting.

While we list 27 pneumonia codes above, our clinical advisors do not believe that all of the codes mentioned could possibly be associated with ventilator-associated pneumonia. Our clinical advisors specifically question whether the following codes would ever represent cases of ventilator-associated pneumonia: 073.0, 480.0, 480.1,

480.2, 480.3, 480.8, 480.9, and 483.0. Therefore, we have a range of pneumonia codes, all of which may not represent cases that could involve ventilator-associated pneumonia. In addition, we do not have a specific code that uniquely identifies cases of ventilator-associated pneumonia.

Burden (High Cost/High Volume) – CDC reports that there are 250,205 ventilator-associated pneumonias per year. Because there is not a unique ICD-9-CM code for ventilator-associated pneumonia, there is not accurate data for FY 2006 on the number of Medicare patients who had this condition as a secondary diagnosis. However, we did examine data for FY 2006 on the number of Medicare patients who listed pneumonia as a secondary diagnosis. There were 92,586 cases with a secondary diagnosis of pneumonia, with average charges of $88,781. According to the journal Critical Care Medicine, patients with ventilator-associated pneumonia have statistically significantly longer intensive care lengths of stay (mean = 6.10 days) than those who do not (mean = 5.32-6.87 days). In addition, patients who develop ventilator-associated pneumonia incur, on average, greater than or equal to $10,019 in additional hospital costs compared to those who do not.[23] Therefore, we believe that this is a high-volume condition.

Prevention guidelines – Prevention guidelines are located at the following Web site: http://www.cdc.gov/ncidod/dhqp/gl_hcpneumonia.html. However, it is not clear how effective these guidelines are in preventing pneumonia. Ventilator-associated pneumonia may be particularly difficult to prevent.

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[23] Safdar N.: Clinical and Economic Consequences of Ventilator-Associated Pneumonia: A Systematic Review, Critical Care Medicine, 2005, 33(10), pp. 2184-2193.

CC – All of the pneumonia codes listed above are CCs under the CMS DRGs and under the MS-DRGs, except for the following pneumonia codes which are non-CCs: 073.0, 480.0, 480.1, 480.2, 480.3, 480.8, 480.9, 483.0. However, as mentioned earlier, there is not a unique ICD-9-CM code for ventilator-associated pneumonia. Therefore, this condition does not currently meet the statutory criteria for being selected.

Considerations – Hospital-acquired pneumonias, and specifically ventilator associated pneumonias, are an important problem. However, based on our work with the medical community to develop specific codes for this condition, we have learned that it is difficult to define what constitutes ventilator associated pneumonia. Although prevention guidelines exist, it is not clear how effective these are in preventing pneumonia. Clinicians cannot always tell which pneumonias are acquired in a hospital. In addition, as mentioned above, there is not a unique code that identifies ventilator-associated pneumonia. There are a number of codes that capture a range of pneumonia cases. It is not possible to specifically identify if these pneumonia cases are ventilator-associated or arose from other sources. Because we cannot identify cases with ventilator-associated pneumonia and there are questions about its preventability, we did not propose to select this condition as one of our initial hospital-acquired conditions. However, we welcomed public comments on how to create an ICD-9-CM code that identifies ventilator-associated pneumonia, and we encouraged participation in our September 28-29, 2007 ICD-9-CM Coordination and Maintenance Committee meeting where this issue will be discussed. We indicated that we would reevaluate the selection of this condition in FY 2009.

Comment: Some commenters urged CMS to select ventilator-associated pneumonia at this time. Most commenters recommended that CMS delay selecting this condition until a unique code is established.

Some commenters submitted an evidence-based peer-reviewed American Association for Respiratory Care (AARC) Clinical Practice Guideline (CPG) on strategies that should be disseminated and available to hospitals for the prevention of ventilator associated pneumonia. The CPG can be found at http://www.rcjournal.com/cpgs/09.03.0869.html. Concurrently, the AARC acknowledges that more research needs to be done in this area.

A majority of commenters believed this condition can be reasonably prevented through evidence-based medicine guidelines. These commenters noted that current unique codes for this condition are absent. These commenters urged CMS to consider the development of an explicit ICD-9-CM code for this ventilator-associated pneumonia and to select it at a later date.

Response: At the time of publication of this final rule with comment period, there is not a code associated with ventilator-associated pneumonia. Therefore, this condition does not currently meet the statutory criteria for being selected. However, the ICD-9-CM Coordination and Maintenance Committee will meet September 27–28, 2007, to discuss the creation of a unique ICD-9-CM code for this condition. Further information of the Committee's activities on diagnosis code issues can be found at the Web site: http://www.cdc.gov/nchs/icd9.htm. We believe that once this condition has a unique code, it should be further considered for selection beginning in FY 2009.

We believe that ventilator-associated pneumonia meets some of the criteria for being selected. There are guidelines for prevention of ventilator-associated pneumonia within CDC evidence based guidelines for healthcare associated pneumonia. More information can be found at: http://www.cdc.gov/ncidod/dhqp/gl_hcpneumonia.html. Furthermore, we are aware that the American Thoracic Society and the Infectious Disease Society of America collaborated to produce guidelines on the prevention of ventilator-associated pneumonia. As indicated above, most pneumonias are CCs. Therefore, it is reasonable to believe that ventilator-associated pneumonia will also be classified as a CC once a new code is created to identify it. At that time, we can further consider whether the condition is reasonably preventable and should be subject to this provision.

We appreciate all the public comment on this condition, and considered all of the respondents' point of view. While we acknowledge the clinical challenge of clearly identifying ventilator-associated pneumonia, we believe that once this condition has a unique ICD-9-CM code, coupled with well-known prevention guidelines that are the result of evidence-based medicine, we will give strong consideration for selecting this condition for FY 2009, and including it in the FY 2009 IPPS proposed rule.

(h) Vascular Catheter-Associated Infections

Coding – The proposed rule noted that the code used to identify vascular catheter associated infections is ICD-9-CM code 996.62 (Infection due to other vascular device, implant, and graft). This code includes infections associated with all vascular devices, implants, and grafts. It does not uniquely identify vascular catheter associated infections.

Therefore, there was not a unique ICD-9-CM code for this infection at the time of the proposed rule. CDC and CMS staff requested that the ICD-9-CM Coordination and Maintenance Committee discuss the creation of a unique ICD-9-CM code for vascular catheter associated infections because the issue is important for public health. The proposal to create a new ICD-9-CM was discussed at the March 22-23, 2007 meeting of the ICD-9-CM Coordination and Maintenance Committee. A summary of this meeting can be found at: http://www.cdc.gov/nchs/icd9.htm. In the proposed rule, we indicated that coders would have to assign code 996.62 plus an additional code for the infection such as septicemia to identify vascular catheter-associated infections. Therefore, a list of specific infection codes would have to be developed to go along with code 996.62 if CDC did not create a code for vascular catheter-associated infections. If the vascular catheter associated infection was hospital-acquired, the DRG logic would have to be modified so that neither the code for the vascular catheter associated infection along with the specific infection code would count as a CC. However, even if these actions were taken, we were concerned that code 996.62 is not specific to vascular catheter-associated infections.

Burden (High Cost/High Volume) – CDC reports that there are 248,678 central line associated bloodstream infections per year. It appears to be both high cost and high volume. However, we were not able to identify Medicare data on these cases because there is no existing unique ICD-9-CM code.

Prevention guidelines – CDC guidelines are located at the following Web site: http://www.cdc.gov/ncidod/dhqp/gl_intravascular.html.

CC – Code 996.62 is a CC under the CMS DRGs and the MS-DRGs. However, as stated earlier, this code is broader than vascular catheter-associated infections. Therefore, at the time of the proposed rule, there was not a unique ICD-9-CM code to identify the condition, and it did not meet the statutory criteria to be selected. However, the proposed rule indicated that we will be seeking to create a code(s) to identify this condition and may select it as a condition under the provision beginning in FY 2009.

Considerations - There was not yet a unique ICD-9-CM code to identify this condition at the time of the proposed rule. In the proposed rule, we indicated that if a code were created prior to October 1, 2007, we would be able to specifically identify these cases. Some patients require long-term indwelling catheters, which are more prone to infections. Ideally catheters should be changed at certain time intervals. However, circumstances might prevent such practice (for example, the patient has a bleeding diathesis). In addition, a patient may acquire an infection from another source which can colonize the catheter. As mentioned earlier, coders would also assign an additional code for the infection, such as septicemia. Therefore, a list of specific infection codes would have to be developed to go along with code 996.62. If the vascular catheter-associated infection was hospital-acquired, the DRG logic would have to be modified so that neither the code for the vascular catheter-associated infection along with the specific infection code would count as a CC. Without a specific code for infections due to a catheter, it would be difficult to identify these patients. Given the current lack of an ICD-9-CM code for this condition, we did not propose to include it as one of our initial hospital-acquired conditions. However, we believed it showed merit for inclusion in future lists of

hospital-acquired conditions once we had resolved the coding issues and were able to better identify the condition in the Medicare data. We indicated that we would reevaluate the selection of this condition in FY 2009.

We encouraged comments on this condition which was identified as an important public health issue by several organizations that provided recommendations on hospital-acquired conditions. We indicated that we were particularly interested in receiving comments on how we should handle additional associated infections that might develop along with the vascular catheter-associated infection.

Comment: Some commenters stated there was not a unique ICD-9-CM code for vascular catheter-associated infection. Therefore, the condition does not meet the criteria for being selected. These commenters requested that CMS consider creating an explicit code for catheter-associated infections and selecting the condition at that time. One commenter recommended that CMS examine selecting vascular-catheter associated infections and identify the condition using the CPT codes for insertion of a central venous catheter. Other commenters recommend selecting the condition and rely on the use of specific codes for the insertion of catheters to supplement the existing code 996.62 (Infection and inflammatory reaction due to other vascular device, implant, and graft). The commenters believed that this alternative approach may reduce the need to rely on a unique code for catheter associated blood stream infection (CA-BSI). Some commenters noted that it is possible to screen for bloodstream infections upon admission. Other commenters suggested that CMS exempt vascular surgery, implantable device codes, and other obvious sources of existing conditions that cause blood stream infection prior to

catheter placement. Finally, the commenters suggested that CMS exclude long-term catheter insertions such as the tunneled central venous catheter using codes 365.57 through 365.66.

Response: Since the publication of the FY 2008 IPPS proposed rule, CDC has created a new code for vascular catheter-associated infection. The new code 999.31, (Infection due to central venous catheter) will become effective on October 1, 2007. It is available for public viewing along with other new codes listed on the CMS Web site at: http://www.cms.hhs.gov/ICD9ProviderDiagnosticCodes/Downloads/new_diagnosis_codes_2007.pdf. This new code will address commenters concerns regarding coding for this condition.

We appreciate all the public comment on this condition, and have considered all of these points of view. For the proposed rule, our only barrier to selecting vascular catheter-associated infections was the absence of a unique code to identify the condition. As CDC has since created a code to identify vascular catheter-associated infections, we believe the condition meets the criteria for being selected:

- There are unique codes that identify vascular catheter-associated infections as a CC under the MS-DRGs;
- Prevention guidelines exist to avoid vascular catheter-associated infections; and
- As shown above, vascular catheter-associated infections are high-volume conditions.

At this time, we have not decided whether there are specific clinical situations where a vascular catheter associated infection would not be considered preventable. We will consider exceptions to the policy in the circumstances provided in the public comments. We will consider these suggestions before the provision becomes effective in FY 2009.

(i) Clostridium Difficile-Associated Disease (CDAD)

Coding –This condition is identified by ICD-9-CM code 008.45 (Clostridium difficile).

Burden (High Cost/High Volume) – CDC reports that there are 178,000 cases per year in U.S. hospitals. For FY 2006, there were 110,761 reported cases of Medicare patients with CDAD as a secondary diagnosis, with average charges for the hospital stay of $52,464. Therefore, this is a high-cost and high-volume condition.

Prevention guidelines– Prevention guidelines are not available. Therefore, we do not believe this condition can reasonably be prevented through the application of evidence-based guidelines.

CC – Code 008.45 is a CC under the CMS DRGs and the MS-DRGs.

Considerations – CDAD is an emerging problem with significant public health importance. If found early CDAD cases can easily be treated. However, cases not diagnosed early can be expensive and difficult to treat. CDAD occurs in patients on a variety of antibiotic regiments, many of which are unavoidable, and therefore preventability is an issue. We did not propose to include CDAD as one of our initial hospital-acquired conditions at this time, given the lack of prevention guidelines. We

welcomed public comments on CDAD, specifically on its preventability and whether there is potential to develop guidelines to identify it early in the disease process and/or diminish its incidence. We indicated that we would reevaluate the selection of this condition in FY 2009.

Comment: Commenters noted the current clinical debate surrounding this condition reveals that it is very difficult to prevent in all cases; it can be prevalent within the hospital setting. In addition, some commenters noted this condition may be caused by the treatment protocol prescribed for a principal diagnosis; it can also occur if the patient is immune-compromised. Finally, some commenters stated that a significant percentage of CDAD is unavoidable, and it is difficult to distinguish community acquired from hospital acquired CDAD. Commenters also urged CMS to delay selection of this condition because there is a lack of unique codes, complication codes, and guidelines for prevention of this condition.

Response: This condition meets two of the three statutory criteria. There is an ICD-9-CM code for CDAD. The code is 008.45 (Clostridium difficile). Therefore, the condition can be clearly identified through the use of ICD-9-CM codes. Code 008.45 is also a CC under the CMS DRGs and the MS-DRGs. Also, as shown above, CDAD occurs with significant frequency in the Medicare population and is a high cost condition. However, prevention guidelines for this condition are currently unavailable. As suggested by the commenters, leading clinicians believe this condition may not be reasonably preventable because it can occur as a result of broad spectrum antibiotic administration, which is often unavoidable. Although we agree with these commenters,

we are also aware of the public interest in this issue and will continue to be interested in selecting this condition if treatment protocols evolve to the point where CDAD is a preventable condition and prevention guidelines are developed.

We are not selecting this condition for implementation in the FY 2008 final rule. It does not currently meet the statutory guidelines for being selected because there are no prevention guidelines. Nevertheless, we will consider adopting this condition in the future if prevention guidelines to avoid CDAD are developed.

(j) Methicillin-Resistant Staphylococcus Aureus (MRSA)

Coding – MRSA is identified by ICD-9-CM code V09.0 (Infection with microorganisms resistant to penicillins). One would also assign a code(s) to describe the exact nature of the infection.

Burden (High Cost/High Volume) – For FY 2006, there were 95,103 reported cases of Medicare patients who had MRSA as a secondary diagnosis. The average charges for these cases were $31,088. This condition is a high-cost and high-volume infection. MRSA has become a very common bacterium occurring both in and outside of the hospital environment.

Prevention guidelines – CDC guidelines are located at the following Web site: http://www.cdc.gov/ncidod/dhqp/pdf/ar/mdroGuideline2006.pdf.

CC – Code V09.0 is not a CC under the CMS DRGs and the MS-DRGs. The specific infection would be identified in a code describing the exact nature of the infection, which may be a CC.

Considerations – As stated earlier, preventability may be hard to ascertain since the bacteria have become so common both inside and outside the hospital. There are also considerations in identifying MRSA infections because hospitals would report the code for MRSA along with additional codes that would describe the exact nature of the infection. We would have to develop a list of specific infections that could be the result of MRSA. We did not propose to include MRSA as one of our initial hospital-acquired conditions because the condition is not a CC. We recognize that associated conditions may be a CC. In the proposed rule, we welcomed comments on the proposal not to include this condition. Should there be support for including this condition, we requested recommendations on what codes might be selected to identify the specific types of infections associated with MRSA.

Comment: Commenters displayed a high level of interest in this condition, not only as a hospital-acquired condition, but also as a broader public health problem that continues to affect Medicare beneficiaries. Commenters noted that MRSA is both high volume and high cost, referring to the language in the proposed rule. For this reason, many commenters believed this condition should be given a unique ICD-9-CM code to be tracked in FY 2008. Furthermore, the commenters urged CMS to include it on the list of conditions for FY 2009 for which reimbursement may be withheld. Medical device companies that provide products to screen for MRSA commented in support of selecting the condition.

However, a large number of commenters had reservations about selecting this condition because MRSA is not a CC or MCC under the new MS-DRGs. Most

commenters acknowledged the clear prevention guidelines for MRSA. However, they contend that there remains debate on whether MRSA is reasonably preventable. These commenters indicated MRSA is ubiquitous and may be colonizing in so many potential patients that it is difficult to determine if it is acquired in a hospital. The commenters also noted current literature reveals a strain of community acquired MRSA that may be difficult to detect upon admission to the hospital.

Response: We acknowledge the strong public health interest in reducing the number of MRSA related infections. However, MRSA does not currently meet the statutory criteria to be selected. Although there is an ICD-9-CM code to identify MRSA and CDC has prevention guidelines to reduce its incidence, we do not believe that there is a consensus among public health experts that MRSA is preventable. The public comments and the literature on this condition reveal a vigorous debate over whether MRSA is really community-acquired rather than hospital-acquired given the significant potential number of patients that can be colonized with MRSA prior to admission. While this concern may be possible to address through screening patients for MRSA upon admission, the condition is not currently identified as a CC or MCC under the MS-DRGs. If present as a secondary diagnosis, the presence of MRSA alone does not lead to higher Medicare payment. Our data do not suggest that presence of MRSA alone will lead to higher hospital costs that would justify classifying it as a CC or MCC. Therefore, as the condition is not an MCC or CC, it does not meet the statutory criteria for being selected at this time.

Although we are not selecting MRSA at this time, we believe it is a precursor to several other conditions that we have selected. MRSA may be a precursor to catheter associated urinary tract infections, vascular catheter-associated infections, and mediastinitis after coronary artery bypass graft (CABG) surgery—a surgical site infection that we have selected and is discussed in more detail below.

(k) Surgical Site Infections

Coding – Surgical site infections are identified by ICD-9-CM code 998.59 (Other postoperative infection). The code does not tell the exact location or nature of the postoperative wound infection. The code includes wound infections and additional types of postoperative infections such as septicemia. The coding guidelines instruct the coder to add an additional code to identify the type of infection. To implement this condition we would have to remove both code 998.59 and the specific infection from counting as a CC if they occurred after the admission. We would have to develop an extensive list of possible infections that would be subject to the provision. We may also need to recommend the creation of a series of new ICD-9-CM codes to identify various types of surgical site infections, should this condition merit inclusion among those that are subject to the proposed hospital-acquired conditions provision.

Burden (High Cost/High Volume) – CDC reports that there are 290,485 surgical site infections each year. As stated earlier, there is not a unique code for surgical site infection. Therefore, we examined Medicare data on patients with any type of postoperative infection. For FY 2006, there were 38,763 reported cases of Medicare patients who had a postoperative infection. These patients had average charges for the

hospital stay of $79,504. We are unable to determine how many of these patients had surgical site infections.

Prevention guidelines – CDC guidelines are available at the following Web site: http://www.cdc.gov/ncidod/dhqp/gl_surgicalsite.html

CC – Code 998.59 is a CC under the CMS DRGs and the MS-DRGs.

Considerations – As mentioned earlier, code 998.59 is not exclusive to surgical site infections. It includes other types of postoperative infections. Therefore, code 998.59 does not currently meet the statutory criteria for being subject to the provision because it does not uniquely identify surgical site infections. To identify surgical site infections, we would need new codes that provide more detail about the type of postoperative infection as well as the site of the infection. In addition, one would report both code 998.59 as well a more specific code for the specific type of infection, making implementation difficult. While there are prevention guidelines, it is not always possible to identify the specific types of surgical infections that are preventable. Therefore, we did not propose to select surgical site infections as one of our proposed hospital-acquired conditions at this time. However, we welcomed public comments on whether we can develop criteria and codes to identify preventable surgical site infections that would assist us in reducing their incidence. We indicated that we were exploring ways to identify surgical site infections and would reevaluate this condition in FY 2009.

Comment: A number of commenters specifically requested that CMS consider selecting mediastinitis after coronary artery bypass graft (CABG) surgery. Commenters noted that mediastinitis is a postoperative infection that can arise after CABG.

Commenters stated that the condition meets the criteria set forth in the DRA. According to the comments, mediastinitis is a frequently occurring and costly infection that will develop after CABG surgery. The commenters noted that there are unique codes to identify mediastinitis and prevention guidelines that are backed by evidence-based medicine have been developed.

Response: We agree that mediastinitis meets the statutory criteria for being selected.

Coding—There are unique ICD-9-CM codes to identify the condition. The ICD-9-CM code for mediastinitis is 519.2.

Burden (High Cost/High Volume)—We examined Medicare data on patients who received a CABG operation (with codes 36.10 - 36.19) and also had mediastinitis (ICD-9-CM code 519.2) as a secondary diagnosis. For FY 2006, there were 108 reported cases of Medicare patients who had this postoperative infection after CABG. These patients had average charges for the hospital stay of $304,747. Therefore, mediastinitis is a high-cost condition.

Prevention guidelines— The CDC surgical site infection prevention guidelines are backed by evidence based medicine. Further information can be found at: http://www.cdc.gov/ncidod/dhqp/gl_surgicalsite.html.

We are selecting this condition because it meets the statutory criteria and was suggested in the public comments. We would identify the coronary artery bypass graft procedures through procedure codes 36.10 through 36.19. Therefore, when a patient has a coronary artery bypass graft performed (code 36.10 through 36.19), and a secondary

diagnosis of mediastinitis (code 519.2) is reported that was not present on admission, we will not count mediastinitis as an MCC beginning October 1, 2009.

"Surgical site infections" is a broad category, and we were looking for assistance from the public for ways to identify specific surgical site infections. We appreciate the suggestion to select mediastinitis after CABG surgery when it is a hospital acquired condition. We are selecting this condition for implementation in this FY 2008 final rule. We welcome additional recommendations for other types of surgical site infections that could also be selected and look forward to working with stakeholders and the public as we consider additional surgical site infections in the future.

(l) Serious Preventable Event – Surgery on Wrong Body Part, Patient, or Wrong Surgery

Coding - Surgery performed on the wrong body part, wrong patient, or the wrong surgery would be identified by ICD-9-CM code E876.5 (Performance of inappropriate operation). This diagnosis code does not specifically identify which of these events has occurred.

Burden (High Cost/High Volume) – As stated earlier, there are not unique ICD-9-CM codes which capture surgery performed on the wrong body part or the wrong patient, or the wrong surgery. Therefore, we examined Medicare data on the code for performance of an inappropriate operation. For FY 2006, there was one Medicare case reported with this code, and the patient had average charges for the hospital stay of $24,962. This event is rare. Therefore, it is not high volume. Individual cases could have high costs. However, we were unable to determine the impact with our limited data.

Prevention guidelines – There are guidelines to ensure that the correct surgery was performed on the correct patient or correct patient's body part. This event should not occur. Further information and prevention guidelines can be found at: http://www.ahrq.gov/clinic/ptsafety/.

CC - This code is not a CC under the CMS DRGs and the MS-DRGs. Therefore, it does not meet the criteria for selection under section 1886(d)(4)(D)(iv) of the Act. However, Medicare does not pay for performing surgery on the wrong body part or patient, or performing the wrong surgery. These services are not considered to be reasonable and necessary and are excluded from Medicare coverage.

Considerations – There are significant considerations for the selection of this condition. There is not a unique ICD-9-CM code that would describe the nature of the inappropriate operation. All types of inappropriate operations are included in code E876.5. Unlike other conditions, performance of an inappropriate operation is not a complication of a prior medical event that was medically necessary. Rather, in this case, there was a needed intervention but it was done to either the wrong body part or the wrong patient, or was not the correct operation. Thus, a service was completed that was not reasonable and necessary and Medicare does not pay for any inpatient service associated with the wrong surgery. It is not necessary for us to select this condition because Medicare does not pay for it under any circumstances.

Comment: A majority of commenters agreed that there are not unique codes to identify wrong surgery. In addition, these commenters pointed out that there are guidelines to ensure that the correct surgery is being performed on the correct patient or correct patient's body part. These commenters stated that wrong surgery is a serious preventable event that should not occur.

One commenter urged CMS to rank the condition - surgery on wrong body part, wrong patient, or wrong surgery (wrong site surgery) - higher in our list of hospital-acquired conditions. This commenter stated that wrong site surgery may not be rare, but rather may be quite prevalent. The commenter disagreed with CMS' belief that wrong site surgery should not be considered as a complication because it is a risk of being in a hospital. The commenter recommended the development of specific codes for wrong site surgery.

Response: With respect to this latter comment, the commenter may have misunderstood our discussion of this issue in the proposed rule. We never asserted wrong site surgery is not a complication because it is a risk of being in a hospital. Rather, we stated the event itself is wrong and should never occur. Unlike CCs and MCCs, wrong surgery is not a complication of a prior medical event that was medically necessary. Wrong surgery is not a CC or an MCC because the entire event itself should never occur, is not reasonable and necessary and should not result in any payment to the hospital or physician. We are not selecting wrong surgery because it is not an event for which Medicare should pay less; it is an event for which Medicare should pay nothing at all.

As stated in the proposed rule, there is not a unique ICD-9-CM code that identifies surgery performed on the wrong body part or the wrong patient, or the wrong surgery. Code E876.5 (Performance of inappropriate operation) does not describe what specifically was wrong with the surgery, such as whether it was performed on the wrong side, the wrong patient, or if the wrong surgery were performed. In examining Medicare data on the code for performance of an inappropriate operation, we found only one case reported in FY 2006. We agree this is a serious issue that requires close examination and monitoring.

The proposed rule indicated that wrong surgery (right patient, wrong surgery, right surgery, wrong patient, etc.) is not a reasonable and necessary service. Therefore, it is not covered by Medicare and should not be paid. Wrong surgery is not a CC and does not meet the criteria of the statute. As stated above, there are generally recognized

guidelines hospitals and physicians must follow to ensure that the correct surgery was performed on the correct patient or correct patient's body part. This event should not occur. If hospitals fail to ensure the correct surgery is performed, there are other provisions in the regulations to address this alarming event**.** For instance, a hospital must meet the CoPs in order to participate in Medicare. If wrong surgery was performed, the hospital could be out of compliance with the Surgical Services CoP, the Quality Assessment and Performance Improvement CoP, or potentially others. Performance of wrong surgery may suggest a systems failure or systems that do not comply with the CoPs that should be further investigated. We are interested in promoting a culture of safety and are interested in helping hospitals improve their performance. The hospital would have an opportunity to develop and present a plan of correction to avoid termination of its participation in Medicare by addressing the deficiencies that resulted in an incorrect surgery being performed. The final action that would be taken would depend on the individual circumstances and whether the hospital has addressed the problem to reduce the chance of a similar occurrence in the future. In any event, we reiterate that the way for Medicare to address wrong surgery is not through this provision that does not pay extra for preventable hospital complications when we should be paying nothing at all, but instead through Medicare's regulations that ensure that every Medicare provider meets basic quality of care standards.

(m) Falls and Fractures, Dislocations, Intracranial Injury, Crushing Injury, and Burns

Coding – There is no single code that shows that a patient has suffered a fall in the hospital. Codes would be assigned to identify the nature of any resulting injury from the fall such as a fracture, contusion, concussion, etc. There is a code to indicate that a patient fell from bed, code E884.4 (Fall from bed). One would then assign a code that identifies the external cause of the injury (the fall from the bed) and an additional code(s) for any resulting injury (a fractured bone).

Burden (High Cost/High Volume) – As stated earlier, there is not a code to identify all types of falls. Therefore, in the FY 2008 IPPS proposed rule, we examined Medicare data on the number of Medicare beneficiaries who fell out of bed. For FY 2006, there were 2,591 cases reported of Medicare patients who fell out of bed. These patients had average charges of the hospital stay of $24,962. However, depending on the nature of the injury, costs may vary in specific cases.

Prevention guidelines – Falls may or may not be preventable. Serious preventable event guidelines can be found at the following Web site: http://www.qualityindicators.ahrq.gov/psi_download.htm

CC – Code E884.4 is not a CC under the CMS DRGs or the MS-DRGs.

Considerations – There are not clear codes that identify all types of falls. Hospitals would also have to use additional codes for fractures and other injuries that result from the fall. In addition, depending on the circumstances, the falls may or may not be preventable. We did not propose the inclusion of falls as one of our initial hospital-acquired conditions because we could only identify a limited number of these cases, and they were not classified as CCs. However, we welcomed public comments on

how to develop codes or coding logic that would allow us to identify injuries that result from falls in the hospital so that Medicare would not recognize the higher costs associated with treating patients who acquire these conditions in the hospital.

Comment: Several commenters stated that the category of falls is not appropriate for inclusion as one of the hospital-acquired conditions. Specifically, the commenters noted that it is impossible to prevent all falls, and the definition of what constitutes a "preventable fall" is not well-defined. Several commenters strongly recommended the inclusion of falls for the final rule because falls and their resulting injuries are an important public health safety issue. However, these commenters did not give further details or recommendations to CMS regarding how to identify falls and related injuries as a hospital-acquired condition that would be subject to this provision.

Response: With respect to the comment that not all falls are preventable, we reiterate that the statutory provision authorizes the Secretary to select conditions that "could reasonably have been prevented through the application of evidence based guidelines." We believe that injuries that occur in the hospital due to falls are preventable. As discussed earlier, we received a couple of comments urging us to include falls as one of our hospital acquired conditions. We recognize that preventable injuries are an important patient safety issue. Therefore, we considered additional ways to identify patients who had preventable injuries that occurred in the hospital. We examined the use of a combination of External cause of injury codes and the specific injury to identify these cases. We identified five external causes of injury codes that would identify falls in a hospital. These include:

- E884.2 Fall from chair
- E884.3 Fall from wheelchair
- E884.4 Fall from bed
- E 884.5 Fall from other furniture
- E884.6 Fall from commode

These codes clearly identify certain types of falls. If coded for an inpatient, they could identify that the fall occurred in the hospital. If these codes appeared on a claim along with a fracture or trauma code that did not reflect that the condition was present on admission, we could conclude that the injury was a result of a fall in the hospital that should not be counted as an MCC or CC. However, we identified potential problems in using the external cause of injury codes. There is a separate field on the electronic claim to report one external cause of injury code. However, hospitals do not report the POA indicator with this field. Therefore, we will not be able to tell if the external cause of injury code is identifying an event that occurred before or after admission.

Hospitals can also report external cause of injury codes as a secondary diagnosis. If the hospital lists the external cause of injury code among the secondary diagnoses, the hospital would be assigning a Present on Admission indicator to the external cause of injury code. In these cases, we would be able to identify that one of the five types of falls indicated above occurred after admission. We could use this information along with the ICD-9-CM diagnosis code for the specific type of injury, such as a fracture, to not allow the specific injury to count as a MCC or CC, since it would be the result of a preventable injury. In our analysis of the use of an external cause of injury code, we believe this

approach is too complicated to identify preventable injuries. Therefore, we focused on simply identifying injuries that should not occur during a hospitalization. If a preventable injury occurs during a hospitalization, it should be included on our list of hospital acquired conditions.

We reviewed diagnosis codes contained in the Injury and Poisoning Chapter of ICD-9-CM and attempted to develop a list of codes that could identify potential adverse events that may or may not have been the result of a fall occurring in the hospital setting. After reviewing each category of diagnosis codes, we identified the following injuries that should not occur during a patient's hospitalization. The generic categories of injuries are as follows:

- Fractures – ICD-9-CM code range 800 through 829
- Dislocations – ICD-9-CM code range 830 through 839
- Intracranial injury – ICD-9-CM code range 850 through 854
- Crushing injury – ICD-9-CM code range 925 through 929
- Burns – ICD-9-CM code range 940 through 949
- Other and unspecified effects of external causes – ICD-9-CM code range 991 through 994

In our view, the above conditions should not occur after admission to the hospital. That is, if the patient is admitted to the hospital without a crushing injury, a burn, fracture, dislocation, among others, we can see no reason why such an event would not be preventable while the patient is in the hospital. None of these injuries should occur after admission. We believe this range of conditions offers a relatively uncomplicated method

to determine if an injury or trauma is acquired in the hospital. This range of conditions meets the statutory criteria for being selected when they are MCCs or CCs. First, they are identifiable with ICD-9-CM codes. Second, injuries that occur as a result of a fall in the hospital complicate the care and treatment of the patient. Fractures and dislocations and other injuries are common in the Medicare population. There were more than 175,000 fractures and other traumatic injuries in the above range of codes for FY 2006. Third, hospital-acquired injuries included in this range of codes should not occur and are preventable. Although we have not identified specific prevention guidelines for the conditions described by the above range of codes, we believe these types of injuries and trauma should not occur in the hospital, and we look forward to working with CDC and the public in identifying research that has or will occur that will assist hospitals in following the appropriate steps to prevent these conditions from occurring after admission.

We welcome public comments on additions and deletions to this injury list as well as our findings on the use of a combination of external cause of injury codes and injury codes to identify patients that acquired an injury in the hospital due to a fall. We also welcome any additional suggestions to identify cases where preventable injuries, such as falls, occur during hospitalization. We will review all recommendations in the FY 2009 IPPS rule in order to further refine our policy to identify preventable injuries and ensure that Medicare does not pay extra by counting them as MCC or CCs.

(n) Other Conditions Suggested through Comment: Deep Vein Thrombosis (DVT)/ Pulmonary Embolism (PE)

Comment: A number of commenters encouraged CMS to select Venous Thromboembolism (VTE), which includes both Deep Vein Thrombosis (DVT) and Pulmonary Embolism (PE), as a preventable condition. The commenters noted that prophylactic measures exist to avoid these conditions and they are preventable if these steps are followed.

The commenters asserted that this condition meets the DRA criteria requirements for a condition eligible for a payment adjustment in that it involves high cost and high volume (according to the 2006 MedPAR data, DVT resulted in more than 180,000 discharges with a mean standardization cost of $17,410 and PE in more than 100,000 discharges with a mean standardization cost of $20,742), and results in assignment to a higher paying DRG if present as a secondary diagnosis. The commenters also noted that both DVT and PE have ICD-9-CM codes that are on the MCC and CC lists. In addition, this condition can be prevented in accordance with evidence-based guidelines. These commenters cited Geerts, et al., *Prevention of Venous Thromboembolism: The Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy*, Chest, 126: 338S-400S (2004). The commenters acknowledged DVT and PE are identified by multiple codes, but asserted that administrative issues surrounding the selection of this condition could be resolved. They requested that CMS consider selecting DVT and PE as preventable complications for which hospitals will not receive additional payments.

Response: We appreciate these comments suggesting that we add DVT and PE to our list of conditions that would be subject to the hospital acquired conditions provision. A DVT is a blood clot that forms in a vein, most commonly in the lower extremity. It

can arise secondary to a number of clinical circumstances, including prolonged inactivity or bedrest, or from extended periods of time with the lower extremity in a bent position. It can also arise in the setting of a hypercoagulable state such as that which occurs with a number of malignancies, where the blood has an increased propensity to form clots, and it is also more common in patients taking oral contraceptives, particularly in conjunction with regular tobacco use. A PE is a clot that occurs in one of the pulmonary arteries that supplies a portion of the lung, most commonly when part or all of a DVT migrates to the pulmonary vessels from its original location, although it can also occur in the absence of a DVT, and it is a particularly serious event that is often life threatening. We refer readers to the current medical literature to further define DVT and PE.

We agree that there are circumstances where these conditions are preventable, and where the condition meets the statutory criteria to be selected. These conditions can be identified by unique ICD-9-CM codes. DVT can be identified through codes 453.40 (Venous embolism and thrombosis of unspecified deep vessels of lower extremity), 453.41 (Venous embolism and thrombosis of deep vessels of proximal lower extremity), and 453.42 (Venous embolism and thrombosis of deep vessels of distal lower extremity). All three codes are on the CC list. PE is identified through codes 415.10 (Iatrogenic pulmonary embolism and infarction) and 415.19 (Other pulmonary embolism and infarction). Both of these codes are on the MCC list. The commenters provided Medicare data showing that these conditions are both frequent and high cost in the Medicare population. Finally, the commenters have identified prevention guidelines

backed by evidence-based medicine to avoid DVTs and PEs. Therefore, at least in some circumstances, these conditions meet the statutory criteria for being selected.

We appreciate the collaborative efforts of other organizations to further define the prevention guidelines for this condition. We recognize that routine admission physical examinations should include efforts to detect a DVT. Although we believe DVTs and PEs may be preventable in certain circumstances (such as when an otherwise healthy patient is having elective surgery on a lower extremity), it is possible that a patient may have a DVT upon admission that goes unidentified, and it is also possible that DVT may occur because of other circumstances, such as an occult malignancy. If a DVT is clinically suspected upon admission to the hospital, the definitive diagnosis of a DVT can be made with a Doppler ultrasound examination or intravenous venogram, or both. We anticipate that it is not feasible to perform these studies on every hospitalized patient. In the case of a patient who is admitted with a clinically unapparent DVT that is not detected, the hospital will have followed all typical patient care protocols yet the DVT went undiagnosed upon admission. It may remain undetected until the patient exhibits symptoms of either the DVT or a PE that is unrelated to the patient's principal diagnosis. In these circumstances, we believe the DVT or PE should continue to be counted as an MCC or CC because, in our view, the condition either was unidentifiable prior to admission or did not likely occur as a result of poor management of the patient while they were in the hospital. We believe it is very important to select DVTs and PEs only when they are preventable through following standard prevention guidelines. We will seek to

identify clearly defined instances of preventable DVT and PE that should not occur in the hospital setting which will help to further increase hospital quality of care.

We appreciate suggestions on how to identify DVTs and PEs that are preventable hospital acquired conditions. If we can identify only those circumstances where DVTs and PEs are preventable and meet the statutory criteria for being selected, we likely would make them subject to the provision in the FY 2009 IPPS final rule. We welcome comments on this issue and look forward to working with stakeholders to identify instances of preventable DVTs and PEs prior to implementation of this provision on October 1, 2008.

(o) Other Conditions Suggested through Public Comment: Legionnaires' Disease

Comment: One commenter suggested that CMS select Legionnaire's disease. The commenter asserted that this condition is high cost/high volume: CDC estimates between 8,000 and 18,000 cases per year. Due to underreporting and underdiagnosis, only 2 to 10 percent of cases are reported. Death occurs in 10 to 15 percent of cases. In addition, the commenter cited established prevention guidelines: CDC prevention guidelines are available and widely distributed. Finally, the commenter stated that Legionnaires' disease is identified by ICD-9-CM code 482.84.

Response: While there may be a discrete ICD-9-CM code to identify Legionnaires' disease, it is not typically a hospital-acquired condition. Legionnaires' disease is usually acquired outside of a hospital from a contaminated water supply that may or may not have any relation to a particular institution. Any outbreak of

Legionnaires' disease suggests a significant public health emergency that should be addressed by public health resources rather than by a particular Medicare payment policy.

(p) CMS Response to Additional Comments

We welcomed any comments on the clinical aspects of the conditions and on which conditions should be selected for implementation on October 1, 2008. We also solicited comments on any problematic issues for specific conditions that may support not selecting them as one of the initial conditions. We encouraged comments on how some of the administrative problems can be overcome if there is support for a particular condition.

Commenters did not raise any general administrative concerns. Rather, a number of commenters addressed the potential for an appeals process and POA coding issues. We have included the comment and response for each issue below:

- **Appeals Process:**

Comment: A large number of commenters requested clarification from CMS on how hospitals appeal CMS decisions that a particular patient may fall under the hospital-acquired conditions policy and, therefore, is not eligible for higher payment through assignment to the higher CC/MCC level of the MS-DRG. They asked CMS to provide specific instructions for hospitals to follow for appealing a decision.

Response: We do not believe a separate appeals process is necessary for the payment adjustment for hospital-acquired conditions because existing procedures provide adequate opportunity for review. Under 42 CFR §412.60(d), a hospital has 60 days after the date of the notice of the initial assignment of a discharge to a DRG to request a review of that assignment. The hospital may submit additional information as a part of its request. A hospital that believes a discharge was assigned to the incorrect DRG as a

result of the payment adjustment for hospital-acquired conditions may request review of the DRG assignment by its fiscal intermediary or MAC.

However, we note that section 1886(d)(7)(B) of the Act, as amended by section 5001(c)(2) of the DRA, provides that there shall be no administrative or judicial review of the establishment of DRGs, including the selection and revision of codes under the payment adjustment for hospital-acquired conditions. Therefore, although a hospital may request review of a DRG assignment in a particular case, the statute does not provide for review of the codes we select to be subject to the payment adjustment for hospital-acquired conditions.

- **POA Coding**

Comment: Commenters suggested that all secondary diagnoses coded as present on admission be used to support the development of new complication rate measures and other quality indicators in the future. They suggested that CMS should develop special Grouper logic to exclude similar ICD-9-CM codes. The commenters stated that reducing hospital payments for a condition present upon admission, but not documented, is too punitive.

Many commenters submitted the experiences of two States that already use present-on-admission coding. They believed it takes several years and intense educational efforts to achieve reliable data and therefore there must be a strong clinical training component.

The commenters recommended that CMS implement the collection of the POA indicator but delay the implementation of any conditions that are dependent on its use until physicians and hospitals have an appropriate level of experience.

Response: We refer commenters to the Change Request No. 5499 released on May 11, 2007, for answers to additional questions regarding present-on-admission coding. We remind commenters that the DRG payment adjustment based on the POA indicator is not applicable until October 1, 2008. It is important to note that hospitals will gain experience in reporting POA information during FY 2008 prior to it having a payment impact in FY 2009.

- **Prevention Guidelines**

Comment: A small number of commenters questioned the feasibility and reliability of current prevention guidelines. The commenters supported CMS' goal of encouraging improvements in health care and reducing the number of preventable infections, but believed that hospitals must be reimbursed appropriately for providing the care patients need. The commenters believed that CMS should be sure that hospitals are not penalized for infections that originated outside the hospital or that are caused by factors beyond the hospital's control.

The commenters suggested that CMS should recognize that, even with the best infection control practices, some infections will occur anyway. They added that reducing payments for all cases in which those infections occur could harm hospitals' ability to purchase and provide advanced drugs and treatment modalities or invest in other infection control technologies.

Response: We address each concern regarding prevention guidelines in the respective response for each condition. We are committed to improving quality and decreasing the number of hospital-acquired conditions. In that goal, we have chosen these specific conditions because they fulfill the criteria outlined in the DRA: the conditions have unique codes that are MCCs or CCs; the conditions are high volume, high cost or both; and the conditions can be reasonably prevented through the application of evidence-based guidelines.

- **Academic Centers/Hospitals with high risk patients:**

Comment: Commenters representing academic centers and hospitals with high risk patient populations urged CMS to consider excluding patients considered to be high risk such as those that are more susceptible to infections.

Response: As indicated above, we are selecting conditions that are "reasonably preventable" through application of evidence-based guidelines and meet the other statutory criteria. In response to comments on each of the conditions considered, we indicated that we are researching whether to establish exceptions to the conditions for specific clinical circumstances where the condition may not be preventable. The determination of whether a patient is "high risk" will depend on the specific circumstances of the patient and the condition under consideration. We do not believe it is possible to classify a patient generally as "high risk" in all the circumstances where the provision could potentially apply. As we indicated above, we welcome public comments on clinical scenarios where a specific condition may not be reasonably preventable in the

hospital and how to identify and distinguish those circumstances from other situations where the condition is preventable.

7. Other Issues

Under section 1886(d)(4)(D)(vi) of the Act, "[a]ny change resulting from the application of this subparagraph shall not be taken into account in adjusting the weighting factors under subparagraph (C)(i) or in applying budget neutrality under subparagraph (C)(iii)." Subparagraph (C)(i) refers to DRG classifications and relative weights. Therefore, the statute requires the Secretary to continue counting the conditions selected under section 5001(c) of the DRA as MCCs or CCs when updating the relative weights annually. Thus, the higher costs associated with a case with a hospital-acquired MCC or CC will continue to be assigned to the MCC or CC DRG when calculating the relative weight but payment will not be made to the hospital at one of these higher-paying DRGs. Further, subparagraph (C)(iii) refers to the budget neutrality calculations that are done so aggregate payments do not increase as a result of changes to DRG classifications and relative weights. Again, the higher costs associated with the cases that have a hospital-acquired MCC or CC will be included in the budget neutrality calculation but Medicare will make a lower payment to the hospital for the specific cases that includes a hospital-acquired MCC or CC. Thus, to the extent that the provision applies and cases with an MCC or CC are assigned to a lower-paying DRG, section 5001(c) of the DRA will result in cost savings to the Medicare program. We note that the provision will only apply when the selected conditions are the only MCCs and CCs present on the claim. Therefore, if a nonselected MCC or CC is on the claim, the case will continue to be

assigned to the higher paying MCC or CC DRG, and there will be no savings to Medicare from the case. We believe the provision will apply in a small minority of cases because it is rare that one of the selected conditions will be the only MCC or CC present on the claim.

To summarize, we appreciate all of the comments on hospital-acquired conditions and look forward to continued input as we plan to implement these hospital-acquired conditions. Below is the list of conditions that we are selecting in this FY 2008 final rule. These conditions will be made subject to the provision beginning on October 1, 2008 (FY 2009).

- Serious Preventable Event- Object Left in Surgery
- Serious Preventable Event- Air Embolism
- Serious Preventable Event- Blood incompatibility
- Catheter-Associated Urinary Tract Infections
- Pressure Ulcers (Decubitus Ulcers)
- Vascular Catheter-Associated Infection
- Surgical Site Infection - Mediastinitis After Coronary Artery Bypass Graft (CABG) Surgery
- Hospital-Acquired Injuries - Fractures, Dislocations, Intracranial Injury, Crushing Injury, Burn, and Other Unspecified Effects of External Causes

We will also propose the following conditions for consideration in the FY 2009 IPPS proposed rule. We will work diligently to address issues surrounding these conditions and propose to select these conditions in the FY 2009 IPPS final rule.

- Ventilator Associated Pneumonia (VAP)
- Staphylococcus Aureus Septicemia
- Deep Vein Thrombosis (DVT)/ Pulmonary Embolism (PE)

Finally, we list below the set of conditions that signal further analysis for future implementation.

- Methicillin Resistant Staphylococcus Aureus (MRSA)
- Clostridium Difficile-Associated Disease (CDAD)
- Wrong Surgery - Provision not applicable because Medicare should not pay less; it should not pay at all.

Table 1: Hospital-Acquired Conditions (in rank order)

Condition	Considered in NPRM	Proposed in NPRM	Selected in FY 2008 Final Rule	May Be Considered in Future Rulemaking
1. Serious Preventable Event-Object left in surgery	Yes	Yes	Yes	N/A
2. Serious Preventable Event-Air embolism	Yes	Yes	Yes	N/A
3. Serious Preventable Event-Blood incompatibility	Yes	Yes	Yes	N/A
4. Catheter Associated Urinary Tract Infections	Yes	Yes	Yes	N/A
5. Pressure Ulcers (Decubitus Ulcers)	Yes	Yes	Yes	N/A
6. Vascular Catheter Associated Infection	Yes	No (No FY 2008 code)	Yes (Code Created for FY 2008)	N/A

Condition	Considered in NPRM	Proposed in NPRM	Selected in FY 2008 Final Rule	May Be Considered in Future Rulemaking
7. Surgical Site Infection-Mediastinitis after Coronary Artery Bypass Graft (CABG) surgery	Yes (All surgical site infections, not just Mediastinitis)	No (No unique codes)	Yes (Comments suggested Mediastinitis which has unique code)	N/A
8. Falls	Yes	No (Coding not unique)	Yes (Operational difficulties will be overcome by FY 2009)	Expand to all hospital acquired injuries, adverse events
9. Ventilator Associated Pneumonia (VAP)	Yes	No (Coding not unique)	No (Coding not unique)	Yes- FY 2009 IPPS final rule (Pursuing code with CDC)
10. Staphylococcus Aureus Septicemia	Yes	Yes	No (Must identify subset where preventable)	Yes- FY 2009 IPPS final rule
11. Deep Vein Thrombosis (DVT)/ Pulmonary Embolism (PE)	No	No	No	Yes- FY 2009 IPPS final rule (Work to identify situations where it should be preventable)
12. Methicillin Resistant Staphylococcus Aureus (MRSA)	Yes	No	No	Yes
13. Clostridium Difficile-Associated Disease (CDAD)	Yes	No	No	Yes
Other: Medicare Does not Pay For:				

Condition	Considered in NPRM	Proposed in NPRM	Selected in FY 2008 Final Rule	May Be Considered in Future Rulemaking
14. Wrong Surgery	Yes	No	No	Provision not Applicable. Medicare should not pay at all.

G. Changes to Specific DRG Classifications

1. Pre-MDCs: Intestinal Transplantation

In the FY 2005 IPPS final rule (69 FR 48976), we reassigned intestinal transplant cases from CMS DRG 148 (Major Small and Large Bowel Procedures with CC) and CMS DRG 149 (Major Small and Large Bowel Procedures without CC) to CMS DRG 480 (Liver Transplant and/or Intestinal Transplantation). In the FY 2006 IPPS final rule (70 FR 47286), we continued to evaluate these cases to see if a further DRG change was warranted. While we found that intestinal only transplants and combination liver-intestine transplants have higher average charges than other cases in CMS DRG 480, these cases are extremely rare (there were only 4 cases in FY 2004) and the insufficient number of cases did not warrant creating a separate DRG.

For FY 2008, we examined the September 2006 update of the FY 2006 MedPAR file and found 1,208 cases assigned to CMS DRG 480. In section II.C. of the preamble of the FY 2008 IPPS proposed rule, we proposed to split CMS DRG 480 into two severity levels: MS-DRG 005 (Liver Transplant and/or Intestinal Transplant with MCC) and MS-DRG 006 (Liver Transplant and/or Intestinal Transplant without MCC). The following table displays our results:

MS-DRG	Number of Cases	Average Length	Average Charges

Purposes, Eligibility, Requirements, and Confidentiality

Purposes of NHSN

Participation in the NHSN reflects the individual facility's need for high quality and timely data on adverse events and adherence to prevention practices associated with healthcare delivery, and their desire to share these data with CDC. The purposes of the NHSN are to:

- Collect data from a sample of healthcare facilities in the United States to permit valid estimation of the magnitude of adverse events among patients and healthcare personnel.
- Collect data from a sample of healthcare facilities in the United States to permit valid estimation of the adherence to practices known to be associated with prevention of healthcare-associated infections (HAI).
- Analyze and report collected data to permit recognition of trends.
- Provide facilities with risk-adjusted data that can be used for inter-facility comparisons and local quality improvement activities.
- Assist facilities in developing surveillance and analysis methods that permit timely recognition of patient and healthcare personnel safety problems and prompt intervention with appropriate measures.
- Conduct collaborative research studies with NHSN member facilities (e.g., describe the epidemiology of emerging HAI and pathogens, assess the importance of potential risk factors, further characterize HAI pathogens and their mechanisms of resistance, and evaluate alternative surveillance and prevention strategies).

Eligibility Criteria

Facilities participating in the NHSN must meet the following criteria:

- Be a *bona fide* healthcare facility in the United States of America, i.e., be listed in or associated with a facility that is listed in one of the following national databases:
  - American Hospital Association (AHA)
  - Centers for Medicare and Medicaid Services (CMS)
  - Veteran's Affairs (VA).
- Have email addresses for NHSN users and high-speed Internet access on the computers they will use to access NHSN and the ability to download a digital certificate onto those computers for each authorized user.
- Be willing to follow the selected NHSN component protocols exactly and report complete and accurate data in a timely manner during months when reporting data for use by CDC.
- Be willing to share such data with CDC for the purposes stated above.
- Be able to provide written consent for participation in the NHSN by a member of the facility's chief executive leadership (e.g., Chief Executive Officer).

Data Collection and Reporting Requirements for Participation

Once enrolled in the NHSN, each facility must:

- Use the NHSN Internet-based data entry interface and/or data import tools for reporting data to CDC.
- Successfully complete an annual survey for each component selected.
- Successfully complete one or more modules of the component selected. Successful completion requires the following:
    - For the selected component, submit a reporting plan each month to inform CDC which, if any, of the modules will be used for that month. Data for at least one module must be submitted for a minimum of six months of the calendar year to maintain active status.
    - Adhere to the selected module's protocol(s) exactly as described in the NHSN Manual during the months when one or more NHSN modules are used. This includes using surveillance methodology appropriate for the module and as described in the protocol.
    - Report adverse events/exposures and appropriate summary or denominator data as required for the module(s) indicated on the reporting plan to CDC within 30 days of the end of the month.
    - For those months when the Healthcare Worker Exposure module is followed and no exposures are reported, confirm that none occurred.
    - Pass quality control acceptance checks that assess the data for completeness and accuracy.
- NHSN facilities must agree to report to state health authorities those outbreaks that are identified in their facility by the surveillance system and about which they are contacted by CDC.
- Failure to comply with these requirements will result in withdrawal from the NHSN. Such facilities will be offered the opportunity to download their data before being withdrawn. Six months after withdrawal, a facility may apply for re-enrollment into the NHSN.

There is no fee for participation in the NHSN.

Assurance of Confidentiality

Each NHSN facility is afforded the following Assurance of Confidentiality:

"The information obtained in this surveillance system that would permit identification of any individual or institution is collected with a guarantee that it will be held in strict confidence, will be used only for the purposes stated, and will not be disclosed or released without the consent of the individual, or the institution in accordance with Section 304, 306, and 308(d) of the Public Health Service Act (42 USC 242b, 242k, and 242m(d))."

State	Year	Type	Hospital required	ASC required	NHSN	Reporting required	Facility-level	Report rates	Report cost	CLABI	SSI	VAP	Other	First report	Notes
AK	2006	Study only	No	No	No	No	No	No	No	No	No	No		None	Feasibility study only
AR	2007	Voluntary	No	No	No	Yes	No	Yes	No	Yes	Yes	No		2010	State-level rates only
CA	2006	Mandatory	Yes	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes	CAUTI	2008	Process measures only
CO	2006	Mandatory	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No		2008	
CT	2006	Mandatory	Yes	No	No	Yes	Yes	?	No	?	?	?		2008	Measures to be determined by Committee on HAI
DE	2007	Mandatory	Yes	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes	CAUTI	2008	
FL	2004	Mandatory	Yes	Yes	No	Yes	Yes	Yes	No	No	No	No	PSIs	2005	Component of statute creating FL Center for Health Information and Policy Analysis
GA	2006	Study only	No	No	No	No	No	No	No	No	No	No		None	Feasibility study only
IL	2003	Mandatory	Yes	No	No	Yes	?	?	No	Yes	Yes	Yes	SCIP	2008?	
MD	2006	Mandatory	Yes	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes	SCIP	?	
MN	2007	Mandatory	Yes	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes	NQF	?	
MO	2004	Mandatory	Yes	Yes	?	Yes	Yes	Yes	No	Yes	Yes	Yes		2006	Advisory council to create reporting rules
NE	2005	Mandatory	Yes	Yes	No	No	No	No	No	No	No	No	Yes[1]	None	Confidential reporting only; No public disclosure
NV	2005	Mandatory	Yes	Yes	No	No	No	No	No	No	No	No	Yes[2]	None	Confidential reporting only; No public disclosure
NH	2006	Mandatory	Yes	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes	CAUTI	2008	
NM	2007	Study only	No	No	No	Yes	No	No	No	No	No	No		None	Feasibility study only
NY	2005	Mandatory	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes		2007?	
OH	2006	Mandatory	Yes	?	?	Yes	Yes	Yes	Yes	?	?	?		2007?	Hospital measures advisory council to create rules for HAI reporting
OR	2007	Mandatory	Yes	Yes	?	Yes	Yes	?	?	Yes	Yes	No	CAUTI	2009	
PA	2004	Mandatory	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes		2005	
RI	2006	Consider options	No	No	No	No	No	No	No	No	No	No		None	Committee to consider adding HAI measures to existing reporting process
SC	2005	Mandatory	Yes	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes		2009	
TN	2006	Mandatory	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	CAUTI	2007?	Facility level reporting only for CLABI
TX	2007	Mandatory	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No		2008?	Advisory committee stacked heavily with hospital/ASC physicians
VA	2005	Mandatory	Yes	No	Yes	No	No	No	No	Yes	Yes	Yes	CAUTI	None	
VT	2006	Mandatory	Yes	No	No	Yes	Yes	No	No	No	No	No		2006?	Omnibus report by each hospital to be posted on hospital's web site; process measures only
WA	2007	Mandatory	Yes	pending	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes		2009	

1 – Death or major loss of function

2 – “Facility acquired infection”

Acronyms

ASC: ambulatory surgery center
CAUTI: catheter associated urinary tract infection
CLABI: central line associated bloodstream infection
NHSN: National Healthcare Safety Network
NQF: National Quality Foundation
PSIs: Patient Safety Indicators
SCIP: Surgical Care Improvement Project
SSI: surgical site infection
VAP: ventilator associated pneumonia

Hospital-acquired Infections in Pennsylvania

Data Reporting Period: January 1, 2005 - December 31, 2005

PHC4

Pennsylvania Health Care Cost Containment Council

November 2006

The Pennsylvania Health Care Cost Containment Council (PHC4) was established as an independent state agency by the General Assembly and the Governor of the Commonwealth of Pennsylvania in 1986. To help improve the quality and restrain the cost of health care, PHC4 promotes health care competition through the collection, analysis and public dissemination of uniform cost and quality-related information.

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Key Findings

- In 2005, hospitals reported 19,154 cases in which patients contracted an infection while in the hospital, a rate of 12.2 per 1,000 cases. The hospitalizations in which these infections occurred amounted to 394,129 hospital days and $3.5 billion in hospital charges. Additional details for cases with and without hospital-acquired infections are displayed below:

	Number of Cases	Mortality		Average Length of Stay (in Days)	Average Charge
		Number	Percent		
Cases with a hospital-acquired infection	19,154	2,478	12.9	20.6	$185,260
Cases without a hospital-acquired infection	1,550,010	36,238	2.3	4.5	$31,389

- Surgery performed on the small and large intestines represented the largest percentage of surgical site infections at 9.0 percent followed closely by surgery for blockages in blood vessels, including blood vessels of the heart, which accounted for 8.9 percent. Surgery for osteoarthritis and fractures of the leg accounted for 6.1 percent of surgical site infections.

- Patients admitted for heart failure represented the largest percentage of urinary tract infections at 7.1 percent. Patients admitted for heart attack and other forms of heart disease accounted for 6.4 percent. Patients admitted for osteoarthritis or fractures of the leg accounted for 5.3 percent of urinary tract infections.

- Patients admitted for heart attack, other forms of heart disease, and some types of peripheral artery disease represented the largest percentage of pneumonia at 9.2 percent. Patients admitted for lung diseases accounted for 7.2 percent. Stroke patients accounted for 4.8 percent of pneumonia cases.

- Patients admitted for lung diseases represented the largest percentage of bloodstream infections at 7.6 percent. Patients admitted for heart attack, other forms of heart disease, and some types of peripheral artery disease accounted for 5.1 percent. Patients admitted for heart failure accounted for 3.3 percent of bloodstream infections.

Commercial Insurance Payments for Patients with and without Hospital-acquired Infections

- Pennsylvania hospitals reported data for 276,523 cases covered by commercial insurance. Of these cases, 1,522 (5.5 per 1,000 cases) had a hospital-acquired infection. The hospitalizations in which these infections occurred amounted to $82 million in commercial insurance payments.
- The average payment for a hospitalization in which a patient acquired an infection was $53,915, while the payment when a hospital-acquired infection was not present averaged $8,311. The differences in payment varied by the condition that brought a patient to the hospital. For example:
  - For patients receiving treatment for circulatory system disorders, the average payment for a hospitalization in which the patient acquired an infection was $71,516, while the payment when a hospital-acquired infection was not present averaged $12,056.
  - For patients receiving treatment for musculoskeletal system disorders, the average payment for a hospitalization in which the patient acquired an infection was $36,983, while the payment when a hospital-acquired infection was not present averaged $10,834.
  - For women receiving treatment for reproductive system disorders, the average payment for a hospitalization in which the patient acquired an infection was $15,587, while the payment when a hospital-acquired infection was not present averaged $5,942.
- For each type of infection, the following table shows the number of cases reported and the average insurance payment for hospitalizations in which patients contracted an infection:

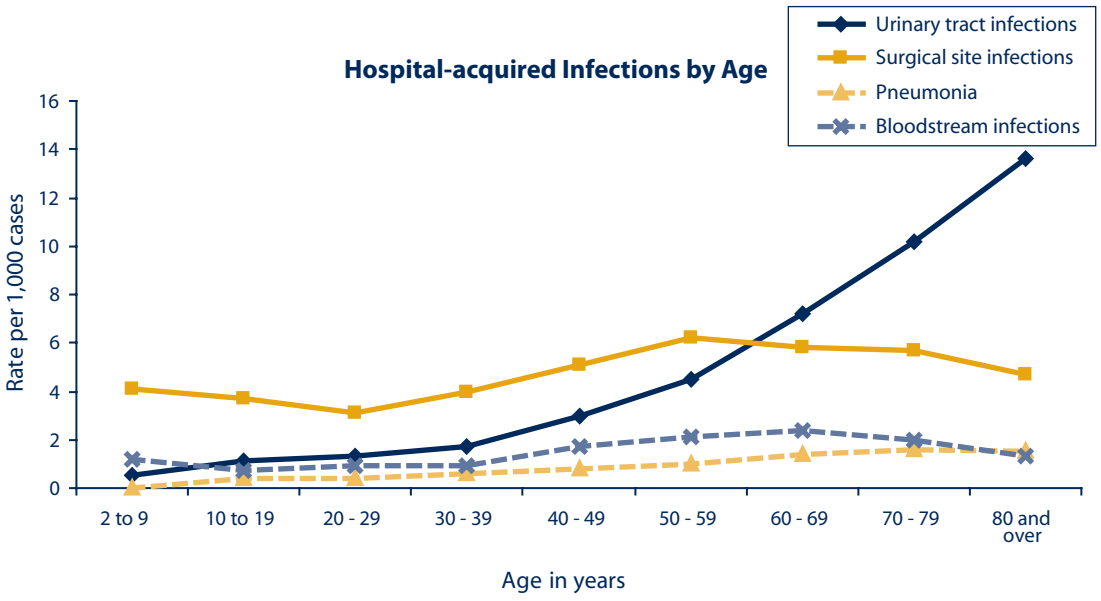
	Number of Cases	Average Commercial Insurance Payment
Cases with a hospital-acquired infection	1,522	$53,915
Urinary tract	664	$43,932
Surgical site	291	$27,470
Pneumonia	143	$62,509
Bloodstream	258	$80,233
Multiple	166	$91,898
Cases without a hospital-acquired infection	275,001	$8,311

Commercial Insurance Payments by Peer Group

- For this report, hospitals were categorized into one of four peer groups based on the complexity of services offered (including the percent of surgical procedures performed) and the number of patients treated. Peer Group 1 offered the most complex services and, on average, treated the most patients. In contrast, Peer Group 4 offered the least complex services and treated, on average, the fewest number of patients. The average commercial insurance payment for each of the peer groups are described below:

Commercial Insurance Payments	Peer Group 1	Peer Group 2	Peer Group 3	Peer Group 4
Cases with a hospital-acquired infection	$74,482	$35,044	$24,206	$18,603
Cases without a hospital-acquired infection	$10,657	$7,402	$5,837	$4,260

Infection Rates by Age



- The rate of urinary tract infections was progressively higher with increasing age (as shown in the graph above), while the change in rates for the other types of hospital-acquired infections was less dramatic across the different age groups.
- Surgical site infections had the highest rate of all the hospital-acquired infections in every age group, except the patients aged 60 years and over, in which urinary tract infections were the most common type of hospital-acquired infection.

Infection Rates by Hospital Location

- Hospital-acquired infection rates varied by hospital location. The following table displays the infection rate for hospitals located in a particular geographic region of Pennsylvania:

Pennsylvania Region	Rate of Hospital-acquired Infections per 1,000 Cases					
	Urinary Tract Infection	Surgical Site Infection	Pneumonia	Blood-stream Infection	Multiple Infections	Total Hospital-acquired Infections
Southwest[1]	8.5	7.3	1.3	1.2	1.1	13.6
Northwest[2]	9.0	6.2	1.1	1.0	1.8	13.9
Southern Allegheny[3]	8.5	3.4	0.6	0.8	0.5	11.1
Northcentral[4]	5.6	4.2	1.1	0.9	1.8	10.3
Southcentral[5]	7.3	5.2	1.2	1.7	1.5	12.8
Northeast[6]	4.8	4.4	1.3	0.9	0.5	8.3
Lehigh Valley/Reading[7]	8.0	3.4	1.4	1.3	0.8	12.3
Suburban Philadelphia[8]	6.0	2.9	1.1	1.9	1.0	10.5
Philadelphia[9]	6.4	5.8	1.1	3.2	1.4	13.2
Statewide	**7.2**	**5.2**	**1.2**	**1.7**	**1.2**	**12.2**

[1] Allegheny, Armstrong, Beaver, Butler, Fayette, Greene, Washington, and Westmoreland counties
[2] Cameron, Clarion, Clearfield, Crawford, Elk, Erie, Forest, Jefferson, Lawrence, McKean, Mercer, Potter, Venango, and Warren counties
[3] Bedford, Blair, Cambria, Indiana, and Somerset counties
[4] Centre, Clinton, Columbia, Lycoming, Mifflin, Montour, Northumberland, Snyder, Tioga, and Union counties
[5] Adams, Cumberland, Dauphin, Franklin, Fulton, Huntingdon, Juniata, Lancaster, Lebanon, Perry, and York counties
[6] Bradford, Lackawanna, Luzerne, Monroe, Pike, Sullivan, Susquehanna, Wayne, and Wyoming counties
[7] Berks, Carbon, Lehigh, Northampton, and Schuylkill counties
[8] Bucks, Chester, Delaware, and Montgomery counties
[9] Philadelphia County

Reader's Guide

On July 12, 2005, Pennsylvania, through the Pennsylvania Health Care Cost Containment Council (PHC4), released a report that helped to change the national conversation about infections contracted by patients during their stay in a hospital. The first of its kind, PHC4's four-page Research Brief reported the results of 11,668 hospital-acquired infection cases confirmed and submitted by Pennsylvania hospitals for the year 2004. Since its first report, PHC4 has released two additional briefs on hospital-acquired infections, one in November 2005 and the other in March 2006.

This first report received significant national attention because for the first time, actual numbers, rather than estimates or extrapolations, were made public. The report also highlighted the quality of care and financial consequences of hospital-acquired infections. But perhaps the most important result of this modest study was its contribution to the discussion among patients, policymakers, purchasers and medical professionals that hospital-acquired infections are not inevitable, unavoidable by-products of health care, and that many can be prevented. This has helped to lend force to the tidal wave of positive action already occurring in many health care institutions. These actions include cultural and behavioral changes that are saving numerous patient lives, improving the quality of life for countless others and saving ample health care dollars today.

Why is it important to look at hospital-acquired infections?

A hospital-acquired infection is an infection that a patient contracts while hospitalized. At the time of admission, the infection would not have been either present or developing. Hospital-acquired infections represent a direct threat to patient safety and health care quality. They are life threatening and costly.

Impact on patient safety and finances

During 2005, Pennsylvania hospitals identified 19,154 hospital-acquired infections. The mortality rate for patients with a hospital-acquired infection was 12.9%, while the mortality rate for patients without a hospital-acquired infection was 2.3%. The average length of stay for patients with a hospital-acquired infection was 20.6 days, while the average length of stay for patients without a hospital-acquired infection was 4.5 days. The average hospital charge for patients with a hospital-acquired infection was $185,260, while the average for those patients without such infections was $31,389.

When looking at private sector insurance reimbursements (which do not include Medicare and Medicaid), the average payment for a case in 2005 with a hospital-acquired infection was $53,915, while the average payment for a case without a hospital-acquired infection was $8,311. The fact that infections have such a significant impact upon resources should be a major concern for businesses and labor unions that pay insurance premiums through the commercial markets, as well as to public sector programs like Medicare and Medicaid.

We may not know if there were other factors that contributed to the outcome of a given patient's case, including whether or not an infection contributed to a patient's death. However, it is universally agreed that hospital-acquired infections in the aggregate have a significant impact upon the cost of care, as well as on patient care outcomes. Efforts to reduce and prevent infections should be among our highest priorities.

Hospitals may have commented on this report. Copies of their comments are available on the PHC4 Web site (www. phc4.org) or by request.

Preventable, not inevitable, not unavoidable

In some circles, pointing to inevitability, instead of identifying and correcting problems with the processes of care that lead to infections, has been the norm. Although the myth of inevitability surrounding this issue has been powerful, it is changing. It is not uncommon to hear health professionals say "we used to think these infections were inevitable, but no longer."

Many hospital-acquired infections can be prevented, and experts are coming to believe that goals of zero hospital-acquired infections are appropriate, honorable and necessary targets. There are many simple and effective methods that can dramatically reduce the incidence of hospital-acquired infections: hand washing; using gloves and properly sterilized equipment; and following the same established best practices every time, all the time, for procedures like the insertion of an intravenous tube to deliver fluids and medication.

What this report represents

This hospital-specific report, the first of its kind, is a snapshot of activity over a one-year period and represents the beginning of a process. It establishes a baseline against which a hospital's future performance can be measured. Hospitals differ in terms of the volume and types of care provided, and the completeness of infection reporting across hospitals may vary.

For example, a low number of infections reported by a hospital in this report could mean that they are doing an excellent job in reducing their infection rate and ensuring patient safety. On the other hand, it could indicate that they are underreporting their infection numbers to PHC4. Conversely, a hospital with a high number of infections might appear to be less effective at patient safety. Yet, in reality, they may be doing a very good job of identifying and reporting infections – a positive contribution to patient safety. Hospitals using electronic surveillance approaches may report higher numbers for this very reason, and these hospitals are noted in the report.

As a result, this report should be used to measure individual hospital performance over time, rather than to compare hospitals to each other. It should be used as a tool to ask hospital representatives informed questions, especially about their infection control and prevention program. It is not intended to be the sole source of information in making decisions about hospital care, nor should it be used to generalize about the overall quality of care provided by hospitals.

Responding to the challenge

Here in Pennsylvania, work done through the Pittsburgh Regional Healthcare Initiative (PRHI), as well as through other hospital initiatives across the state, has dramatically reduced the rate of central line-associated bloodstream infections and ventilator-associated pneumonia while demonstrating that the costs of treating a hospital-acquired infection can outstrip the payment system. Based on those experiences, the Jewish Healthcare Foundation and PHC4 collaborated in 2005 in awarding grants to Charles Cole Memorial Hospital, Holy Spirit Hospital, Hamot Medical Center, Lehigh Valley Hospital and Thomas Jefferson University Hospital which were attempting to replicate these results.

In 2006, PHC4 and the Highmark Foundation awarded grants to 11 facilities to implement new technology to track and proactively prevent hospital-acquired infections. Hospitals selected for the *Reducing Hospital-Acquired Infections with Electronic Surveillance Demonstration Project* received funding to assist them in implementing an approach which allows for more timely and comprehensive identification of hospital-acquired infections, and allows infection control professionals to get out of the data collection business and onto the floors of the hospital where they can do what they have been trained to do – identify and prevent hospital-acquired infections.

Consumers and patients have a role to play as well. Become informed. Wash your hands. Make sure your providers and hospital visitors have washed theirs as well. Become an advocate for stellar care. Ask questions of your doctors and hospital about their infection control processes.

An idea whose time is come

There are additional examples of groundbreaking patient safety work being done by hospitals, physicians, nurses and other medical staff all over the country that are gaining more notoriety. The Institute for Health Improvement's 100,000 Lives Campaign provides many success stories. For example, Baptist Memorial Hospital for Women, a 140-bed facility in Memphis, Tennessee, was able to lower its surgical site infections through appropriate pre- and postoperative use of antibiotics. Transferring responsibility for administering antibiotics to pre-op nurses from anesthesiology staff was one specific change this hospital made. In Florida, Tallahassee Memorial Hospital tackled surgical site infections by banning shaving in operating rooms. Surgeons that insist on shaving a patient must bring their own razor, shave the patient themselves and record it in the patient's record. This has greatly increased compliance with the "no shave" protocol. Porter Hospital, a 45-bed acute care facility in rural Middlebury, Vermont, saw its surgical site infection rate drop from almost three percent in October 2004 to zero — 302 infection-free cases — through July 2005. One successful strategy involved utilizing a more accurate method to measure and maintain normal body temperature during and after surgery.

It is clear from these examples and countless others that the issue of prevention has taken center stage. Pennsylvania hospitals have acknowledged that this is a problem that cries out for solutions, leadership and resources, and that measurement of the problem is needed before solutions can be identified and implemented. By making infection prevention a top priority, safer environments are being created for patients. And while the primary responsibilities for patient safety rest with health care professionals, the establishment of these safe environments must be the result of the collective efforts of all health care stakeholders. Together, these actions will save lives, improve the quality of care and help to ease the financial impact of these events on our health care delivery system.

Finding solutions is what this process is about. What is not measured cannot be improved. According to the *New England Journal of Medicine*[1], between 1975 and 1995, the number of patient days spent in the hospital decreased by 36.5%, the average length of stay decreased by 32.9%, the number of inpatient surgical procedures decreased by 27.3%, and the number of infections generally decreased by 9.5%, but the incidence of hospital-acquired infections per 1,000 bed days increased by 36.1%.

Data collection and reporting in Pennsylvania

This report includes information on approximately 1,570,000 patients treated in the 168 Pennsylvania general acute care hospitals during calendar year 2005. The hospital-acquired infections listed in this hospital-specific PHC4 report were identified, confirmed and submitted by Pennsylvania hospitals for the following categories: central line-associated bloodstream infections, ventilator-associated pneumonia, indwelling catheter-associated urinary tract infections and surgical site infections for circulatory, neurological and orthopedic procedures. For the third and fourth quarters of 2005, the surgical site infection category was expanded to include all surgical procedures. For the fourth quarter of 2005, the pneumonia, bloodstream and urinary tract infection categories were expanded to include hospital-acquired infections that were not device-related. As of January 2006, Pennsylvania hospitals are now required to submit data on all hospital-acquired infections to PHC4. PHC4 did not use billing data to

[1] (348:7, 2003)

identify hospital-acquired infections. Pennsylvania uses a hospital-acquired infection reporting system that every state has the capability to replicate.

To define a hospital-acquired infection, PHC4 adopted the Centers for Disease Control and Prevention (CDC) definition: *an infection is a localized or systemic condition that 1) results from adverse reaction to the presence of an infectious agent(s) or its toxin(s) and 2) was not present or incubating at the time of admission to the hospital.* In simple terms, you did not have it when you entered the hospital, and you contracted it while you were there.

PHC4 also adopted, with minor clarifications, the CDC's 13 major site categories that define the hospital-acquired infection location, and expanded the list of 13 to include a category for multiple infections and to differentiate device related and non-device related infections. We then redefined a two-character data field (Field 21d) on the *Pennsylvania Uniform Claims and Billing Form*, which is submitted along with administrative and billing data for each inpatient hospital admission. Hospital personnel enter one of a defined set of codes into this field when the relevant hospital-acquired infection is present.

An evolving process

The 2005 hospital-acquired infection data provided by hospitals underscores that the problem was larger and more costly than originally estimated for 2004. The increase, however, can partly be attributed to the fact that Pennsylvania hospitals continued to get better at the reporting process and the expansion in surgical site infection data collection requirements and the inclusion of non-device related urinary tract infections, bloodstream infections and pneumonia.

Most Pennsylvania hospitals are making a good faith effort to fully comply with the hospital-acquired infection reporting requirements, and consistent improvement in data submission can be seen from first quarter 2004 through fourth quarter 2005.

However, some data submission disparities among hospitals still exist, and there may be potential under-reporting occurring. To resolve any potential under-reporting, PHC4 has taken a number of steps. In addition to giving hospital chief executive officers the opportunity to explain and/or re-verify their quarterly submissions, PHC4 has notified the Secretary of the Pennsylvania Department of Health about possibly underreporting hospitals and, on a separate track, began an auditing process of hospitals that PHC4 felt might be possibly underreporting.

Interpreting the numbers

The national discussion regarding the public reporting of hospital-acquired infection data has included an ongoing debate about how, or whether, to risk-adjust this information. That is, should the illness level of a patient be considered when analyzing the data? One argument against risk-adjusting hospital-acquired infection data is that we should all strive toward the goal of zero hospital-acquired infections. The reporting of actual numbers, rather than risk-adjusted numbers, highlights actual results and encourages root cause analysis of every patient who contracted an infection while in the hospital. For this report, PHC4 addressed the concerns illuminated in the risk-adjustment debate in two ways.

First, patients being treated for burns, undergoing organ transplants, or being treated for complications of an organ transplant were excluded from the report because they may be at a greater risk of acquiring an infection while in a hospital. Second, hospital peer groups were created to ensure that hospitals that offer similar types and complexity of services and treat a similar number of patients are displayed together.

The debate about the relationship of patient risk factors and characteristics to hospital-acquired infections will certainly continue, and PHC4 intends to follow and contribute to this dialogue.

- ***Cases included in the report***

  This report includes information on approximately 1,570,000 patients treated in the 168 Pennsylvania general acute care hospitals during calendar year 2005. Information is provided on cases for which the hospital was required to report hospital-acquired infections, which includes patients that were at least two years old and were hospitalized for reasons other than mental disorders or alcohol and drug related disorders. Patients that were hospitalized for an organ transplant, complications of an organ transplant, and/or burn treatment were not included in the report.

- ***Measures reported***

  The following information is presented for cases in the report:

  Number of Cases – The number of cases with infections represents the hospital-acquired infections identified and reported by the hospital.

  Infection Rate – This is the rate of infection per 1,000 cases. The rate is based on the number of patients for which hospitals were required to report hospital-acquired infections, with one exception. For surgical site infections, only patients undergoing surgical procedures were included.

  Mortality – The number and percent of mortality represents the number/percent of patients who died during the hospitalization.

  Average Length of Stay – This measure represents the average number of days a patient stayed in the hospital.

  Average Charges – This measure represents the average amount the hospital charged for a patient's care. The charges do not include professional fees (e.g., physician fees) and do not reflect the amount that a hospital is actually reimbursed. Generally, hospitals do not receive full reimbursement of charges because insurance companies and other large purchasers of health care usually negotiate large discounts.

- ***Understanding how like hospitals are grouped together (peer groups)***

  The four peer groups identified in this report were developed to assist the reader in recognizing "like" hospitals. Hospitals were grouped according to the complexity of services offered, the number of patients treated, and the percent of surgical procedures performed. The hospitals using total electronic hospital-acquired infection surveillance are not included in the four peer groups. Their information is presented separately.

  Peer Group 1 includes hospitals that provide more complex services and treat a larger number of patients than Peer Groups 2, 3, and 4. Hospitals that are designated as trauma centers are included in this group. All of the hospitals in Peer Group 1 perform open-heart surgery. They treat an average of 25,800 patients a year. On average, 36 percent of these patients undergo surgical procedures.

  Peer Group 2 includes hospitals that provide more complex services and treat a larger number of patients than Peer Groups 3 and 4. All of the hospitals in Peer Group 2 perform open-heart surgery. They treat an average of 11,000 patients a year. On average, 31 percent of these patients undergo surgical procedures.

  Peer Group 3 includes hospitals that treat a larger number of patients than Peer Group 4. They treat an average of 7,600 patients a year. On average, 22 percent of these patients undergo surgical procedures.

  Peer Group 4 hospitals treat an average of 2,000 patients a year. On average, 16 percent of these patients undergo surgical procedures.

The role of electronic surveillance – Is all reporting equal?

Traditional infection surveillance is a time-consuming process; infection control staff must manually review numerous reports daily in order to identify hospital-acquired infections, infection trends, and other issues – with limited time left for other important job functions.

Furthermore, without electronic tools, hospital-wide surveillance is difficult. As a result, "targeted" surveillance has often been used in the past. However, this approach may not find infections occurring outside of the selected patient population. In addition, the lack of uniformity in manual data capture leads to debate about what is or is not an infection, rather than focusing on more rapid identification and prevention of infections.

Electronic surveillance systems eliminate both the human involvement in reviewing and finding infections hidden in patient data, and the potential for human error in distinguishing between what is and what is not an infection when reporting this information. Because the data is available in real time, facilities can reduce preventable infections, improve safety, decrease costs, and report infections more accurately.

During the period covered by this report, three facilities were using a form of total electronic surveillance. Total electronic surveillance used to submit hospital-acquired infection data to PHC4 utilizes automated software that identifies hospital-acquired infections based on laboratory and/or clinical data criteria.

Some facilities may use electronic surveillance software as a screening tool only. Cases flagged by the electronic surveillance software as having a potential hospital-acquired infection are reviewed by an infection control professional, who makes the final determination of whether or not a hospital-acquired infection is present.

The three facilities using total electronic surveillance are noted to alert the reader that their higher number of reported infections may be due to more comprehensive reporting, and not that they have, in reality, a higher infection rate than facilities not using such strategies. As other hospitals adjust to the process and become more comprehensive in their reporting, infection rates should start to "normalize," and it will become clearer as to whether higher reported numbers are due to higher infection rates or simply superior identification and reporting of infections.

Acknowledgements

PHC4 wishes to acknowledge and thank the many infection control professionals, medical records staff, and infectious disease physicians for their commitment to this process and their dedication to providing the highest quality care possible to all Pennsylvanians. PHC4 also wishes to thank its Technical Advisory Group and its Hospital-acquired Infection Advisory Panel for their invaluable assistance.

More Data on PHC4's Web Site

Additional information, including hospital comments and technical notes, is included on the PHC4 Web site at www.phc4.org.

Statewide Summary Data

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Statewide	**1,569,164**	**NA**	**38,716**	**2.5**	**4.7**	**$33,267**
Cases with Infections	19,154	12.2	2,478	12.9	20.6	$185,260
Urinary Tract	11,265	7.2	983	8.7	16.8	$123,725
Surgical Site	1,615	5.2	68	4.2	14.5	$132,110
Pneumonia	1,824	1.2	452	24.8	24.3	$256,133
Bloodstream	2,602	1.7	540	20.8	27.3	$282,276
Multiple	1,848	1.2	435	23.5	36.0	$400,262
Cases without Infections	1,550,010	NA	36,238	2.3	4.5	$31,389

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.

NA - Not applicable.

Hospitals using Electronic Surveillance Summary Data

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Electronic Surveillance Hospitals	**48,946**	**NA**	**1,234**	**2.5**	**4.7**	**$25,926**
Cases with Infections	1,536	31.4	99	6.4	13.7	$76,454
Urinary Tract	778	15.9	16	2.1	9.9	$44,456
Surgical Site	88	6.8	2	2.3	12.5	$72,901
Pneumonia	63	1.3	10	15.9	20.4	$103,674
Bloodstream	273	5.6	33	12.1	15.7	$81,964
Multiple	334	6.8	38	11.4	20.0	$142,289
Cases without Infections	47,410	NA	1,135	2.4	4.4	$24,289

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Butler Memorial	**10,527**	**NA**	**228**	**2.2**	**4.2**	**$15,350**
Cases with Infections	415	39.4	24	5.8	8.9	$30,847
Urinary Tract	275	26.1	8	2.9	6.6	$19,788
Surgical Site	12	5.9	0	0.0	7.8	$26,221
Pneumonia	7	0.7	2	28.6	19.7	$61,737
Bloodstream	39	3.7	6	15.4	10.7	$42,474
Multiple	82	7.8	8	9.8	15.2	$60,444
Cases without Infections	10,112	NA	204	2.0	4.0	$14,714
Hamot	**16,936**	**NA**	**381**	**2.2**	**4.6**	**$36,327**
Cases with Infections	662	39.1	30	4.5	12.6	$95,432
Urinary Tract	351	20.7	6	1.7	9.3	$57,783
Surgical Site	51	10.4	1	2.0	12.6	$90,645
Pneumonia	31	1.8	2	6.5	12.9	$79,611
Bloodstream	68	4.0	8	11.8	12.2	$87,041
Multiple	161	9.5	13	8.1	20.2	$185,619
Cases without Infections	16,274	NA	351	2.2	4.3	$33,923
Milton S Hershey†	**21,483**	**NA**	**625**	**2.9**	**5.1**	**$22,909**
Cases with Infections	459	21.4	45	9.8	19.5	$90,319
Urinary Tract	152	7.1	2	1.3	17.2	$58,310
Surgical Site	25	4.2	1	4.0	14.6	$59,111
Pneumonia	25	1.2	6	24.0	30.0	$145,255
Bloodstream	166	7.7	19	11.4	18.4	$89,162
Multiple	91	4.2	17	18.7	23.9	$139,378
Cases without Infections	21,024	NA	580	2.8	4.8	$21,438

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.

NA - Not applicable.

† Electronic surveillance technology was only used to report Quarter 4-2005 hospital-acquired infection data.

Peer Group 1 Summary Data

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
PEER GROUP 1	**636,998**	**NA**	**15,053**	**2.4**	**4.9**	**$45,992**
Cases with Infections	8,894	14.0	1,259	14.2	24.5	$273,626
Urinary Tract	5,132	8.1	503	9.8	19.4	$181,133
Surgical Site	766	5.0	33	4.3	16.2	$188,641
Pneumonia	792	1.2	208	26.3	30.1	$400,050
Bloodstream	1,327	2.1	284	21.4	31.8	$379,425
Multiple	877	1.4	231	26.3	45.9	$614,848
Cases without Infections	628,104	NA	13,794	2.2	4.6	$42,768

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Abington Memorial	**32,169**	**NA**	**646**	**2.0**	**4.3**	**$55,386**
Cases with Infections	529	16.4	51	9.6	17.3	$228,657
Urinary Tract	410	12.7	19	4.6	13.0	$152,987
Surgical Site	7	1.1	0	0.0	18.0	$251,442
Pneumonia	26	0.8	6	23.1	24.9	$368,000
Bloodstream	57	1.8	19	33.3	26.4	$415,799
Multiple	29	0.9	7	24.1	53.7	$800,221
Cases without Infections	31,640	NA	595	1.9	4.1	$52,489
Albert Einstein	**23,698**	**NA**	**719**	**3.0**	**5.1**	**$44,459**
Cases with Infections	264	11.1	67	25.4	31.1	$280,900
Urinary Tract	107	4.5	25	23.4	27.1	$238,485
Surgical Site	6	1.9	1	16.7	20.0	$236,184
Pneumonia	12	0.5	8	66.7	26.3	$284,066
Bloodstream	92	3.9	20	21.7	30.4	$275,117
Multiple	47	2.0	13	27.7	44.1	$393,682
Cases without Infections	23,434	NA	652	2.8	4.8	$41,795
Allegheny General	**27,933**	**NA**	**806**	**2.9**	**5.2**	**$37,626**
Cases with Infections	557	19.9	75	13.5	23.0	$177,716
Urinary Tract	407	14.6	44	10.8	20.8	$164,374
Surgical Site	41	4.7	2	4.9	12.2	$63,837
Pneumonia	27	1.0	4	14.8	27.6	$279,480
Bloodstream	51	1.8	12	23.5	39.5	$228,522
Multiple	31	1.1	13	41.9	35.2	$331,295
Cases without Infections	27,376	NA	731	2.7	4.9	$34,776
Altoona Regional	**14,390**	**NA**	**507**	**3.5**	**4.3**	**$20,200**
Cases with Infections	148	10.3	23	15.5	18.3	$80,639
Urinary Tract	99	6.9	13	13.1	16.1	$60,792
Surgical Site	11	3.3	2	18.2	11.2	$68,794
Pneumonia	23	1.6	4	17.4	25.2	$151,119
Bloodstream	12	0.8	2	16.7	23.4	$79,214
Multiple	3	0.2	NR	NR	NR	NR
Cases without Infections	14,242	NA	484	3.4	4.1	$19,572
Community/Scranton	**11,648**	**NA**	**178**	**1.5**	**4.5**	**$22,443**
Cases with Infections	58	5.0	5	8.6	23.8	$114,084
Urinary Tract	36	3.1	3	8.3	25.0	$108,981
Surgical Site	13	4.7	0	0.0	14.9	$72,661
Pneumonia	7	0.6	2	28.6	32.0	$179,824
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	2	0.2	NR	NR	NR	NR
Cases without Infections	11,590	NA	173	1.5	4.4	$21,984

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.
NR - Not reported. Had fewer than 5 cases evaluated.

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Conemaugh Valley Memorial	**21,826**	**NA**	**640**	**2.9**	**5.1**	**$21,544**
Cases with Infections	318	14.6	39	12.3	19.1	$79,891
Urinary Tract	260	11.9	23	8.8	16.4	$63,978
Surgical Site	9	2.0	0	0.0	18.1	$146,071
Pneumonia	3	0.1	NR	NR	NR	NR
Bloodstream	23	1.1	9	39.1	20.1	$94,123
Multiple	23	1.1	6	26.1	48.1	$207,349
Cases without Infections	21,508	NA	601	2.8	4.9	$20,682
Crozer-Chester	**17,232**	**NA**	**481**	**2.8**	**5.0**	**$81,189**
Cases with Infections	282	16.4	69	24.5	33.3	$671,008
Urinary Tract	117	6.8	15	12.8	22.1	$368,162
Surgical Site	7	2.5	2	28.6	26.3	$379,674
Pneumonia	39	2.3	9	23.1	40.5	$934,110
Bloodstream	60	3.5	20	33.3	25.7	$506,083
Multiple	59	3.4	23	39.0	59.6	$1,299,937
Cases without Infections	16,950	NA	412	2.4	4.6	$71,376
Frankford	**28,374**	**NA**	**645**	**2.3**	**5.1**	**$34,902**
Cases with Infections	273	9.6	36	13.2	26.8	$217,343
Urinary Tract	155	5.5	14	9.0	20.8	$148,334
Surgical Site	7	1.7	0	0.0	19.7	$109,049
Pneumonia	39	1.4	8	20.5	29.3	$283,707
Bloodstream	41	1.4	7	17.1	39.0	$321,433
Multiple	31	1.1	7	22.6	39.2	$365,677
Cases without Infections	28,101	NA	609	2.2	4.9	$33,129
Geisinger/Danville	**19,770**	**NA**	**592**	**3.0**	**4.4**	**$40,570**
Cases with Infections	281	14.2	39	13.9	22.8	$235,001
Urinary Tract	85	4.3	6	7.1	14.0	$110,605
Surgical Site	11	1.9	1	9.1	24.6	$238,488
Pneumonia	46	2.3	10	21.7	17.0	$186,355
Bloodstream	34	1.7	5	14.7	20.0	$190,792
Multiple	105	5.3	17	16.2	33.0	$370,965
Cases without Infections	19,489	NA	553	2.8	4.1	$37,767
Hahnemann University	**16,383**	**NA**	**345**	**2.1**	**6.0**	**$106,458**
Cases with Infections	292	17.8	74	25.3	40.0	$698,389
Urinary Tract	76	4.6	12	15.8	30.4	$497,690
Surgical Site	12	3.5	2	16.7	37.9	$695,520
Pneumonia	27	1.6	8	29.6	47.3	$978,481
Bloodstream	157	9.6	41	26.1	42.2	$695,016
Multiple	20	1.2	11	55.0	50.8	$1,111,126
Cases without Infections	16,091	NA	271	1.7	5.3	$95,716

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.
NR - Not reported. Had fewer than 5 cases evaluated.

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Hospital University PA	**33,296**	**NA**	**875**	**2.6**	**5.4**	**$67,921**
Cases with Infections	673	20.2	121	18.0	31.2	$387,835
Urinary Tract	380	11.4	55	14.5	23.7	$306,649
Surgical Site	36	4.2	3	8.3	26.9	$310,207
Pneumonia	33	1.0	6	18.2	42.9	$607,457
Bloodstream	155	4.7	35	22.6	33.3	$369,574
Multiple	69	2.1	22	31.9	64.9	$811,436
Cases without Infections	32,623	NA	754	2.3	4.9	$61,322
Lancaster General	**30,842**	**NA**	**486**	**1.6**	**4.8**	**$21,302**
Cases with Infections	327	10.6	29	8.9	18.4	$83,903
Urinary Tract	259	8.4	24	9.3	15.9	$64,691
Surgical Site	14	1.6	0	0.0	26.0	$121,946
Pneumonia	23	0.7	2	8.7	23.6	$161,589
Bloodstream	13	0.4	1	7.7	24.5	$126,388
Multiple	18	0.6	2	11.1	37.3	$200,816
Cases without Infections	30,515	NA	457	1.5	4.6	$20,631
Lehigh Valley	**34,979**	**NA**	**781**	**2.2**	**4.4**	**$37,727**
Cases with Infections	391	11.2	47	12.0	21.3	$224,209
Urinary Tract	250	7.1	22	8.8	16.4	$142,507
Surgical Site	17	2.0	1	5.9	18.8	$173,329
Pneumonia	49	1.4	11	22.4	28.9	$422,760
Bloodstream	48	1.4	8	16.7	28.8	$309,282
Multiple	27	0.8	5	18.5	41.0	$501,178
Cases without Infections	34,588	NA	734	2.1	4.2	$35,619
Main Line Lankenau	**19,272**	**NA**	**390**	**2.0**	**4.3**	**$46,202**
Cases with Infections	120	6.2	31	25.8	28.7	$365,108
Urinary Tract	43	2.2	7	16.3	23.3	$256,742
Surgical Site	6	1.5	0	0.0	25.0	$332,927
Pneumonia	15	0.8	8	53.3	29.4	$418,984
Bloodstream	47	2.4	16	34.0	29.4	$405,760
Multiple	9	0.5	0	0.0	52.1	$602,229
Cases without Infections	19,152	NA	359	1.9	4.2	$44,204
Mercy Pittsburgh	**18,060**	**NA**	**438**	**2.4**	**5.4**	**$27,752**
Cases with Infections	315	17.4	31	9.8	22.6	$119,527
Urinary Tract	207	11.5	18	8.7	20.5	$102,140
Surgical Site	36	8.9	1	2.8	11.6	$75,352
Pneumonia	3	0.2	NR	NR	NR	NR
Bloodstream	40	2.2	8	20.0	27.6	$161,765
Multiple	29	1.6	3	10.3	43.2	$231,163
Cases without Infections	17,745	NA	407	2.3	5.1	$26,123

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.
NR - Not reported. Had fewer than 5 cases evaluated.

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Pennsylvania	**21,446**	**NA**	**221**	**1.0**	**4.6**	**$41,176**
Cases with Infections	232	10.8	33	14.2	25.6	$237,156
Urinary Tract	143	6.7	15	10.5	18.7	$164,096
Surgical Site	11	1.5	0	0.0	22.8	$232,615
Pneumonia	12	0.6	3	25.0	32.8	$382,601
Bloodstream	41	1.9	5	12.2	29.3	$238,543
Multiple	25	1.2	10	40.0	57.2	$584,967
Cases without Infections	21,214	NA	188	0.9	4.3	$39,033
Pinnacle Health	**31,048**	**NA**	**678**	**2.2**	**4.6**	**$24,633**
Cases with Infections	346	11.1	42	12.1	18.9	$97,383
Urinary Tract	232	7.5	18	7.8	16.6	$75,781
Surgical Site	17	2.1	0	0.0	21.6	$121,776
Pneumonia	14	0.5	3	21.4	25.4	$198,577
Bloodstream	32	1.0	6	18.8	19.1	$94,259
Multiple	51	1.6	15	29.4	26.5	$161,698
Cases without Infections	30,702	NA	636	2.1	4.5	$23,813
Reading	**26,309**	**NA**	**606**	**2.3**	**5.1**	**$16,813**
Cases with Infections	565	21.5	54	9.6	21.1	$61,642
Urinary Tract	412	15.7	33	8.0	18.3	$46,174
Surgical Site	33	5.1	1	3.0	15.4	$57,184
Pneumonia	28	1.1	6	21.4	19.3	$73,241
Bloodstream	47	1.8	4	8.5	32.8	$113,629
Multiple	45	1.7	10	22.2	40.0	$145,018
Cases without Infections	25,744	NA	552	2.1	4.8	$15,829
St Luke's/Bethlehem	**29,964**	**NA**	**639**	**2.1**	**4.2**	**$20,060**
Cases with Infections	283	9.4	36	12.7	22.2	$116,083
Urinary Tract	132	4.4	7	5.3	15.9	$70,589
Surgical Site	12	1.8	1	8.3	10.4	$69,701
Pneumonia	74	2.5	20	27.0	24.8	$144,940
Bloodstream	45	1.5	7	15.6	34.0	$171,708
Multiple	20	0.7	1	5.0	35.3	$212,246
Cases without Infections	29,681	NA	603	2.0	4.1	$19,144
St Mary	**20,468**	**NA**	**462**	**2.3**	**4.5**	**$30,963**
Cases with Infections	327	16.0	48	14.7	22.1	$142,444
Urinary Tract	171	8.4	7	4.1	20.1	$113,621
Surgical Site	24	6.9	1	4.2	13.9	$105,286
Pneumonia	37	1.8	12	32.4	23.7	$210,064
Bloodstream	44	2.1	13	29.5	22.5	$143,590
Multiple	51	2.5	15	29.4	31.3	$206,525
Cases without Infections	20,141	NA	414	2.1	4.3	$29,153

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Temple University	**26,286**	**NA**	**664**	**2.5**	**5.7**	**$118,730**
Cases with Infections	537	20.4	96	17.9	35.9	$791,576
Urinary Tract	306	11.6	38	12.4	25.0	$505,404
Surgical Site	26	6.1	1	3.8	31.1	$685,601
Pneumonia	21	0.8	10	47.6	38.4	$1,070,370
Bloodstream	86	3.3	15	17.4	37.7	$856,842
Multiple	98	3.7	32	32.7	68.9	$1,596,231
Cases without Infections	25,749	NA	568	2.2	5.1	$104,697
Thomas Jefferson Univ	**31,111**	**NA**	**611**	**2.0**	**5.5**	**$63,910**
Cases with Infections	382	12.3	37	9.7	25.6	$283,912
Urinary Tract	104	3.3	5	4.8	27.1	$228,808
Surgical Site	171	17.9	2	1.2	12.1	$176,426
Pneumonia	57	1.8	18	31.6	49.7	$543,803
Bloodstream	50	1.6	12	24.0	41.4	$469,856
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	30,729	NA	574	1.9	5.3	$61,175
UPMC Presby Shadyside	**56,936**	**NA**	**1,700**	**3.0**	**5.5**	**$76,340**
Cases with Infections	920	16.2	129	14.0	22.9	$359,286
Urinary Tract	485	8.5	63	13.0	21.1	$298,955
Surgical Site	169	9.7	7	4.1	13.9	$223,659
Pneumonia	106	1.9	31	29.2	29.0	$597,099
Bloodstream	109	1.9	16	14.7	28.7	$413,456
Multiple	51	0.9	12	23.5	44.4	$772,389
Cases without Infections	56,016	NA	1,571	2.8	5.3	$71,693
Western Pennsylvania	**19,019**	**NA**	**366**	**1.9**	**4.7**	**$35,846**
Cases with Infections	178	9.4	22	12.4	22.1	$183,588
Urinary Tract	106	5.6	9	8.5	18.7	$143,362
Surgical Site	16	3.2	2	12.5	19.4	$161,444
Pneumonia	20	1.1	7	35.0	31.7	$326,792
Bloodstream	25	1.3	2	8.0	25.9	$210,127
Multiple	11	0.6	2	18.2	32.6	$282,740
Cases without Infections	18,841	NA	344	1.8	4.5	$34,451
York	**24,539**	**NA**	**577**	**2.4**	**4.2**	**$14,682**
Cases with Infections	296	12.1	25	8.4	17.8	$66,695
Urinary Tract	150	6.1	8	5.3	14.2	$40,105
Surgical Site	54	9.2	3	5.6	13.9	$46,505
Pneumonia	51	2.1	10	19.6	23.3	$117,007
Bloodstream	18	0.7	1	5.6	23.0	$87,225
Multiple	23	0.9	3	13.0	33.9	$159,885
Cases without Infections	24,243	NA	552	2.3	4.1	$14,047

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.

Peer Group 2 Summary Data

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
PEER GROUP 2	**352,047**	**NA**	**9,022**	**2.6**	**4.6**	**$28,697**
Cases with Infections	4,160	11.8	600	14.4	18.6	$128,688
Urinary Tract	2,550	7.2	248	9.7	15.7	$89,153
Surgical Site	340	4.8	18	5.3	15.2	$102,436
Pneumonia	432	1.2	121	28.0	21.0	$175,148
Bloodstream	502	1.4	114	22.7	24.6	$207,979
Multiple	336	1.0	99	29.5	32.0	$277,093
Cases without Infections	347,887	NA	8,422	2.4	4.4	$27,501

* Surgical Site Infection Rate – based on the number of surgical cases, not the total number of cases.
NA - Not applicable.

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Brandywine	**7,069**	**NA**	**197**	**2.8**	**4.5**	**$59,236**
Cases with Infections	69	9.8	12	17.4	20.4	$265,837
Urinary Tract	28	4.0	1	3.6	12.5	$142,363
Surgical Site	6	4.8	0	0.0	13.3	$273,794
Pneumonia	13	1.8	5	38.5	31.7	$377,109
Bloodstream	11	1.6	1	9.1	16.7	$246,702
Multiple	11	1.6	5	45.5	34.8	$463,428
Cases without Infections	7,000	NA	185	2.6	4.3	$57,200
Chester County	**13,203**	**NA**	**254**	**1.9**	**4.2**	**$17,915**
Cases with Infections	95	7.2	14	14.7	19.5	$91,279
Urinary Tract	48	3.6	4	8.3	17.7	$78,928
Surgical Site	5	2.1	0	0.0	13.4	$81,668
Pneumonia	16	1.2	6	37.5	21.7	$119,535
Bloodstream	21	1.6	3	14.3	21.7	$96,220
Multiple	5	0.4	1	20.0	26.8	$108,276
Cases without Infections	13,108	NA	240	1.8	4.1	$17,383
Doylestown	**12,172**	**NA**	**247**	**2.0**	**4.3**	**$30,284**
Cases with Infections	180	14.8	24	13.3	17.3	$102,547
Urinary Tract	139	11.4	14	10.1	16.2	$91,986
Surgical Site	8	3.2	0	0.0	8.5	$58,268
Pneumonia	17	1.4	4	23.5	16.4	$112,389
Bloodstream	9	0.7	2	22.2	24.3	$155,595
Multiple	7	0.6	4	57.1	43.1	$270,773
Cases without Infections	11,992	NA	223	1.9	4.1	$29,200
DuBois Regional	**6,925**	**NA**	**137**	**2.0**	**4.0**	**$18,754**
Cases with Infections	107	15.5	8	7.5	15.6	$59,739
Urinary Tract	79	11.4	2	2.5	15.6	$42,510
Surgical Site	9	6.4	1	11.1	12.8	$69,746
Pneumonia	13	1.9	4	30.8	16.8	$135,354
Bloodstream	6	0.9	1	16.7	16.0	$107,745
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	6,818	NA	129	1.9	3.8	$18,111
Easton	**12,340**	**NA**	**299**	**2.4**	**4.6**	**$37,259**
Cases with Infections	193	15.6	29	15.0	20.4	$171,590
Urinary Tract	142	11.5	17	12.0	18.7	$142,815
Surgical Site	8	4.8	1	12.5	24.5	$284,494
Pneumonia	11	0.9	6	54.5	22.5	$281,466
Bloodstream	28	2.3	5	17.9	26.8	$235,011
Multiple	4	0.3	NR	NR	NR	NR
Cases without Infections	12,147	NA	270	2.2	4.3	$35,124

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.
NR - Not reported. Had fewer than 5 cases evaluated.

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Geisinger Wilkes-Barre	**7,015**	**NA**	**176**	**2.5**	**5.1**	**$23,865**
Cases with Infections	19	2.7	2	10.5	20.1	$112,766
Urinary Tract	14	2.0	0	0.0	13.4	$61,034
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	2	0.3	NR	NR	NR	NR
Bloodstream	3	0.4	NR	NR	NR	NR
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	6,996	NA	174	2.5	5.0	$23,624
Geisinger Wyoming Valley	**8,168**	**NA**	**184**	**2.3**	**4.3**	**$25,799**
Cases with Infections	57	7.0	9	15.8	17.7	$132,952
Urinary Tract	28	3.4	2	7.1	10.9	$50,728
Surgical Site	1	0.6	NR	NR	NR	NR
Pneumonia	10	1.2	3	30.0	23.7	$211,966
Bloodstream	17	2.1	4	23.5	25.2	$224,683
Multiple	1	0.1	NR	NR	NR	NR
Cases without Infections	8,111	NA	175	2.2	4.2	$25,046
Good Samaritan/Lebanon	**9,236**	**NA**	**266**	**2.9**	**4.6**	**$16,974**
Cases with Infections	64	6.9	4	6.3	15.8	$61,613
Urinary Tract	46	5.0	2	4.3	13.1	$45,666
Surgical Site	5	3.2	1	20.0	26.6	$133,948
Pneumonia	3	0.3	NR	NR	NR	NR
Bloodstream	9	1.0	0	0.0	25.8	$111,612
Multiple	1	0.1	NR	NR	NR	NR
Cases without Infections	9,172	NA	262	2.9	4.5	$16,663
Graduate	**6,283**	**NA**	**161**	**2.6**	**5.4**	**$84,456**
Cases with Infections	179	28.5	38	21.2	25.1	$372,720
Urinary Tract	71	11.3	10	14.1	22.0	$309,108
Surgical Site	13	11.5	1	7.7	15.8	$288,609
Pneumonia	16	2.5	6	37.5	24.6	$448,669
Bloodstream	37	5.9	9	24.3	29.0	$352,259
Multiple	42	6.7	12	28.6	30.0	$495,381
Cases without Infections	6,104	NA	123	2.0	4.8	$76,003
Holy Spirit	**14,177**	**NA**	**512**	**3.6**	**4.9**	**$23,076**
Cases with Infections	326	23.0	71	21.8	16.4	$80,434
Urinary Tract	238	16.8	46	19.3	14.7	$60,751
Surgical Site	16	5.5	1	6.3	17.3	$108,433
Pneumonia	24	1.7	9	37.5	16.5	$119,879
Bloodstream	28	2.0	7	25.0	21.6	$123,044
Multiple	20	1.4	8	40.0	27.6	$185,274
Cases without Infections	13,851	NA	441	3.2	4.6	$21,726

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.
NR - Not reported. Had fewer than 5 cases evaluated.

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Jefferson Regional	**16,601**	**NA**	**548**	**3.3**	**5.3**	**$15,012**
Cases with Infections	476	28.7	45	9.5	15.1	$46,591
Urinary Tract	210	12.6	7	3.3	12.8	$31,961
Surgical Site	87	27.0	2	2.3	11.2	$42,533
Pneumonia	68	4.1	16	23.5	14.8	$51,045
Bloodstream	32	1.9	5	15.6	22.0	$64,073
Multiple	79	4.8	15	19.0	22.9	$79,036
Cases without Infections	16,125	NA	503	3.1	5.0	$14,079
Lancaster Regional	**6,360**	**NA**	**144**	**2.3**	**5.3**	**$31,911**
Cases with Infections	67	10.5	8	11.9	18.3	$137,013
Urinary Tract	20	3.1	0	0.0	14.3	$57,139
Surgical Site	3	2.2	NR	NR	NR	NR
Pneumonia	22	3.5	6	27.3	17.2	$174,630
Bloodstream	14	2.2	1	7.1	22.1	$148,070
Multiple	8	1.3	1	12.5	27.0	$227,447
Cases without Infections	6,293	NA	136	2.2	5.1	$30,792
Lehigh Valley/Muhlenberg	**8,643**	**NA**	**211**	**2.4**	**4.2**	**$33,106**
Cases with Infections	55	6.4	7	12.7	17.9	$135,812
Urinary Tract	43	5.0	3	7.0	16.3	$115,374
Surgical Site	1	0.6	NR	NR	NR	NR
Pneumonia	3	0.3	NR	NR	NR	NR
Bloodstream	7	0.8	2	28.6	17.3	$128,498
Multiple	1	0.1	NR	NR	NR	NR
Cases without Infections	8,588	NA	204	2.4	4.2	$32,448
Main Line Bryn Mawr	**15,849**	**NA**	**306**	**1.9**	**4.0**	**$40,376**
Cases with Infections	75	4.7	18	24.0	27.8	$351,106
Urinary Tract	46	2.9	10	21.7	19.3	$212,450
Surgical Site	1	0.3	NR	NR	NR	NR
Pneumonia	6	0.4	2	33.3	43.8	$774,247
Bloodstream	19	1.2	4	21.1	40.3	$505,077
Multiple	3	0.2	NR	NR	NR	NR
Cases without Infections	15,774	NA	288	1.8	3.9	$38,899
Main Line Paoli	**11,617**	**NA**	**236**	**2.0**	**3.5**	**$36,083**
Cases with Infections	70	6.0	10	14.3	17.8	$188,932
Urinary Tract	39	3.4	5	12.8	15.8	$153,837
Surgical Site	1	0.4	NR	NR	NR	NR
Pneumonia	11	0.9	1	9.1	12.6	$167,522
Bloodstream	11	0.9	3	27.3	19.9	$200,200
Multiple	8	0.7	1	12.5	33.6	$392,803
Cases without Infections	11,547	NA	226	2.0	3.4	$35,156

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.
NR - Not reported. Had fewer than 5 cases evaluated.

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Medical Center Beaver	**15,215**	**NA**	**436**	**2.9**	**4.7**	**$15,080**
Cases with Infections	153	10.1	12	7.8	14.5	$47,616
Urinary Tract	123	8.1	5	4.1	13.1	$38,014
Surgical Site	10	3.6	1	10.0	20.2	$79,794
Pneumonia	10	0.7	4	40.0	18.4	$85,921
Bloodstream	5	0.3	2	40.0	16.2	$55,017
Multiple	5	0.3	0	0.0	28.2	$135,473
Cases without Infections	15,062	NA	424	2.8	4.6	$14,750
Mercy Fitzgerald	**10,404**	**NA**	**326**	**3.1**	**5.0**	**$59,719**
Cases with Infections	199	19.1	45	22.6	27.5	$334,437
Urinary Tract	102	9.8	10	9.8	18.7	$203,331
Surgical Site	13	11.5	2	15.4	30.8	$371,118
Pneumonia	5	0.5	1	20.0	44.8	$587,167
Bloodstream	42	4.0	12	28.6	24.1	$314,549
Multiple	37	3.6	20	54.1	52.1	$671,400
Cases without Infections	10,205	NA	281	2.8	4.6	$54,362
Mercy/Scranton	**10,501**	**NA**	**259**	**2.5**	**4.5**	**$25,732**
Cases with Infections	67	6.4	11	16.4	18.6	$112,322
Urinary Tract	28	2.7	5	17.9	15.8	$72,947
Surgical Site	4	1.9	NR	NR	NR	NR
Pneumonia	23	2.2	4	17.4	20.1	$150,481
Bloodstream	6	0.6	1	16.7	19.0	$98,856
Multiple	6	0.6	1	16.7	31.3	$200,947
Cases without Infections	10,434	NA	248	2.4	4.4	$25,176
Phoenixville	**7,935**	**NA**	**228**	**2.9**	**3.9**	**$22,046**
Cases with Infections	33	4.2	4	12.1	22.1	$118,781
Urinary Tract	14	1.8	1	7.1	14.4	$61,320
Surgical Site	3	2.5	NR	NR	NR	NR
Pneumonia	7	0.9	0	0.0	25.3	$160,441
Bloodstream	4	0.5	NR	NR	NR	NR
Multiple	5	0.6	2	40.0	40.8	$244,939
Cases without Infections	7,902	NA	224	2.8	3.8	$21,642
Robert Packer	**10,942**	**NA**	**345**	**3.2**	**4.1**	**$18,172**
Cases with Infections	78	7.1	19	24.4	21.9	$84,068
Urinary Tract	35	3.2	7	20.0	18.2	$66,435
Surgical Site	9	2.8	1	11.1	30.9	$109,571
Pneumonia	5	0.5	2	40.0	20.8	$88,800
Bloodstream	26	2.4	8	30.8	23.6	$92,441
Multiple	3	0.3	NR	NR	NR	NR
Cases without Infections	10,864	NA	326	3.0	4.0	$17,699

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.
NR - Not reported. Had fewer than 5 cases evaluated.

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Sacred Heart/Allentown	**5,833**	**NA**	**136**	**2.3**	**4.2**	**$16,518**
Cases with Infections	35	6.0	4	11.4	18.6	$70,451
Urinary Tract	19	3.3	2	10.5	14.1	$43,222
Surgical Site	5	3.8	0	0.0	17.6	$80,698
Pneumonia	6	1.0	2	33.3	25.5	$120,388
Bloodstream	3	0.5	NR	NR	NR	NR
Multiple	2	0.3	NR	NR	NR	NR
Cases without Infections	5,798	NA	132	2.3	4.2	$16,192
Saint Vincent Health	**15,736**	**NA**	**370**	**2.4**	**4.7**	**$49,093**
Cases with Infections	238	15.1	22	9.2	18.8	$177,080
Urinary Tract	194	12.3	11	5.7	16.3	$132,483
Surgical Site	10	2.8	1	10.0	19.4	$209,548
Pneumonia	12	0.8	1	8.3	36.4	$459,672
Bloodstream	10	0.6	5	50.0	27.6	$414,185
Multiple	12	0.8	4	33.3	32.4	$390,821
Cases without Infections	15,498	NA	348	2.2	4.5	$47,127
Sharon Regional	**8,345**	**NA**	**211**	**2.5**	**4.8**	**$16,781**
Cases with Infections	121	14.5	13	10.7	16.8	$50,092
Urinary Tract	105	12.6	10	9.5	15.2	$40,160
Surgical Site	2	1.6	NR	NR	NR	NR
Pneumonia	8	1.0	3	37.5	26.5	$132,658
Bloodstream	1	0.1	NR	NR	NR	NR
Multiple	5	0.6	0	0.0	40.2	$131,696
Cases without Infections	8,224	NA	198	2.4	4.7	$16,291
St Clair Memorial	**13,414**	**NA**	**437**	**3.3**	**5.0**	**$16,576**
Cases with Infections	232	17.3	32	13.8	16.3	$60,030
Urinary Tract	137	10.2	12	8.8	14.1	$43,360
Surgical Site	30	11.4	1	3.3	12.5	$50,794
Pneumonia	20	1.5	4	20.0	17.6	$79,039
Bloodstream	27	2.0	11	40.7	23.4	$97,181
Multiple	18	1.3	4	22.2	27.5	$125,451
Cases without Infections	13,182	NA	405	3.1	4.8	$15,811
St Joseph/Reading	**9,151**	**NA**	**260**	**2.8**	**4.2**	**$19,800**
Cases with Infections	114	12.5	21	18.4	16.4	$74,015
Urinary Tract	54	5.9	9	16.7	16.5	$64,813
Surgical Site	24	12.7	1	4.2	9.3	$43,799
Pneumonia	19	2.1	6	31.6	15.8	$89,342
Bloodstream	6	0.7	0	0.0	16.0	$68,090
Multiple	11	1.2	5	45.5	32.7	$161,872
Cases without Infections	9,037	NA	239	2.6	4.1	$19,116

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.
NR - Not reported. Had fewer than 5 cases evaluated.

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Temple Lower Bucks	**7,543**	**NA**	**231**	**3.1**	**4.6**	**$59,885**
Cases with Infections	49	6.5	10	20.4	24.2	$335,157
Urinary Tract	19	2.5	2	10.5	22.1	$280,225
Surgical Site	5	4.3	1	20.0	27.6	$364,871
Pneumonia	10	1.3	4	40.0	23.2	$361,568
Bloodstream	15	2.0	3	20.0	26.3	$377,227
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	7,494	NA	221	2.9	4.5	$58,086
UPMC Passavant	**14,614**	**NA**	**364**	**2.5**	**5.0**	**$23,800**
Cases with Infections	80	5.5	14	17.5	16.5	$90,463
Urinary Tract	27	1.8	4	14.8	14.1	$72,990
Surgical Site	19	5.9	0	0.0	13.6	$64,839
Pneumonia	21	1.4	7	33.3	16.4	$107,030
Bloodstream	7	0.5	1	14.3	24.9	$102,720
Multiple	6	0.4	2	33.3	27.7	$177,947
Cases without Infections	14,534	NA	350	2.4	4.9	$23,433
Univ PA/Presbyterian	**12,628**	**NA**	**271**	**2.1**	**4.6**	**$54,071**
Cases with Infections	134	10.6	38	28.4	28.6	$297,548
Urinary Tract	53	4.2	17	32.1	26.8	$289,847
Surgical Site	1	0.2	NR	NR	NR	NR
Pneumonia	8	0.6	5	62.5	38.6	$493,638
Bloodstream	69	5.5	14	20.3	27.5	$268,822
Multiple	3	0.2	NR	NR	NR	NR
Cases without Infections	12,494	NA	233	1.9	4.3	$51,460
WVHCS	**16,771**	**NA**	**420**	**2.5**	**5.0**	**$18,972**
Cases with Infections	260	15.5	29	11.2	16.7	$67,562
Urinary Tract	199	11.9	16	8.0	13.9	$48,509
Surgical Site	10	3.2	1	10.0	23.4	$119,200
Pneumonia	21	1.3	3	14.3	18.4	$96,769
Bloodstream	12	0.7	4	33.3	18.6	$75,212
Multiple	18	1.1	5	27.8	40.6	$210,343
Cases without Infections	16,511	NA	391	2.4	4.8	$18,207
Washington	**13,321**	**NA**	**275**	**2.1**	**4.5**	**$15,769**
Cases with Infections	73	5.5	7	9.6	21.7	$76,974
Urinary Tract	59	4.4	5	8.5	16.9	$48,314
Surgical Site	4	1.6	NR	NR	NR	NR
Pneumonia	10	0.8	2	20.0	47.8	$229,577
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	13,248	NA	268	2.0	4.4	$15,432

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.
NR - Not reported. Had fewer than 5 cases evaluated.

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Westmoreland Regional	**12,819**	**NA**	**289**	**2.3**	**4.5**	**$14,817**
Cases with Infections	116	9.0	10	8.6	16.0	$52,701
Urinary Tract	93	7.3	6	6.5	14.4	$41,307
Surgical Site	6	2.5	0	0.0	21.8	$91,532
Pneumonia	9	0.7	2	22.2	14.6	$79,271
Bloodstream	5	0.4	0	0.0	35.4	$148,900
Multiple	3	0.2	NR	NR	NR	NR
Cases without Infections	12,703	NA	279	2.2	4.4	$14,471
Williamsport	**11,217**	**NA**	**286**	**2.5**	**4.2**	**$17,063**
Cases with Infections	146	13.0	10	6.8	15.0	$52,492
Urinary Tract	98	8.7	3	3.1	14.7	$40,280
Surgical Site	21	6.1	1	4.8	8.7	$35,482
Pneumonia	3	0.3	NR	NR	NR	NR
Bloodstream	12	1.1	4	33.3	18.5	$95,609
Multiple	12	1.1	2	16.7	24.6	$122,183
Cases without Infections	11,071	NA	276	2.5	4.1	$16,596

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.
NR - Not reported. Had fewer than 5 cases evaluated.

Peer Group 3 Summary Data

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
PEER GROUP 3	**426,984**	**NA**	**10,630**	**2.5**	**4.6**	**$24,152**
Cases with Infections	3,971	9.3	458	11.5	17.5	$108,197
Urinary Tract	2,491	5.8	195	7.8	15.3	$77,235
Surgical Site	364	5.8	14	3.8	11.2	$65,288
Pneumonia	411	1.0	96	23.4	20.7	$149,376
Bloodstream	450	1.1	102	22.7	25.1	$223,570
Multiple	255	0.6	51	20.0	29.1	$201,929
Cases without Infections	423,013	NA	10,172	2.4	4.5	$23,364

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Alle-Kiski	**10,458**	**NA**	**274**	**2.6**	**4.5**	**$14,936**
Cases with Infections	105	10.0	12	11.4	13.6	$47,909
Urinary Tract	48	4.6	3	6.3	12.1	$37,349
Surgical Site	14	10.6	0	0.0	11.9	$43,966
Pneumonia	31	3.0	7	22.6	12.4	$43,839
Bloodstream	2	0.2	NR	NR	NR	NR
Multiple	10	1.0	2	20.0	24.9	$112,202
Cases without Infections	10,353	NA	262	2.5	4.4	$14,601
Armstrong County Memorial	**5,373**	**NA**	**152**	**2.8**	**4.8**	**$9,245**
Cases with Infections	29	5.4	2	6.9	21.2	$44,442
Urinary Tract	28	5.2	2	7.1	20.9	$44,079
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	0	NA	NA	NA	NA	NA
Bloodstream	1	0.2	NR	NR	NR	NR
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	5,344	NA	150	2.8	4.7	$9,054
Bon Secours	**4,205**	**NA**	**162**	**3.9**	**5.7**	**$14,902**
Cases with Infections	41	9.8	8	19.5	30.2	$68,302
Urinary Tract	27	6.4	4	14.8	20.6	$39,880
Surgical Site	4	5.0	NR	NR	NR	NR
Pneumonia	2	0.5	NR	NR	NR	NR
Bloodstream	8	1.9	3	37.5	40.9	$106,559
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	4,164	NA	154	3.7	5.5	$14,376
Canonsburg General	**4,385**	**NA**	**132**	**3.0**	**5.0**	**$16,005**
Cases with Infections	31	7.1	3	9.7	12.3	$37,790
Urinary Tract	22	5.0	0	0.0	12.8	$35,612
Surgical Site	4	7.5	NR	NR	NR	NR
Pneumonia	0	NA	NA	NA	NA	NA
Bloodstream	5	1.1	3	60.0	12.0	$43,837
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	4,354	NA	129	3.0	4.9	$15,850
Carlisle Regional	**6,065**	**NA**	**184**	**3.0**	**4.4**	**$22,935**
Cases with Infections	94	15.5	6	6.4	10.2	$58,027
Urinary Tract	37	6.1	2	5.4	12.8	$43,813
Surgical Site	9	8.1	0	0.0	8.3	$72,075
Pneumonia	6	1.0	2	33.3	19.8	$189,073
Bloodstream	5	0.8	1	20.0	27.0	$180,005
Multiple	37	6.1	1	2.7	4.1	$31,088
Cases without Infections	5,971	NA	178	3.0	4.3	$22,382

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.
NR - Not reported. Had fewer than 5 cases evaluated.

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Central Montgomery	**5,376**	**NA**	**164**	**3.1**	**4.7**	**$34,543**
Cases with Infections	55	10.2	9	16.4	16.9	$125,924
Urinary Tract	33	6.1	2	6.1	15.6	$100,756
Surgical Site	3	4.0	NR	NR	NR	NR
Pneumonia	3	0.6	NR	NR	NR	NR
Bloodstream	10	1.9	3	30.0	17.0	$144,405
Multiple	6	1.1	3	50.0	25.8	$225,796
Cases without Infections	5,321	NA	155	2.9	4.6	$33,598
Chambersburg	**12,485**	**NA**	**265**	**2.1**	**4.3**	**$14,886**
Cases with Infections	88	7.0	4	4.5	13.0	$42,754
Urinary Tract	68	5.4	2	2.9	12.6	$40,356
Surgical Site	3	1.4	NR	NR	NR	NR
Pneumonia	11	0.9	1	9.1	11.3	$41,385
Bloodstream	4	0.3	NR	NR	NR	NR
Multiple	2	0.2	NR	NR	NR	NR
Cases without Infections	12,397	NA	261	2.1	4.2	$14,688
Chestnut Hill	**8,954**	**NA**	**120**	**1.3**	**4.2**	**$31,929**
Cases with Infections	41	4.6	1	2.4	18.4	$152,005
Urinary Tract	18	2.0	0	0.0	12.4	$98,285
Surgical Site	1	0.9	NR	NR	NR	NR
Pneumonia	5	0.6	0	0.0	30.2	$311,974
Bloodstream	11	1.2	1	9.1	25.6	$194,117
Multiple	6	0.7	0	0.0	15.7	$124,736
Cases without Infections	8,913	NA	119	1.3	4.1	$31,377
Delaware County Memorial	**10,821**	**NA**	**290**	**2.7**	**5.7**	**$62,824**
Cases with Infections	90	8.3	16	17.8	33.0	$372,132
Urinary Tract	67	6.2	8	11.9	25.8	$263,659
Surgical Site	3	2.0	NR	NR	NR	NR
Pneumonia	8	0.7	2	25.0	37.5	$570,284
Bloodstream	9	0.8	3	33.3	44.6	$642,049
Multiple	3	0.3	NR	NR	NR	NR
Cases without Infections	10,731	NA	274	2.6	5.5	$60,230
Ephrata Community	**7,325**	**NA**	**125**	**1.7**	**3.8**	**$14,590**
Cases with Infections	93	12.7	5	5.4	9.0	$42,104
Urinary Tract	54	7.4	3	5.6	8.8	$34,073
Surgical Site	18	14.2	0	0.0	5.3	$29,824
Pneumonia	8	1.1	0	0.0	10.9	$63,189
Bloodstream	9	1.2	2	22.2	14.2	$83,533
Multiple	4	0.5	NR	NR	NR	NR
Cases without Infections	7,232	NA	120	1.7	3.8	$14,237

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.
NR - Not reported. Had fewer than 5 cases evaluated.

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Evangelical Community	**6,858**	**NA**	**146**	**2.1**	**3.7**	**$7,988**
Cases with Infections	62	9.0	0	0.0	12.9	$23,099
Urinary Tract	49	7.1	0	0.0	12.8	$20,512
Surgical Site	6	4.1	0	0.0	6.7	$14,417
Pneumonia	5	0.7	0	0.0	20.0	$51,428
Bloodstream	2	0.3	NR	NR	NR	NR
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	6,796	NA	146	2.1	3.6	$7,850
Frick	**4,294**	**NA**	**113**	**2.6**	**4.3**	**$10,592**
Cases with Infections	38	8.8	1	2.6	10.4	$25,235
Urinary Tract	35	8.2	1	2.9	10.3	$24,324
Surgical Site	1	2.6	NR	NR	NR	NR
Pneumonia	1	0.2	NR	NR	NR	NR
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	1	0.2	NR	NR	NR	NR
Cases without Infections	4,256	NA	112	2.6	4.3	$10,461
Gettysburg	**3,977**	**NA**	**80**	**2.0**	**4.1**	**$12,156**
Cases with Infections	57	14.3	2	3.5	11.0	$34,561
Urinary Tract	38	9.6	0	0.0	9.6	$29,096
Surgical Site	7	10.5	0	0.0	7.4	$22,100
Pneumonia	9	2.3	2	22.2	15.1	$56,759
Bloodstream	2	0.5	NR	NR	NR	NR
Multiple	1	0.3	NR	NR	NR	NR
Cases without Infections	3,920	NA	78	2.0	4.0	$11,830
Gnaden Huetten Memorial	**3,274**	**NA**	**79**	**2.4**	**4.9**	**$8,515**
Cases with Infections	46	14.1	3	6.5	14.2	$27,650
Urinary Tract	25	7.6	0	0.0	11.1	$14,778
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	7	2.1	1	14.3	15.1	$31,747
Bloodstream	5	1.5	1	20.0	17.6	$60,140
Multiple	9	2.7	1	11.1	20.2	$42,167
Cases without Infections	3,228	NA	76	2.4	4.7	$8,242
Good Samaritan Regional	**6,629**	**NA**	**281**	**4.2**	**5.7**	**$10,730**
Cases with Infections	83	12.5	4	4.8	17.7	$30,497
Urinary Tract	74	11.2	4	5.4	16.9	$27,275
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	1	0.2	NR	NR	NR	NR
Bloodstream	6	0.9	0	0.0	20.0	$39,049
Multiple	2	0.3	NR	NR	NR	NR
Cases without Infections	6,546	NA	277	4.2	5.6	$10,479

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.
NR - Not reported. Had fewer than 5 cases evaluated.

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Grand View	**8,724**	**NA**	**162**	**1.9**	**4.5**	**$32,278**
Cases with Infections	95	10.9	14	14.7	26.1	$241,338
Urinary Tract	48	5.5	6	12.5	18.5	$120,184
Surgical Site	8	5.0	0	0.0	20.5	$183,827
Pneumonia	21	2.4	3	14.3	28.3	$298,425
Bloodstream	10	1.1	2	20.0	29.2	$306,731
Multiple	8	0.9	3	37.5	67.4	$794,185
Cases without Infections	8,629	NA	148	1.7	4.2	$29,976
Hanover	**5,836**	**NA**	**146**	**2.5**	**4.5**	**$11,117**
Cases with Infections	78	13.4	3	3.8	10.4	$24,250
Urinary Tract	40	6.9	3	7.5	13.4	$24,470
Surgical Site	34	28.7	0	0.0	5.7	$19,076
Pneumonia	2	0.3	NR	NR	NR	NR
Bloodstream	1	0.2	NR	NR	NR	NR
Multiple	1	0.2	NR	NR	NR	NR
Cases without Infections	5,758	NA	143	2.5	4.4	$10,939
Hazleton General	**6,757**	**NA**	**241**	**3.6**	**5.2**	**$19,267**
Cases with Infections	88	13.0	8	9.1	15.6	$55,731
Urinary Tract	70	10.4	4	5.7	14.7	$41,825
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	8	1.2	3	37.5	24.0	$154,290
Bloodstream	9	1.3	1	11.1	15.6	$77,093
Multiple	1	0.1	NR	NR	NR	NR
Cases without Infections	6,669	NA	233	3.5	5.1	$18,786
Holy Redeemer	**13,111**	**NA**	**241**	**1.8**	**4.1**	**$52,292**
Cases with Infections	84	6.4	7	8.3	21.0	$286,337
Urinary Tract	60	4.6	5	8.3	19.0	$248,383
Surgical Site	4	1.8	NR	NR	NR	NR
Pneumonia	7	0.5	0	0.0	20.7	$287,343
Bloodstream	12	0.9	2	16.7	33.4	$501,341
Multiple	1	0.1	NR	NR	NR	NR
Cases without Infections	13,027	NA	234	1.8	4.0	$50,783
Indiana Regional	**7,354**	**NA**	**190**	**2.6**	**4.5**	**$11,841**
Cases with Infections	85	11.6	7	8.2	13.8	$39,588
Urinary Tract	68	9.2	5	7.4	13.5	$33,389
Surgical Site	9	10.9	0	0.0	8.6	$36,476
Pneumonia	5	0.7	2	40.0	24.4	$108,886
Bloodstream	1	0.1	NR	NR	NR	NR
Multiple	2	0.3	NR	NR	NR	NR
Cases without Infections	7,269	NA	183	2.5	4.4	$11,516

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.
NR - Not reported. Had fewer than 5 cases evaluated.

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Jameson Memorial	**10,538**	**NA**	**286**	**2.7**	**4.6**	**$11,249**
Cases with Infections	65	6.2	10	15.4	12.0	$26,694
Urinary Tract	53	5.0	7	13.2	11.6	$22,451
Surgical Site	3	2.8	NR	NR	NR	NR
Pneumonia	4	0.4	NR	NR	NR	NR
Bloodstream	5	0.5	1	20.0	16.6	$50,020
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	10,473	NA	276	2.6	4.5	$11,153
Jeanes	**10,311**	**NA**	**205**	**2.0**	**4.6**	**$59,642**
Cases with Infections	85	8.2	10	11.8	17.2	$263,262
Urinary Tract	60	5.8	2	3.3	13.8	$185,694
Surgical Site	10	6.6	2	20.0	14.5	$219,642
Pneumonia	3	0.3	NR	NR	NR	NR
Bloodstream	11	1.1	5	45.5	27.1	$489,199
Multiple	1	0.1	NR	NR	NR	NR
Cases without Infections	10,226	NA	195	1.9	4.5	$57,949
Jennersville Regional	**3,741**	**NA**	**44**	**1.2**	**3.6**	**$20,040**
Cases with Infections	22	5.9	2	9.1	10.1	$47,300
Urinary Tract	15	4.0	1	6.7	11.1	$48,073
Surgical Site	3	9.5	NR	NR	NR	NR
Pneumonia	1	0.3	NR	NR	NR	NR
Bloodstream	1	0.3	NR	NR	NR	NR
Multiple	2	0.5	NR	NR	NR	NR
Cases without Infections	3,719	NA	42	1.1	3.6	$19,879
Latrobe Area	**9,395**	**NA**	**250**	**2.7**	**4.0**	**$11,922**
Cases with Infections	57	6.1	11	19.3	17.3	$54,212
Urinary Tract	38	4.0	5	13.2	13.3	$38,227
Surgical Site	5	3.1	0	0.0	22.6	$61,269
Pneumonia	8	0.9	2	25.0	23.4	$80,786
Bloodstream	2	0.2	NR	NR	NR	NR
Multiple	4	0.4	NR	NR	NR	NR
Cases without Infections	9,338	NA	239	2.6	4.0	$11,664
Lewistown	**6,751**	**NA**	**156**	**2.3**	**3.8**	**$8,880**
Cases with Infections	29	4.3	3	10.3	12.8	$28,107
Urinary Tract	16	2.4	2	12.5	14.1	$27,931
Surgical Site	3	4.6	NR	NR	NR	NR
Pneumonia	1	0.1	NR	NR	NR	NR
Bloodstream	9	1.3	1	11.1	11.2	$28,321
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	6,722	NA	153	2.3	3.8	$8,797

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.
NR - Not reported. Had fewer than 5 cases evaluated.

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Meadville	**6,336**	**NA**	**143**	**2.3**	**4.5**	**$10,330**
Cases with Infections	82	12.9	6	7.3	14.5	$35,589
Urinary Tract	54	8.5	4	7.4	13.1	$25,622
Surgical Site	12	11.0	0	0.0	10.8	$22,384
Pneumonia	5	0.8	1	20.0	12.2	$50,131
Bloodstream	5	0.8	1	20.0	19.6	$61,573
Multiple	6	0.9	0	0.0	31.8	$117,934
Cases without Infections	6,254	NA	137	2.2	4.3	$9,999
Memorial York	**6,073**	**NA**	**125**	**2.1**	**3.7**	**$11,171**
Cases with Infections	61	10.0	7	11.5	15.9	$60,887
Urinary Tract	14	2.3	0	0.0	14.5	$40,946
Surgical Site	11	10.4	0	0.0	8.6	$38,596
Pneumonia	14	2.3	3	21.4	16.9	$63,972
Bloodstream	7	1.2	1	14.3	13.4	$35,730
Multiple	15	2.5	3	20.0	22.9	$104,708
Cases without Infections	6,012	NA	118	2.0	3.6	$10,667
Mercy Jeannette	**5,229**	**NA**	**134**	**2.6**	**4.7**	**$11,379**
Cases with Infections	43	8.2	3	7.0	15.8	$41,817
Urinary Tract	26	5.0	1	3.8	15.0	$35,677
Surgical Site	7	11.2	1	14.3	12.0	$43,479
Pneumonia	4	0.8	NR	NR	NR	NR
Bloodstream	5	1.0	1	20.0	19.0	$51,299
Multiple	1	0.2	NR	NR	NR	NR
Cases without Infections	5,186	NA	131	2.5	4.6	$11,126
Mercy Philadelphia	**8,793**	**NA**	**275**	**3.1**	**4.9**	**$47,545**
Cases with Infections	72	8.2	21	29.2	36.4	$428,436
Urinary Tract	38	4.3	10	26.3	28.6	$306,379
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	13	1.5	5	38.5	55.2	$755,867
Bloodstream	16	1.8	5	31.3	35.7	$390,545
Multiple	5	0.6	1	20.0	50.0	$626,001
Cases without Infections	8,721	NA	254	2.9	4.6	$44,400
Mercy Suburban	**7,329**	**NA**	**241**	**3.3**	**4.1**	**$36,334**
Cases with Infections	57	7.8	12	21.1	15.5	$155,170
Urinary Tract	35	4.8	6	17.1	15.7	$154,893
Surgical Site	5	6.2	0	0.0	17.2	$195,402
Pneumonia	3	0.4	NR	NR	NR	NR
Bloodstream	14	1.9	4	28.6	13.9	$127,808
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	7,272	NA	229	3.1	4.0	$35,403

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NA - Not applicable.
NR - Not reported. Had fewer than 5 cases evaluated.

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Methodist Division/TJUH	**10,368**	**NA**	**255**	**2.5**	**6.1**	**$38,243**
Cases with Infections	52	5.0	8	15.4	41.5	$215,197
Urinary Tract	17	1.6	3	17.6	38.4	$195,902
Surgical Site	3	2.1	NR	NR	NR	NR
Pneumonia	1	0.1	NR	NR	NR	NR
Bloodstream	23	2.2	4	17.4	37.5	$196,932
Multiple	8	0.8	1	12.5	69.8	$331,237
Cases without Infections	10,316	NA	247	2.4	5.9	$37,351
Monongahela Valley	**9,320**	**NA**	**243**	**2.6**	**5.1**	**$15,188**
Cases with Infections	45	4.8	7	15.6	17.2	$63,601
Urinary Tract	29	3.1	2	6.9	15.1	$46,976
Surgical Site	2	1.6	NR	NR	NR	NR
Pneumonia	6	0.6	4	66.7	18.8	$84,303
Bloodstream	4	0.4	NR	NR	NR	NR
Multiple	4	0.4	NR	NR	NR	NR
Cases without Infections	9,275	NA	236	2.5	5.0	$14,954
Montgomery	**7,891**	**NA**	**209**	**2.6**	**4.0**	**$23,733**
Cases with Infections	57	7.2	13	22.8	21.5	$140,436
Urinary Tract	37	4.7	7	18.9	17.2	$108,444
Surgical Site	2	1.8	NR	NR	NR	NR
Pneumonia	4	0.5	NR	NR	NR	NR
Bloodstream	7	0.9	2	28.6	23.0	$111,818
Multiple	7	0.9	3	42.9	40.9	$302,159
Cases without Infections	7,834	NA	196	2.5	3.9	$22,884
Moses Taylor	**9,116**	**NA**	**211**	**2.3**	**4.7**	**$12,951**
Cases with Infections	116	12.7	12	10.3	16.5	$55,464
Urinary Tract	53	5.8	1	1.9	12.1	$32,720
Surgical Site	12	8.4	1	8.3	11.3	$29,227
Pneumonia	19	2.1	4	21.1	16.2	$61,029
Bloodstream	15	1.6	3	20.0	20.6	$78,371
Multiple	17	1.9	3	17.6	30.7	$118,464
Cases without Infections	9,000	NA	199	2.2	4.5	$12,403
Mount Nittany	**8,864**	**NA**	**229**	**2.6**	**4.3**	**$14,839**
Cases with Infections	135	15.2	15	11.1	17.5	$54,703
Urinary Tract	105	11.8	10	9.5	15.9	$45,020
Surgical Site	14	6.0	1	7.1	9.2	$36,084
Pneumonia	3	0.3	NR	NR	NR	NR
Bloodstream	3	0.3	NR	NR	NR	NR
Multiple	10	1.1	3	30.0	37.2	$133,717
Cases without Infections	8,729	NA	214	2.5	4.1	$14,223

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	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Nazareth	**10,589**	**NA**	**337**	**3.2**	**5.4**	**$44,324**
Cases with Infections	122	11.5	17	13.9	21.5	$165,913
Urinary Tract	80	7.6	7	8.8	17.2	$125,025
Surgical Site	5	3.3	0	0.0	12.2	$94,899
Pneumonia	13	1.2	5	38.5	30.2	$258,143
Bloodstream	12	1.1	3	25.0	26.1	$220,996
Multiple	12	1.1	2	16.7	40.4	$313,093
Cases without Infections	10,467	NA	320	3.1	5.2	$42,907
Ohio Valley General	**4,521**	**NA**	**126**	**2.8**	**4.8**	**$14,074**
Cases with Infections	67	14.8	7	10.4	13.6	$42,173
Urinary Tract	37	8.2	1	2.7	12.2	$29,862
Surgical Site	11	13.2	1	9.1	11.9	$44,908
Pneumonia	7	1.5	3	42.9	15.3	$56,048
Bloodstream	5	1.1	1	20.0	9.8	$39,965
Multiple	7	1.5	1	14.3	24.6	$90,649
Cases without Infections	4,454	NA	119	2.7	4.6	$13,651
Pocono	**10,912**	**NA**	**258**	**2.4**	**4.1**	**$19,602**
Cases with Infections	55	5.0	12	21.8	21.6	$133,573
Urinary Tract	21	1.9	3	14.3	23.7	$119,936
Surgical Site	10	7.8	1	10.0	19.5	$138,938
Pneumonia	18	1.6	6	33.3	18.8	$145,370
Bloodstream	5	0.5	2	40.0	28.2	$147,136
Multiple	1	0.1	NR	NR	NR	NR
Cases without Infections	10,857	NA	246	2.3	4.1	$19,025
Pottstown Memorial	**8,970**	**NA**	**278**	**3.1**	**4.2**	**$24,280**
Cases with Infections	32	3.6	6	18.8	15.7	$109,598
Urinary Tract	14	1.6	3	21.4	13.8	$87,759
Surgical Site	1	0.9	NR	NR	NR	NR
Pneumonia	14	1.6	2	14.3	16.1	$100,234
Bloodstream	3	0.3	NR	NR	NR	NR
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	8,938	NA	272	3.0	4.1	$23,975
Pottsville Warne Clinic	**7,017**	**NA**	**180**	**2.6**	**4.7**	**$8,411**
Cases with Infections	35	5.0	0	0.0	15.2	$24,452
Urinary Tract	26	3.7	0	0.0	15.1	$21,347
Surgical Site	4	3.6	NR	NR	NR	NR
Pneumonia	5	0.7	0	0.0	15.4	$37,257
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	6,982	NA	180	2.6	4.7	$8,330

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NA - Not applicable.
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	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Riddle Memorial	**10,398**	**NA**	**265**	**2.5**	**4.6**	**$44,525**
Cases with Infections	90	8.7	23	25.6	24.4	$259,507
Urinary Tract	27	2.6	3	11.1	20.3	$201,330
Surgical Site	9	5.1	0	0.0	9.0	$112,216
Pneumonia	10	1.0	2	20.0	27.4	$335,123
Bloodstream	35	3.4	12	34.3	29.4	$306,235
Multiple	9	0.9	6	66.7	29.3	$315,591
Cases without Infections	10,308	NA	242	2.3	4.5	$42,648
Roxborough Memorial	**5,525**	**NA**	**158**	**2.9**	**5.6**	**$21,995**
Cases with Infections	68	12.3	19	27.9	22.7	$108,052
Urinary Tract	27	4.9	2	7.4	14.3	$49,934
Surgical Site	1	2.1	NR	NR	NR	NR
Pneumonia	11	2.0	7	63.6	22.3	$119,636
Bloodstream	27	4.9	10	37.0	32.0	$164,095
Multiple	2	0.4	NR	NR	NR	NR
Cases without Infections	5,457	NA	139	2.5	5.4	$20,923
Sewickley Valley	**9,305**	**NA**	**184**	**2.0**	**4.1**	**$12,726**
Cases with Infections	76	8.2	2	2.6	10.2	$31,158
Urinary Tract	66	7.1	1	1.5	9.4	$28,349
Surgical Site	1	0.4	NR	NR	NR	NR
Pneumonia	7	0.8	1	14.3	14.9	$47,257
Bloodstream	2	0.2	NR	NR	NR	NR
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	9,229	NA	182	2.0	4.1	$12,574
Somerset Center Health	**3,850**	**NA**	**119**	**3.1**	**4.7**	**$11,385**
Cases with Infections	46	11.9	6	13.0	12.1	$28,701
Urinary Tract	39	10.1	4	10.3	11.7	$24,015
Surgical Site	3	6.4	NR	NR	NR	NR
Pneumonia	3	0.8	NR	NR	NR	NR
Bloodstream	1	0.3	NR	NR	NR	NR
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	3,804	NA	113	3.0	4.6	$11,175
Taylor	**6,774**	**NA**	**219**	**3.2**	**6.0**	**$81,944**
Cases with Infections	123	18.2	17	13.8	22.3	$347,790
Urinary Tract	54	8.0	2	3.7	16.1	$175,807
Surgical Site	4	5.1	NR	NR	NR	NR
Pneumonia	1	0.1	NR	NR	NR	NR
Bloodstream	60	8.9	12	20.0	26.6	$461,075
Multiple	4	0.6	NR	NR	NR	NR
Cases without Infections	6,651	NA	202	3.0	5.7	$77,027

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NA - Not applicable.
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	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Temple East	**10,972**	**NA**	**178**	**1.6**	**4.3**	**$32,326**
Cases with Infections	108	9.8	23	21.3	22.5	$170,820
Urinary Tract	80	7.3	13	16.3	21.6	$156,911
Surgical Site	6	5.2	1	16.7	21.8	$194,476
Pneumonia	4	0.4	NR	NR	NR	NR
Bloodstream	18	1.6	6	33.3	26.2	$205,238
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	10,864	NA	155	1.4	4.1	$30,949
UPMC Braddock	**4,351**	**NA**	**105**	**2.4**	**4.9**	**$15,719**
Cases with Infections	55	12.6	4	7.3	14.0	$52,640
Urinary Tract	42	9.7	3	7.1	12.6	$41,407
Surgical Site	6	14.3	1	16.7	24.0	$116,900
Pneumonia	0	NA	NA	NA	NA	NA
Bloodstream	5	1.1	0	0.0	14.2	$74,556
Multiple	2	0.5	NR	NR	NR	NR
Cases without Infections	4,296	NA	101	2.4	4.7	$15,246
UPMC Horizon	**7,163**	**NA**	**155**	**2.2**	**4.2**	**$12,491**
Cases with Infections	51	7.1	5	9.8	13.3	$46,157
Urinary Tract	21	2.9	2	9.5	12.8	$33,801
Surgical Site	10	7.9	0	0.0	8.0	$33,653
Pneumonia	11	1.5	2	18.2	15.2	$55,511
Bloodstream	3	0.4	NR	NR	NR	NR
Multiple	6	0.8	1	16.7	20.2	$92,017
Cases without Infections	7,112	NA	150	2.1	4.2	$12,249
UPMC McKeesport	**8,976**	**NA**	**204**	**2.3**	**5.1**	**$18,273**
Cases with Infections	110	12.3	12	10.9	14.9	$57,330
Urinary Tract	70	7.8	6	8.6	14.8	$50,607
Surgical Site	6	5.8	0	0.0	10.2	$54,683
Pneumonia	15	1.7	5	33.3	13.5	$68,630
Bloodstream	8	0.9	0	0.0	16.0	$56,531
Multiple	11	1.2	1	9.1	19.4	$86,736
Cases without Infections	8,866	NA	192	2.2	5.0	$17,788
UPMC Northwest	**6,540**	**NA**	**164**	**2.5**	**3.8**	**$7,900**
Cases with Infections	41	6.3	1	2.4	13.3	$28,093
Urinary Tract	35	5.4	1	2.9	11.6	$22,701
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	2	0.3	NR	NR	NR	NR
Bloodstream	2	0.3	NR	NR	NR	NR
Multiple	2	0.3	NR	NR	NR	NR
Cases without Infections	6,499	NA	163	2.5	3.8	$7,772

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	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
UPMC South Side	**5,505**	**NA**	**112**	**2.0**	**6.5**	**$22,303**
Cases with Infections	77	14.0	4	5.2	17.8	$61,119
Urinary Tract	40	7.3	0	0.0	20.9	$57,036
Surgical Site	10	11.1	0	0.0	6.4	$38,307
Pneumonia	17	3.1	3	17.6	15.4	$61,795
Bloodstream	5	0.9	1	20.0	22.4	$141,083
Multiple	5	0.9	0	0.0	19.4	$57,153
Cases without Infections	5,428	NA	108	2.0	6.3	$21,752
UPMC St Margaret	**13,674**	**NA**	**248**	**1.8**	**4.6**	**$26,083**
Cases with Infections	167	12.2	10	6.0	13.7	$81,933
Urinary Tract	129	9.4	9	7.0	13.5	$79,410
Surgical Site	18	5.9	0	0.0	8.7	$50,370
Pneumonia	13	1.0	1	7.7	15.5	$102,962
Bloodstream	2	0.1	NR	NR	NR	NR
Multiple	5	0.4	0	0.0	29.2	$174,458
Cases without Infections	13,507	NA	238	1.8	4.5	$25,392
Uniontown	**9,772**	**NA**	**253**	**2.6**	**4.5**	**$9,253**
Cases with Infections	65	6.7	10	15.4	17.8	$38,674
Urinary Tract	46	4.7	7	15.2	17.6	$37,536
Surgical Site	8	4.9	0	0.0	9.4	$20,212
Pneumonia	7	0.7	1	14.3	15.6	$32,283
Bloodstream	1	0.1	NR	NR	NR	NR
Multiple	3	0.3	NR	NR	NR	NR
Cases without Infections	9,707	NA	243	2.5	4.4	$9,056
Warminster	**3,753**	**NA**	**119**	**3.2**	**4.6**	**$52,010**
Cases with Infections	29	7.7	5	17.2	19.6	$215,779
Urinary Tract	19	5.1	2	10.5	13.9	$150,960
Surgical Site	1	2.1	NR	NR	NR	NR
Pneumonia	1	0.3	NR	NR	NR	NR
Bloodstream	6	1.6	1	16.7	20.7	$246,654
Multiple	2	0.5	NR	NR	NR	NR
Cases without Infections	3,724	NA	114	3.1	4.5	$50,735
Wayne Memorial	**3,607**	**NA**	**89**	**2.5**	**4.5**	**$11,877**
Cases with Infections	38	10.5	2	5.3	12.3	$42,156
Urinary Tract	10	2.8	1	10.0	11.6	$35,753
Surgical Site	18	34.7	0	0.0	7.9	$29,968
Pneumonia	6	1.7	1	16.7	19.0	$79,337
Bloodstream	4	1.1	NR	NR	NR	NR
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	3,569	NA	87	2.4	4.4	$11,555

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	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Western PA Hosp/Forbes	**12,494**	**NA**	**326**	**2.6**	**4.8**	**$15,983**
Cases with Infections	155	12.4	18	11.6	16.1	$60,328
Urinary Tract	109	8.7	10	9.2	15.0	$45,556
Surgical Site	12	7.7	2	16.7	18.8	$83,398
Pneumonia	17	1.4	1	5.9	16.9	$82,441
Bloodstream	7	0.6	1	14.3	11.1	$41,068
Multiple	10	0.8	4	40.0	26.8	$169,555
Cases without Infections	12,339	NA	308	2.5	4.6	$15,426

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.

Peer Group 4 Summary Data

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
PEER GROUP 4	**104,189**	**NA**	**2,777**	**2.7**	**4.0**	**$11,717**
Cases with Infections	593	5.7	62	10.5	13.4	$54,658
Urinary Tract	314	3.0	21	6.7	10.6	$31,414
Surgical Site	57	4.8	1	1.8	12.3	$67,560
Pneumonia	126	1.2	17	13.5	12.7	$53,634
Bloodstream	50	0.5	7	14.0	16.7	$71,954
Multiple	46	0.4	16	34.8	32.6	$181,343
Cases without Infections	103,596	NA	2,715	2.6	3.9	$11,471

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Aliquippa Community	**1,722**	**NA**	**55**	**3.2**	**5.0**	**$11,992**
Cases with Infections	21	12.2	1	4.8	12.2	$28,933
Urinary Tract	12	7.0	1	8.3	9.4	$22,495
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	3	1.7	NR	NR	NR	NR
Bloodstream	6	3.5	0	0.0	15.7	$34,068
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	1,701	NA	54	3.2	4.9	$11,783
Ashland Regional	**1,616**	**NA**	**48**	**3.0**	**5.7**	**$10,167**
Cases with Infections	0	NA	NA	NA	NA	NA
Urinary Tract	0	NA	NA	NA	NA	NA
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	0	NA	NA	NA	NA	NA
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	1,616	NA	48	3.0	5.7	$10,167
Barnes Kasson County	**1,349**	**NA**	**24**	**1.8**	**3.1**	**$5,365**
Cases with Infections	0	NA	NA	NA	NA	NA
Urinary Tract	0	NA	NA	NA	NA	NA
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	0	NA	NA	NA	NA	NA
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	1,349	NA	24	1.8	3.1	$5,365
Berwick	**3,150**	**NA**	**51**	**1.6**	**3.9**	**$22,483**
Cases with Infections	22	7.0	1	4.5	10.8	$76,043
Urinary Tract	4	1.3	NR	NR	NR	NR
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	15	4.8	0	0.0	10.5	$63,330
Bloodstream	3	1.0	NR	NR	NR	NR
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	3,128	NA	50	1.6	3.8	$22,106
Bloomsburg	**2,705**	**NA**	**51**	**1.9**	**3.0**	**$13,161**
Cases with Infections	7	2.6	0	0.0	10.6	$45,724
Urinary Tract	2	0.7	NR	NR	NR	NR
Surgical Site	3	5.2	NR	NR	NR	NR
Pneumonia	2	0.7	NR	NR	NR	NR
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	2,698	NA	51	1.9	3.0	$13,076

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.
NR - Not reported. Had fewer than 5 cases evaluated.

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Bradford Regional	**2,970**	**NA**	**94**	**3.2**	**4.1**	**$9,882**
Cases with Infections	39	13.1	4	10.3	11.0	$34,836
Urinary Tract	19	6.4	2	10.5	11.3	$36,122
Surgical Site	6	16.3	0	0.0	7.7	$17,479
Pneumonia	12	4.0	1	8.3	9.0	$35,660
Bloodstream	2	0.7	NR	NR	NR	NR
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	2,931	NA	90	3.1	4.0	$9,550
Brookville	**1,885**	**NA**	**36**	**1.9**	**3.9**	**$6,738**
Cases with Infections	6	3.2	1	16.7	6.8	$11,124
Urinary Tract	5	2.7	1	20.0	7.4	$11,466
Surgical Site	1	5.6	NR	NR	NR	NR
Pneumonia	0	NA	NA	NA	NA	NA
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	1,879	NA	35	1.9	3.9	$6,724
Bucktail	**76**	**NA**	**2**	**2.6**	**3.6**	**$8,680**
Cases with Infections	0	NA	NA	NA	NA	NA
Urinary Tract	0	NA	NA	NA	NA	NA
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	0	NA	NA	NA	NA	NA
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	76	NA	2	2.6	3.6	$8,680
Charles Cole Memorial	**2,484**	**NA**	**70**	**2.8**	**4.5**	**$8,913**
Cases with Infections	26	10.5	1	3.8	10.5	$23,224
Urinary Tract	19	7.6	1	5.3	11.2	$24,498
Surgical Site	5	17.3	0	0.0	7.4	$18,436
Pneumonia	0	NA	NA	NA	NA	NA
Bloodstream	1	0.4	NR	NR	NR	NR
Multiple	1	0.4	NR	NR	NR	NR
Cases without Infections	2,458	NA	69	2.8	4.5	$8,761
Clarion	**3,052**	**NA**	**110**	**3.6**	**3.5**	**$7,605**
Cases with Infections	17	5.6	3	17.6	15.1	$37,010
Urinary Tract	9	2.9	2	22.2	14.4	$34,963
Surgical Site	1	2.1	NR	NR	NR	NR
Pneumonia	1	0.3	NR	NR	NR	NR
Bloodstream	5	1.6	1	20.0	14.8	$35,708
Multiple	1	0.3	NR	NR	NR	NR
Cases without Infections	3,035	NA	107	3.5	3.5	$7,441

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.
NR - Not reported. Had fewer than 5 cases evaluated.

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Clearfield	**3,381**	**NA**	**65**	**1.9**	**4.0**	**$9,923**
Cases with Infections	10	3.0	3	30.0	17.3	$40,400
Urinary Tract	5	1.5	3	60.0	19.6	$47,171
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	4	1.2	NR	NR	NR	NR
Bloodstream	1	0.3	NR	NR	NR	NR
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	3,371	NA	62	1.8	3.9	$9,832
Corry Memorial	**1,714**	**NA**	**30**	**1.8**	**2.9**	**$5,896**
Cases with Infections	5	2.9	0	0.0	10.8	$20,344
Urinary Tract	2	1.2	NR	NR	NR	NR
Surgical Site	1	7.2	NR	NR	NR	NR
Pneumonia	1	0.6	NR	NR	NR	NR
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	1	0.6	NR	NR	NR	NR
Cases without Infections	1,709	NA	30	1.8	2.9	$5,854
Elk Regional	**3,340**	**NA**	**77**	**2.3**	**3.5**	**$10,713**
Cases with Infections	24	7.2	3	12.5	9.3	$28,255
Urinary Tract	14	4.2	1	7.1	8.6	$23,239
Surgical Site	4	6.6	NR	NR	NR	NR
Pneumonia	4	1.2	NR	NR	NR	NR
Bloodstream	1	0.3	NR	NR	NR	NR
Multiple	1	0.3	NR	NR	NR	NR
Cases without Infections	3,316	NA	74	2.2	3.4	$10,586
Ellwood City	**2,382**	**NA**	**55**	**2.3**	**4.4**	**$7,740**
Cases with Infections	9	3.8	0	0.0	10.7	$24,752
Urinary Tract	5	2.1	0	0.0	9.4	$16,663
Surgical Site	2	6.3	NR	NR	NR	NR
Pneumonia	2	0.8	NR	NR	NR	NR
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	2,373	NA	55	2.3	4.4	$7,675
Fulton County	**909**	**NA**	**15**	**1.7**	**3.4**	**$6,568**
Cases with Infections	3	3.3	NR	NR	NR	NR
Urinary Tract	2	2.2	NR	NR	NR	NR
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	1	1.1	NR	NR	NR	NR
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	906	NA	15	1.7	3.4	$6,547

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.
NR - Not reported. Had fewer than 5 cases evaluated.

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Heart of Lancaster	**2,643**	**NA**	**70**	**2.6**	**4.2**	**$23,167**
Cases with Infections	14	5.3	3	21.4	27.5	$261,052
Urinary Tract	0	NA	NA	NA	NA	NA
Surgical Site	5	9.7	0	0.0	38.0	$413,949
Pneumonia	1	0.4	NR	NR	NR	NR
Bloodstream	4	1.5	NR	NR	NR	NR
Multiple	4	1.5	NR	NR	NR	NR
Cases without Infections	2,629	NA	67	2.5	4.1	$21,900
Highlands	**1,737**	**NA**	**44**	**2.5**	**4.0**	**$6,032**
Cases with Infections	3	1.7	NR	NR	NR	NR
Urinary Tract	2	1.2	NR	NR	NR	NR
Surgical Site	1	6.5	NR	NR	NR	NR
Pneumonia	0	NA	NA	NA	NA	NA
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	1,734	NA	44	2.5	4.0	$6,012
J C Blair Memorial	**2,746**	**NA**	**56**	**2.0**	**3.9**	**$7,380**
Cases with Infections	26	9.5	1	3.8	12.2	$19,672
Urinary Tract	22	8.0	0	0.0	12.7	$19,551
Surgical Site	2	9.4	NR	NR	NR	NR
Pneumonia	0	NA	NA	NA	NA	NA
Bloodstream	1	0.4	NR	NR	NR	NR
Multiple	1	0.4	NR	NR	NR	NR
Cases without Infections	2,720	NA	55	2.0	3.8	$7,263
Jersey Shore	**1,102**	**NA**	**19**	**1.7**	**3.5**	**$7,221**
Cases with Infections	7	6.4	0	0.0	4.9	$13,181
Urinary Tract	0	NA	NA	NA	NA	NA
Surgical Site	5	30.5	0	0.0	5.4	$13,338
Pneumonia	1	0.9	NR	NR	NR	NR
Bloodstream	1	0.9	NR	NR	NR	NR
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	1,095	NA	19	1.7	3.5	$7,183
Kane Community	**1,207**	**NA**	**14**	**1.2**	**3.8**	**$10,252**
Cases with Infections	12	9.9	0	0.0	8.6	$21,299
Urinary Tract	10	8.3	0	0.0	7.8	$19,232
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	2	1.7	NR	NR	NR	NR
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	1,195	NA	14	1.2	3.8	$10,141

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.
NR - Not reported. Had fewer than 5 cases evaluated.

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Lock Haven	**2,459**	**NA**	**39**	**1.6**	**2.7**	**$10,870**
Cases with Infections	11	4.5	1	9.1	7.2	$32,103
Urinary Tract	9	3.7	1	11.1	6.4	$26,859
Surgical Site	1	7.6	NR	NR	NR	NR
Pneumonia	1	0.4	NR	NR	NR	NR
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	2,448	NA	38	1.6	2.7	$10,775
Marian Community	**3,159**	**NA**	**100**	**3.2**	**4.5**	**$10,042**
Cases with Infections	26	8.2	4	15.4	15.9	$39,152
Urinary Tract	15	4.7	2	13.3	15.3	$35,151
Surgical Site	6	16.1	1	16.7	13.5	$36,489
Pneumonia	2	0.6	NR	NR	NR	NR
Bloodstream	3	0.9	NR	NR	NR	NR
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	3,133	NA	96	3.1	4.5	$9,800
Memorial/Towanda	**1,976**	**NA**	**52**	**2.6**	**3.5**	**$12,060**
Cases with Infections	8	4.0	3	37.5	9.8	$31,236
Urinary Tract	4	2.0	NR	NR	NR	NR
Surgical Site	1	3.0	NR	NR	NR	NR
Pneumonia	3	1.5	NR	NR	NR	NR
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	1,968	NA	49	2.5	3.5	$11,982
Meyersdale Community	**447**	**NA**	**16**	**3.6**	**3.3**	**$5,861**
Cases with Infections	2	4.5	NR	NR	NR	NR
Urinary Tract	2	4.5	NR	NR	NR	NR
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	0	NA	NA	NA	NA	NA
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	445	NA	16	3.6	3.3	$5,858
Mid-Valley	**1,059**	**NA**	**32**	**3.0**	**4.3**	**$10,343**
Cases with Infections	4	3.8	NR	NR	NR	NR
Urinary Tract	2	1.9	NR	NR	NR	NR
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	0	NA	NA	NA	NA	NA
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	2	1.9	NR	NR	NR	NR
Cases without Infections	1,055	NA	31	2.9	4.2	$10,082

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.
NR - Not reported. Had fewer than 5 cases evaluated.

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Millcreek Community	**2,067**	**NA**	**60**	**2.9**	**4.1**	**$13,788**
Cases with Infections	18	8.7	6	33.3	12.8	$66,195
Urinary Tract	9	4.4	2	22.2	10.1	$41,901
Surgical Site	2	9.3	NR	NR	NR	NR
Pneumonia	5	2.4	2	40.0	13.8	$73,446
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	2	1.0	NR	NR	NR	NR
Cases without Infections	2,049	NA	54	2.6	4.0	$13,328
Miners	**1,053**	**NA**	**43**	**4.1**	**4.0**	**$11,363**
Cases with Infections	3	2.8	NR	NR	NR	NR
Urinary Tract	1	0.9	NR	NR	NR	NR
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	1	0.9	NR	NR	NR	NR
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	1	0.9	NR	NR	NR	NR
Cases without Infections	1,050	NA	41	3.9	3.9	$11,274
Monsour‡	**495**	**NA**	**10**	**2.0**	**5.7**	**$15,158**
Cases with Infections	7	14.1	0	0.0	14.1	$36,444
Urinary Tract	6	12.1	0	0.0	15.8	$39,780
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	0	NA	NA	NA	NA	NA
Bloodstream	1	2.0	NR	NR	NR	NR
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	488	NA	10	2.0	5.6	$14,853
Montrose General	**889**	**NA**	**18**	**2.0**	**3.3**	**$4,151**
Cases with Infections	1	1.1	NR	NR	NR	NR
Urinary Tract	1	1.1	NR	NR	NR	NR
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	0	NA	NA	NA	NA	NA
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	888	NA	18	2.0	3.3	$4,152
Muncy Valley	**566**	**NA**	**21**	**3.7**	**3.7**	**$7,348**
Cases with Infections	0	NA	NA	NA	NA	NA
Urinary Tract	0	NA	NA	NA	NA	NA
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	0	NA	NA	NA	NA	NA
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	566	NA	21	3.7	3.7	$7,348

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.
NR - Not reported. Had fewer than 5 cases evaluated.
‡ Closed in 2006

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Nason	**2,350**	**NA**	**46**	**2.0**	**3.4**	**$6,887**
Cases with Infections	14	6.0	0	0.0	12.0	$22,030
Urinary Tract	12	5.1	0	0.0	12.5	$22,661
Surgical Site	1	2.9	NR	NR	NR	NR
Pneumonia	1	0.4	NR	NR	NR	NR
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	2,336	NA	46	2.0	3.4	$6,796
Palmerton	**2,338**	**NA**	**74**	**3.2**	**4.3**	**$8,438**
Cases with Infections	19	8.1	3	15.8	13.6	$25,093
Urinary Tract	10	4.3	0	0.0	10.8	$16,425
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	5	2.1	2	40.0	17.2	$35,580
Bloodstream	2	0.9	NR	NR	NR	NR
Multiple	2	0.9	NR	NR	NR	NR
Cases without Infections	2,319	NA	71	3.1	4.2	$8,302
Philipsburg Area‡	**1,285**	**NA**	**36**	**2.8**	**3.5**	**$10,818**
Cases with Infections	7	5.4	0	0.0	4.9	$13,316
Urinary Tract	7	5.4	0	0.0	4.9	$13,316
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	0	NA	NA	NA	NA	NA
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	1,278	NA	36	2.8	3.5	$10,805
Punxsutawney Area	**1,902**	**NA**	**51**	**2.7**	**3.8**	**$7,394**
Cases with Infections	3	1.6	NR	NR	NR	NR
Urinary Tract	1	0.5	NR	NR	NR	NR
Surgical Site	2	8.5	NR	NR	NR	NR
Pneumonia	0	NA	NA	NA	NA	NA
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	1,899	NA	51	2.7	3.8	$7,392
Shamokin Area Community	**2,876**	**NA**	**83**	**2.9**	**4.0**	**$7,204**
Cases with Infections	14	4.9	0	0.0	7.5	$15,811
Urinary Tract	12	4.2	0	0.0	6.3	$10,673
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	2	0.7	NR	NR	NR	NR
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	2,862	NA	83	2.9	4.0	$7,162

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.
NR - Not reported. Had fewer than 5 cases evaluated.
‡ Closed in 2006

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Soldiers & Sailors	**2,251**	**NA**	**62**	**2.8**	**3.5**	**$10,230**
Cases with Infections	6	2.7	1	16.7	12.8	$46,684
Urinary Tract	4	1.8	NR	NR	NR	NR
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	0	NA	NA	NA	NA	NA
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	2	0.9	NR	NR	NR	NR
Cases without Infections	2,245	NA	61	2.7	3.5	$10,133
Southwest Regional MC	**1,746**	**NA**	**34**	**1.9**	**3.5**	**$7,696**
Cases with Infections	8	4.6	0	0.0	6.8	$20,322
Urinary Tract	5	2.9	0	0.0	6.4	$16,239
Surgical Site	1	4.9	NR	NR	NR	NR
Pneumonia	2	1.1	NR	NR	NR	NR
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	1,738	NA	34	2.0	3.5	$7,637
Springfield	**1,768**	**NA**	**56**	**3.2**	**4.0**	**$56,979**
Cases with Infections	15	8.5	2	13.3	22.8	$385,278
Urinary Tract	5	2.8	0	0.0	18.6	$247,553
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	2	1.1	NR	NR	NR	NR
Bloodstream	3	1.7	NR	NR	NR	NR
Multiple	5	2.8	1	20.0	26.6	$475,476
Cases without Infections	1,753	NA	54	3.1	3.8	$54,169
St Joseph's/Philadelphia	**3,982**	**NA**	**164**	**4.1**	**6.7**	**$24,549**
Cases with Infections	46	11.6	11	23.9	32.2	$120,441
Urinary Tract	1	0.3	NR	NR	NR	NR
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	18	4.5	3	16.7	14.9	$51,905
Bloodstream	10	2.5	1	10.0	18.6	$59,529
Multiple	17	4.3	6	35.3	53.5	$212,543
Cases without Infections	3,936	NA	153	3.9	6.4	$23,428
St Luke's Miners	**2,133**	**NA**	**51**	**2.4**	**4.7**	**$13,663**
Cases with Infections	22	10.3	2	9.1	12.3	$34,504
Urinary Tract	14	6.6	1	7.1	12.4	$32,902
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	7	3.3	1	14.3	11.4	$35,795
Bloodstream	1	0.5	NR	NR	NR	NR
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	2,111	NA	49	2.3	4.6	$13,446

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.
NR - Not reported. Had fewer than 5 cases evaluated.

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
St Luke's Quakertown	**2,457**	**NA**	**66**	**2.7**	**3.8**	**$18,274**
Cases with Infections	20	8.1	0	0.0	14.7	$66,689
Urinary Tract	9	3.7	0	0.0	9.4	$46,111
Surgical Site	2	4.4	NR	NR	NR	NR
Pneumonia	6	2.4	0	0.0	15.0	$65,879
Bloodstream	1	0.4	NR	NR	NR	NR
Multiple	2	0.8	NR	NR	NR	NR
Cases without Infections	2,437	NA	66	2.7	3.7	$17,877
Sunbury Community	**2,423**	**NA**	**92**	**3.8**	**3.9**	**$9,383**
Cases with Infections	18	7.4	1	5.6	7.6	$22,176
Urinary Tract	13	5.4	0	0.0	6.2	$11,206
Surgical Site	3	11.7	NR	NR	NR	NR
Pneumonia	2	0.8	NR	NR	NR	NR
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	2,405	NA	91	3.8	3.9	$9,287
Tara Hospital/Brownsville‡	**1,546**	**NA**	**38**	**2.5**	**4.1**	**$8,779**
Cases with Infections	0	NA	NA	NA	NA	NA
Urinary Tract	0	NA	NA	NA	NA	NA
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	0	NA	NA	NA	NA	NA
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	1,546	NA	38	2.5	4.1	$8,779
Titusville Area	**2,038**	**NA**	**47**	**2.3**	**3.7**	**$7,473**
Cases with Infections	2	1.0	NR	NR	NR	NR
Urinary Tract	1	0.5	NR	NR	NR	NR
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	1	0.5	NR	NR	NR	NR
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	2,036	NA	45	2.2	3.7	$7,432
Troy Community	**591**	**NA**	**20**	**3.4**	**3.7**	**$6,462**
Cases with Infections	0	NA	NA	NA	NA	NA
Urinary Tract	0	NA	NA	NA	NA	NA
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	0	NA	NA	NA	NA	NA
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	591	NA	20	3.4	3.7	$6,462

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.
NR - Not reported. Had fewer than 5 cases evaluated.
‡ Closed in 2006

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Tyler Memorial	**2,413**	**NA**	**64**	**2.7**	**3.7**	**$10,078**
Cases with Infections	16	6.6	0	0.0	13.6	$45,544
Urinary Tract	2	0.8	NR	NR	NR	NR
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	13	5.4	0	0.0	14.3	$49,146
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	1	0.4	NR	NR	NR	NR
Cases without Infections	2,397	NA	64	2.7	3.6	$9,841
Tyrone	**1,184**	**NA**	**24**	**2.0**	**3.6**	**$6,878**
Cases with Infections	0	NA	NA	NA	NA	NA
Urinary Tract	0	NA	NA	NA	NA	NA
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	0	NA	NA	NA	NA	NA
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	1,184	NA	24	2.0	3.6	$6,878
UPMC Bedford	**2,565**	**NA**	**54**	**2.1**	**2.8**	**$6,829**
Cases with Infections	6	2.3	1	16.7	9.0	$26,441
Urinary Tract	4	1.6	NR	NR	NR	NR
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	1	0.4	NR	NR	NR	NR
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	1	0.4	NR	NR	NR	NR
Cases without Infections	2,559	NA	53	2.1	2.8	$6,783
United Community	**2,416**	**NA**	**76**	**3.1**	**3.5**	**$9,716**
Cases with Infections	5	2.1	1	20.0	10.6	$28,742
Urinary Tract	5	2.1	1	20.0	10.6	$28,742
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	0	NA	NA	NA	NA	NA
Bloodstream	0	NA	NA	NA	NA	NA
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	2,411	NA	75	3.1	3.5	$9,677
Warren General	**2,473**	**NA**	**87**	**3.5**	**4.2**	**$12,491**
Cases with Infections	13	5.3	0	0.0	9.2	$25,546
Urinary Tract	10	4.0	0	0.0	8.0	$19,706
Surgical Site	0	NA	NA	NA	NA	NA
Pneumonia	1	0.4	NR	NR	NR	NR
Bloodstream	1	0.4	NR	NR	NR	NR
Multiple	1	0.4	NR	NR	NR	NR
Cases without Infections	2,460	NA	87	3.5	4.2	$12,422

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.
NR - Not reported. Had fewer than 5 cases evaluated.

	Number of Cases	Infection Rate per 1,000 Cases*	Mortality		Average Length of Stay (in Days)	Average Charge
			Number	Percent		
Waynesboro	**3,129**	**NA**	**70**	**2.2**	**4.0**	**$11,873**
Cases with Infections	14	4.5	0	0.0	8.8	$26,000
Urinary Tract	7	2.2	0	0.0	7.3	$23,445
Surgical Site	1	2.3	NR	NR	NR	NR
Pneumonia	4	1.3	NR	NR	NR	NR
Bloodstream	2	0.6	NR	NR	NR	NR
Multiple	0	NA	NA	NA	NA	NA
Cases without Infections	3,115	NA	70	2.2	3.9	$11,810
Windber	**1,983**	**NA**	**105**	**5.3**	**3.5**	**$11,950**
Cases with Infections	14	7.1	0	0.0	7.9	$29,245
Urinary Tract	11	5.5	0	0.0	7.5	$30,336
Surgical Site	1	3.8	NR	NR	NR	NR
Pneumonia	0	NA	NA	NA	NA	NA
Bloodstream	1	0.5	NR	NR	NR	NR
Multiple	1	0.5	NR	NR	NR	NR
Cases without Infections	1,969	NA	105	5.3	3.4	$11,827

* Surgical Site Infection Rate – Based on the number of surgical cases, not the total number of cases.
NA - Not applicable.
NR - Not reported. Had fewer than 5 cases evaluated.

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PHC4 Research Briefs

MRSA in Pennsylvania Hospitals

As part of PHC4's ongoing efforts to examine issues related to infections, this Research Brief highlights the incidence of Methicillin-resistant *Staphylococcus aureus* (MRSA) in Pennsylvania hospitalizations for 2004. It contains important information for patients and health care workers and raises awareness about the patient safety and economic consequences.

Staphylococcus aureus is a type of bacteria that frequently inhabits the skin or nostrils of healthy people and can cause minor skin infections.[1] These minor infections occur when the bacteria enter through cuts or abrasions in the skin. However, *Staphylococcus aureus* can also have major health consequences, such as pneumonia, infections of the blood, and surgical site infections.

MRSA is a more serious form of bacteria that is resistant to commonly used antibiotics called beta-lactams, including methicillin and oxacillin.[2] The risk of acquiring a MRSA infection is greatest among people treated in the health care system, but it can be acquired in the community.[3] Individuals with community-acquired MRSA have no recent history of hospitalization or surgical procedure. Most community-acquired MRSA infections are skin-related infections and occur in younger, healthier age groups.[1] ***This Research Brief does not distinguish between community-acquired and hospital-acquired MRSA infections.***

Hospitalizations with MRSA

In 2004, there were 13,722 hospitalizations in Pennsylvania in which the patient had a MRSA infection – a rate of 7.4 per every 1,000 inpatient hospitalizations.

About half (50.9%) of all hospitalizations with MRSA were among patients with respiratory diseases, disorders of the circulatory system, and infectious and parasitic diseases.

Hospitalizations with MRSA by Body System, 2004

Body System	Number of Hospitalizations	Percent of Hospitalizations
Respiratory System	2,698	19.7
Infectious & Parasitic Diseases	2,138	15.6
Circulatory System	2,123	15.5
Skin, Subcutaneous Tissue & Breast	2,075	15.1
Musculoskeletal System	1,362	9.9
Digestive System	711	5.2
Kidney & Urinary System	660	4.8
Nervous System	486	3.5
Endocrine System	422	3.1
Injuries, Poisonings & Toxic Effects of Drugs	244	1.8
Other	803	5.9
Total	13,722	100

Compared to patients without MRSA, patients with MRSA were four times as likely to die, had hospital stays more than two and a half times longer, and were charged three times as much for their hospitalization.

The following tables illustrate characteristics of hospitalizations with MRSA compared to hospitalizations without a MRSA infection.

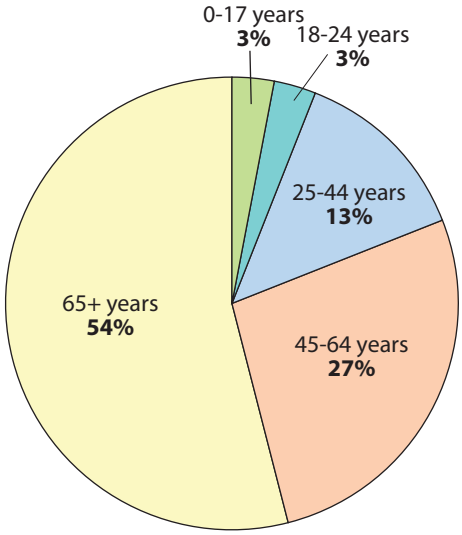
Pennsylvania Hospitalization Summary, 2004

	Number of Hospitalizations	Average Length of Stay in Days	Average Charge	Percent Died
Non-MRSA	1,853,208	4.7	$28,711	2.1
MRSA	13,722	12.6	$87,990	8.9

Differences in Age, Geography, and Hospital Size

Most hospitalizations with MRSA in Pennsylvania were for patients age 65 and older (9.7 per 1,000), followed by those in the 45-64 age category (8.7 per 1,000). Age categories 25-44 (5.2 per 1,000), 18-24 (3.8 per 1,000) and 0-17 excluding newborns (4.0 per 1,000) had lower rates.

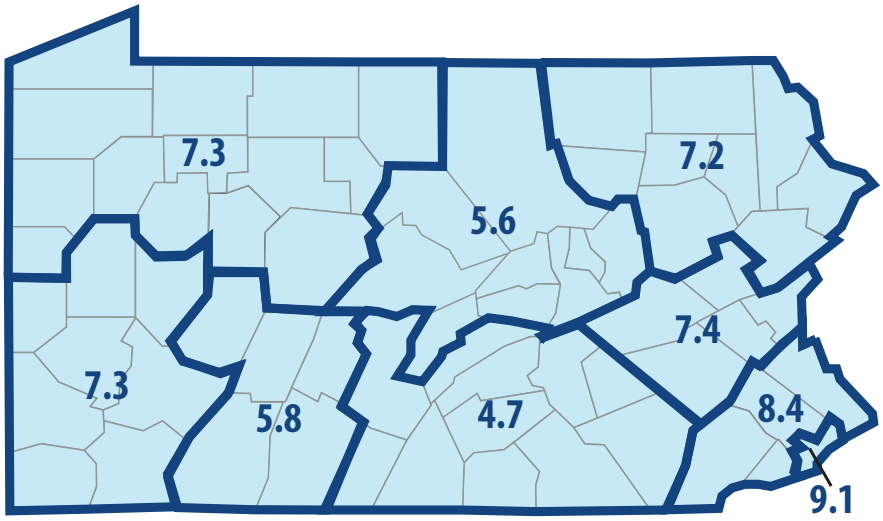
Hospitalizations with MRSA by Age Group, 2004



Pennsylvania Hospitalization Summary by Condition, 2004

	Number of Hospitalizations	Average Length of Stay in Days	Average Charge	Percent Died
Congestive Heart Failure w/ MRSA	300	11.2	$63,170	12.7
Congestive Heart Failure w/o MRSA	59,902	5.2	$24,394	3.4
Chronic Obstructive Pulmonary Disease w/ MRSA	168	9.1	$38,155	6.6
Chronic Obstructive Pulmonary Disease w/o MRSA	24,412	4.7	$18,623	1.5
Renal Failure w/ MRSA	133	11.1	$66,265	12.8
Renal Failure w/o MRSA	16,338	6.2	$30,798	7.2
Pneumonia w/ MRSA	933	10.2	$43,006	7.2
Pneumonia w/o MRSA	46,606	5.3	$20,305	3.6
Septicemia w/ MRSA	915	10.8	$56,761	22.5
Septicemia w/o MRSA	16,610	6.9	$33,122	18.4
Kidney & Urinary Tract Infections w/ MRSA	317	6.7	$24,600	1.9
Kidney & Urinary Tract Infections w/o MRSA	21,542	4.4	$18,386	1.3
Respiratory Failure with Ventilation w/ MRSA	261	15.8	$126,841	32.2
Respiratory Failure with Ventilation w/o MRSA	4,871	9.6	$74,665	26.6

MRSA Rate per 1,000 Hospitalizations by Region, 2004



Geographic differences in the rate of MRSA-related hospital discharges have been found, suggesting that some areas may be more likely to have established underlying conditions or risk factors (e.g., smoking, diabetes, and contact with the health care system) for MRSA infection.[4,5]

The Southeastern Pennsylvania region (Bucks, Chester, Delaware, Montgomery, and Philadelphia Counties) had the highest MRSA infection rate.

The Southcentral Pennsylvania region (Adams, Cumberland, Dauphin, Franklin, Fulton, Huntingdon, Juniata, Lancaster, Lebanon, Perry, and York Counties) had the lowest MRSA infection rate.

In 2004, the MRSA infection rate was similar for hospitals of all sizes.

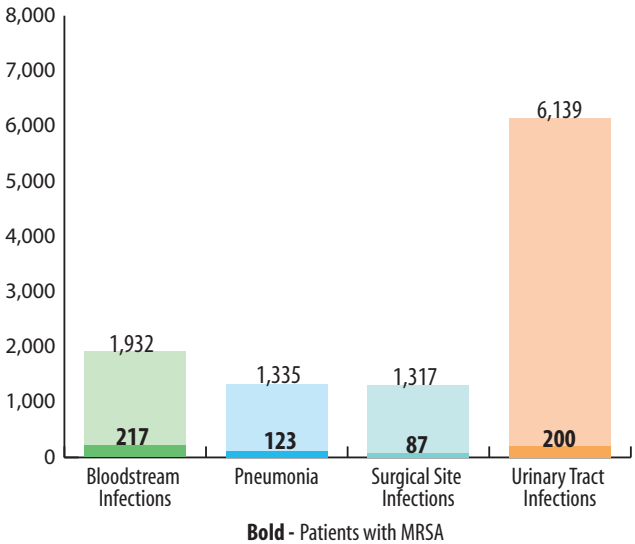
Patients with a Hospital-acquired Infection

Recent PHC4 Research Briefs have highlighted hospital-acquired infections in Pennsylvania. These briefs have focused on four types of hospital-acquired infections (central line-associated bloodstream infections, ventilator-associated pneumonia, surgical site infections, and indwelling catheter-associated urinary tract infections), some of which may be linked to MRSA.

Of the 1,932 patients in 2004 identified by hospitals as having hospital-acquired bloodstream infections, 11.2% (217) had MRSA. Of the 1,335 patients with hospital-acquired pneumonia, 9.2% (123) had MRSA. Of the 1,317 patients with hospital-acquired surgical site infections, 6.6% (87) had MRSA. Finally, of the 6,139 patients with hospital-acquired urinary tract infections, 3.3% (200) had MRSA.

More information about hospital-acquired infections is available at: www.phc4.org

Patients with Hospital-acquired Infections, 2004



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The Pennsylvania Health Care Cost Containment Council (PHC4) periodically releases *Research Briefs* on health care topics relevant to public policy interest.

PHC4 is an independent state agency created to collect, analyze, and disseminate information designed to improve the quality and restrain the cost of health care.

Pediatric Intensive Care Unit

A pediatric intensive care unit (PICU) or a pediatric intensive care service is a separate and distinct unit in a hospital where pediatric patients, suffering from critical illness, receive care. PICU does not include a neonatal intensive care unit.

Definitions

Catheter Related Blood Stream Infection - isolation of the same organism (i.e. identical species, antibiogram) from a semi quantitative or quantitative culture of a catheter and from the blood (preferably drawn from a peripheral vein) of a patient with accompanying clinical symptoms of bloodstream infection and no other apparent source of infection.

Central Line - a venous access device inserted into a central vein (e.g., femoral, axillary, internal jugular, or subclavian vein) and kept in the vein in order to maintain a route for administering fluids and medicines or for gaining access to the heart for obtaining information about pressure in the central venous circulation.

Continuous Positive Airway Pressure (CPAP) - a method of mechanically assisted pulmonary ventilation using a devise to administer air or oxygen to the lungs under a continuous pressure that never returns to zero and which does not deliver a fixed or patient triggered rate of assisted breaths.

Extracorporeal Membrane Oxygenation (ECMO) - a devise external to the body that oxygenates blood delivered to it from the body and then returns it to the patient.

General Anesthesia - means a drug-induced loss of consciousness during which patients are not arousable, even by painful stimulation. The ability to independently maintain ventilatory function is often impaired. Patients often require assistance in maintaining a patent airway, and positive pressure ventilation may be required because of depressed spontaneous ventilation or drug-induced depression of neuromuscular function. Cardiovascular function may be impaired.

High Frequency Ventilation - ventilatory support system using frequencies from 60-900 cycles/min or more. Three types of systems have been distinguished on the basis of rates, volumes, and the system used. They are high frequency positive-pressure ventilation (hfppv), high-frequency jet ventilation (hfjv), and high-frequency oscillation (hfov).

Mechanical Ventilation - mechanically assisted breathing that forces oxygenated air into the lungs and then allows time for passive exhalation of air. Mechanical ventilation does not include non-invasive mechanical ventilation (i.e., ventilation without an endotracheal tube).

Nosocomial Pneumonia - A type of pneumonia contracted during a hospitalization, which may be caused by several types of pathogens, including bacteria and viruses.

Operative Procedure - the performance of an excision or incision, or to make a suture on the body or any of its organs or parts.

Patient - means any individual who receives health care services.

Pediatric Patient - a patient less than 22 years of age.

PRISM – pediatric risk of mortality.

Regional Anesthesia - means the administration of a drug or combination of drugs to interrupt nerve impulses without loss of consciousness and includes epidural, caudal, spinal, axillary, stellate ganglion blocks, regional blocks (such as axillary, bier, retrobulbar, peribulbar, interscalene, subarachnoid, supraclavicular, and infraclavicular), and brachial anesthesia. Regional anesthesia does not include digital or pudendal blocks.

Unplanned Extubations – unplanned or accidental removal of an endotracheal tube from the tracheal airway.

Age Categories

- Less than 18 years of age.
- Greater than or equal to 18 years of age but less than 22 years of age.

Reporting Requirements

Patient Information

Total Number of Patients

- ❑ Report the total number of patients in the appropriate age category.
  - ✓ Count each patient each time they are admitted to the PICU.

Note: The total number of patients includes patients admitted post-operatively.

Total Number of Patient Days

- ❑ Report total number of patient days in the appropriate age category.
  - ✓ Count day one as the first patient day regardless of the time admitted.
  - ✓ Count the last day as a full day regardless of time discharged.
  - ✓ Count total patient days for all patients.

Total Number of Patients Admitted Post-operatively

- ❑ Report the total number of patients admitted post-operatively in the appropriate age category.
  - ✓ Count all patients admitted post-operatively to **your** PICU regardless of where the operation was performed.
  - ✓ Count only admissions following an operative procedure.

Total Number of Patients Readmitted Within 24 Hours of Discharge

- ❑ Report total number of patients readmitted within twenty-four hours of discharge.
  - ✓ **Do not** separate patients by age category.
  - ✓ Count only patients discharged from **your** PICU and readmitted to **your** PICU.

Operative Procedures

Total Number of Operative Procedures in Which General or Regional Anesthesia was Used

- ❑ Report the total number of operative procedures in which general or regional anesthesia was used.
  - ✓ Count only those operative procedures performed after the patient was admitted to the PICU.
  - ✓ Count each encounter in the operating room as one operative procedure.

Total Number of Deaths within 48 Hours of an Operative Procedure in Which General or Regional Anesthesia was Used

- ❑ Report the total number of deaths within 48 hours of an operative procedure in which general or regional anesthesia was used.
  - ✓ Count all deaths that occurred within 48 hours of the operative procedures in which general or regional anesthesia was used.
  - ✓ Count the death in the same year in which the operative procedure was performed.

Mechanical Ventilation

Total Number of Patients Receiving Mechanical Ventilation

- ❑ Report the total number of patients receiving mechanical ventilation excluding patients receiving continuous positive airway pressure (CPAP).
  - ✓ Count each patient only once regardless of how many times they go on and off mechanical ventilation during the same hospital stay.

Total Number of Mechanical Ventilation Patient Days

- ❑ Report the total number of mechanical ventilation patient days excluding days of patients receiving continuous positive airway pressure (CPAP).
  - ✓ Count each day or part of a day that the patient received mechanical ventilation.

Total Number of Patients Receiving High Frequency Ventilation

- ❑ Report the total number of patients receiving high frequency ventilation.
  - ✓ Count each patient only once regardless of how many times they go on and off high frequency ventilation during the same hospital stay.

Total Number of High Frequency Ventilation Days

- ❑ Report the total number of high frequency ventilation days.
  - ✓ Count each day or part of a day that the patient received high frequency ventilation.

Total Number of Unplanned Extubations per One Hundred Mechanical Ventilation Days

- ❑ Report the total number of unplanned extubations per 100 mechanical ventilation days.
  - ✓ Divide total number of unplanned extubations by total number of mechanical ventilation days and multiply by 100.

Total Number of Patients Who Develop Nosocomial Pneumonia per One Thousand Ventilation Days

- ❑ Report the total number of patients who develop nosocomial pneumonia per 1,000 ventilation days consistent with the Centers for Disease Control and Prevention definition of nosocomial pneumonia.
  - ✓ Divide total number of patients with nosocomial pneumonia by total number of mechanical ventilation days and multiply by one thousand.

ECMO

Total Number of Patients Receiving Extracorporeal Membrane Oxygenation (ECMO)

- ❑ Report the total number of patients receiving ECMO.
  - ✓ Count each patient only once regardless of how many times they go on and off ECMO during the same hospital stay.

Total Number of Extracorporeal Membrane Oxygenation (ECMO) patient days

- ❑ Report the total number of ECMO patient days.
  - ✓ Count each day or part of a day that the patient received ECMO.

Central Line

Total Number of Patients with a Central Line

- ❑ Report the total number of patients with a central line.
  - ✓ Count each patient only once regardless of how many times they receive a central line during the same hospital stay.

Total Number of Central Line Patient Days

- ❑ Report the total number of central line patient days.
  - ✓ Count each day or part of a day that a central line was maintained in the patient.

Total Number of Patients Who Develop a Central Line Blood Stream Infection per One Thousand Central Line Days

- ❑ Report the total number of patients who develop a central line blood stream infection per 1,000 central line days consistent with the Centers for Diseases Control and Prevention definition of catheter related blood stream infection.
  - ✓ Divide total number of patients with a central line blood stream infection by total number of central line days and multiply by 1,000.

Mortality

Observed Mortality Rate

- ❑ Report observed mortality rate per each quarter.
  - ✓ Divide total number of deaths by total number of admissions to the PICU and multiply by 100.

Predicted Mortality Rate

- ❑ Report predicted mortality rate using PRISM data for each quarter.
  - ✓ Predicted mortality or PRSIM scores shall be recorded on the first day of admission for all PICU patients.
  - ✓ Both PRISM II and PRISM III scores are acceptable methods of scoring.

Severity Adjusted Mortality Ratio

- ❑ Report severity adjusted ratio (observed deaths/predicted deaths) for each quarter.
  - ✓ Divide observed mortality rate by predicted mortality rate.

Hospital-Acquired Infection Reporting

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Public Health Law 2819

- Enacted in July 2005
- "Hospital-acquired infection" = any localized or systemic condition that
  - (a) resulted from the presence of an infectious agent(s)/toxin(s) as determined by clinical examination or by lab testing; and
  - (b) was not found to be present or incubating at admission unless related to a previous admission to the same setting
- General hospitals must have programs for identifying and tracking HAI for reporting purposes under this law and also for quality improvement

Legislative Requirements – NYSDOH Responsibilities

- Establish guidelines, definitions, criteria, standards and coding for hospital identification, tracking and reporting of HAIs;
  - Consistent with NHSN or other recognized center of expertise
- Establish data collection and analytical methodologies that meet accepted standards for validity and reliability
- Initially require reporting of central line associated blood stream infections and surgical site infections associated with critical care units
- Subsequently, may require tracking and reporting of other HAIs in consultation with technical advisors

NYSDOH Responsibilities

- Report annually to governor, legislature & the public (on the web)
  - Pilot project and data (Year 1 – hospitals de-identified)
  - Annually thereafter, hospital risk-adjusted rates
  - Quality improvement efforts
- Audit hospitals for completeness and accuracy of reporting
- Department may award grants (if funding is made available)

Timeline and Progress To Date

- 7/1/06–DOH must have a reporting system
  - NYS designated the National Healthcare Safety Network for reporting
- 1/1/07-Hospitals must begin collecting data for reporting
  - Nine training sessions were held throughout the state between August and November 2006
  - Attended by all but three hospitals required to report
  - GNYHA videotaped presentations which are available statewide
- 1/1/07-12/31/07- Pilot Year
- May 2008 – legislative requirements
  - DOH will publish report but will not identify hospitals
  - Only DOH will know the identity of hospitals

Reporting System

- **CDC's National Healthcare Safety Network (NHSN) – Why?**
  - Standard definitions, surveillance, risk adjustment
  - National benchmarks/comparison data
  - Healthcare networks cross state lines and can use the system to share data, collaborate in prevention initiatives and evaluate effectiveness
  - Data is immediately available for hospital use
  - System can be used for all infection surveillance activities, not limited to NYS selected indicators

Pilot Year Indicators

- Selected in conjunction with technical advisors
  - Central-line associated blood stream infections in ICUs
  - Surgical Site Infections – Which Procedures ?
    - Frequency
    - Severity
    - Preventability
    - Likelihood that they can be detected and reported accurately
      - Cardiac
      - Colon

Goal: Eliminate Duplication in Reporting

- NYPORTS Surgical Site Infection Reporting Letter – January 2007
  - 808 no longer reportable
  - Deaths related to a surgical site infection are still reportable (900 codes)
- Cardiac Database
  - Cardiac Advisory Committee
    - Recommended evaluation during pilot year
    - HAI Program with conduct and report on findings

Evaluation of Resources

- Infection Control Resources Survey 2007
  - https://commerce.health.state.ny.us/doh3/applinks/hospcap/BuildMenu
  - Intensity of surveillance
  - Other duties and responsibilities for infection control professionals
  - Consider for possible public reporting
- Repeat in future
  - Monitor trends and potential impact on infection control

Audit and Validation
Medical Record Review start June 2007

- Selection of records
  - Cases to ensure accurate documentation
  - Controls to determine if infections are missed or underreported
  - Controls to identify risk factors
  - Controls to evaluate potential prevention measures
- Apply the definitions
  - Evaluate for possible misclassification
  - Determine if there are problems in applying the definitions
  - Determine if there are systematic issues with the definitions
  - Purpose: to provide clarification and/or consider revisions

Integrated Case/Control Study

- Purpose
  - Improve risk adjustment, if necessary
  - Determine factors associated with infection
  - Assess for possible prevention strategies "Why are matched control patients not developing infections?"

NYSDOH Goals and Objectives

- Develop and implement meaningful and useful HAI reporting system for the Public, Hospital, and Department
- The ultimate goal is the prevention of the HAI indicators selected.
- The system will be used to evaluate potential interventions, risk factors, and risk adjustment strategies for those factors that are not amenable to change.
- The NYSDOH may, in the future, consider supporting regional research efforts in the area of infection prevention and control.
- The HAI reporting system will be used to evaluate impact of quality initiatives.

Toward a Consensus on the Issue of Healthcare-Acquired Infections in Oregon
February, 2007

Introduction: In January and February, 2007, the Oregon Patient Safety Commission convened a group of experts and healthcare leaders to discuss the issue of healthcare-acquired infections (HAI) in Oregon. The goal was to articulate a vision for Oregon with regard to HAIs and to offer a unified bundle of potential remedies/strategies.

Members of the **Advisory Group** included:

Mary Adams -- Oregon Coalition of Health Care Purchasers
Margaret Carley -- OHCA
Paul Cieslak, MD -- Public Health
Lynn Marie Crider -- SEIU 49
Gwen Dayton -- OAHHS
Anne Eades – Immediate past president APIC, OR Region
Tina Edlund -- OHPR
Woody English, MD -- Providence
Paul Frisch -- OMA
Vickie Gates -- Health Policy Commission
Ruth Gulyas -- Oregon Alliance of Senior and Health Services
Melvin A. Kohn, MD -- Public Health
Geoffrey McCarthy, MD -- VA Northwest Network
Ruth Medak, MD – Acumentra
Pat Preston -- Long term care infection control consultant
Ralph Prows -- Regence
Dana Selover -- Public Health
Brett Sheppard, MD -- OHSU
Jean Thorne -- PEBB
Joel Young, Public Health

Process: The Advisory Group met twice (January 22, 2007; February 7, 2007); each session lasted 4 hours. The Patient Safety Commission contracted with the Center for Evidence-based Policy to provide a thorough grounding in the best available research. Pam Curtis acted as facilitator.

In May/June, 2007 the Patient Safety Commission and its partners plan to host a 'policy summit' to share, discuss and refine the consensus findings with the State and with the Legislature.

Note: Advisory group members were asked to participate as experts and leaders, not primarily as representatives of their organizations. Therefore, agreement with the consensus does not necessarily mean that the parent organizations have also agreed. Between now and the Policy Summit we will seek to broaden the consensus.

Grounding the Discussion in Science:

The Patient Safety Commission contracted with the Center for Evidence-based Policy to provide a thorough grounding in the best available research on HAI epidemiology, implementation/effectiveness of clinical and organizational interventions, and effectiveness of public reporting. Among the findings:

- If Oregon's HAI infection rate is 5 per 100 admissions, as some national research suggests, then, with 375,000 admissions per year in Oregon, we would expect to see

18,750 HAI in this state. Some in the group felt the actual rate has declined and is now closer to 2.5 per 100 (9,375 HAI per year); Also, some thought that patient days in hospital should be used as denominator instead of admissions. All agreed that HAI represent a significant problem.

- The most frequently found infections are: urinary tract, surgical site, respiratory (especially pneumonia), and bloodstream infections.
- 45% or more of HAI occur in the ICU.
- Research conducted by the Office of Oregon Health Policy and Research suggest significant expense associated with HAI in Oregon.

The Advisory group paid special attention to two documents:

- Guidance on Public Reporting of Healthcare-Associated Infections: Recommendations of the Healthcare Infection Control Practices Advisory Committee), McKibben, et al, June, 2005. [HICPAC]
- Essentials of Public Reporting of Healthcare Associated Infections: a Tool Kit, Prepared by the Healthcare-Associated Infection Working Group of the Joint Public Policy Committee, January, 2007. [Tool Kit]

In addition, the Advisory Group is monitoring the latest developments of the National Quality Forum's Healthcare-Associated Infections Project. NQF hopes to offer its own consensus reporting guidelines by May, 2007.

Consensus Vision of the Advisory Group: "*Oregon should be free from infections acquired as a result of healthcare delivery. Actions to prevent infections should be: trustworthy; effective; transparent; and reliable*."

In coming to this consensus, every member of the advisory group quickly agreed that Oregon could lower HAI rates. With regard to achieving zero HAIs, all participants agreed it would be difficult, some thought it might actually be impossible. But in the end all agreed that it was useful to draft an aspirational goal. We set zero infections as our destination; however, *arrival* is not assured.

The words trustworthy, effective, transparent, and reliable are meant to carry weight. *Trustworthy* refers to both patient care and quality of data; *effective* is meant to emphasize the need for evidence-based, realistic measures; *transparent* must include openness about methods and availability of useful information to consumers. *Reliable* includes a need to sustain the system over time.

Consensus Statements:

The Advisory Group considered a bundle of strategies to lower the number of HAIs in Oregon, including reporting/data; quality improvement and leadership; financial incentives.

Consensus on Reporting

The Advisory Group believes that Oregon should have a public reporting program for healthcare acquired infections, but only if it passes certain tests. A public reporting program must:

1. Have clear goals. The advisory group believes that reporting should:
   - provide public accountability
   - drive organizational change
   - leverage and drive performance and quality improvement

2. Create a strong public-private advisory group to support the reporting program. This advisory group should include all stakeholders including consumers. It would advise on what to report, implementation, decision on measures to use, staging, etc.

3. Include hospitals, ambulatory surgery centers, and nursing homes. The Advisory Group believes it important to acknowledge the differences in these settings. Any reporting/data system should work across different facility types/systems.

4. Have a considered roll-out strategy. Begin with hospitals and freestanding ambulatory surgery centers and only then move to nursing homes/long-term care facilities.

5. Offer an explicit phase-in strategy. The Advisory Group believes that the quality of the reporting program will improve if institutions are allowed time to implement it. Therefore, within each type of organization, the reporting program should be phased-in over a three year period.

6. Provide useful information to consumers. We need to better understand what consumers want to know and to thoughtfully use research on effective consumer communication/engagement. The program should also include tools such as a searchable website.

7. Use risk-adjusted data. The risk adjustment strategy should be transparent.

8. Have a stable funding package that includes state monies.

9. Report data back to participating organizations in a timely fashion. This would assist facility-based quality improvement efforts.

10. Include an audit process to assure consistency of reporting.

11. Provide a system of recognition for participating institutions (e.g., something posted in hospitals).

Reporting Issues still lacking a final consensus

Since the Advisory Group met only twice, it was not possible to reach consensus on all components of a reporting program. Following are some of the issues discussed, but not finalized.

1. Organizational Home – the Advisory Group discussed a number of public, private and mixed options but did not attempt to offer a recommendation on the best candidate to run the reporting program. However it did agree with National Guidelines recommending that any organization taking responsibility for a reporting program must have, or quickly create a skill set in these areas:

- Infection prevention
- Risk adjustment methods
- Healthcare epidemiology
- Statistics

2. Which measures to include: The group agreed that both process and outcome measures should be included. It also strongly believes that the infections to be reported should be prioritized by level of burden (health impact and financial) and by type of facility. Further, any statewide reporting program should be flexible enough to revise measures as conditions and epidemiology change. As to a specific set of measures, the advisory group leans in the direction of those described by the Healthcare-Associated Infection Working Group of the Joint Public Policy Committee (January, 2007). However, the group suggests that any decision on measurement be left to the Reporting Program's Advisory Panel.

3. A protected environment: The advisory group discussed, but did not reach a final conclusion about the utility of creating protected environment where confidential sharing of data and best practices can occur collaboratively across multiple institutions.

Reporting Issues not discussed

Mandatory versus voluntary reporting: the Advisory group did not address this issue.

Consensus on Leadership and Quality Improvement:

The Advisory Group also considered a number of quality improvement and leadership strategies that might align or reinforce activities already underway. All need further development -- the consensus is that these ideas merit further consideration:

- Encourage quality improvement initiatives focused on boards/leadership.
- Consider organizing a state-wide ICU HAI collaborative, modeled after Michigan experience.

- Find better ways to champion and engage consumer activists. Harness the power of personal stories.
- Encourage institutions to participate in on-going quality improvement initiatives such as IHI's 5M lives campaign.
- Convene insurers to consider measures for financial incentives for excellence.
- Consider a state-wide sustained campaign to engage leadership.

Consensus on Financial Incentives:

Finally, the Advisory Group considered financial options for reducing HAIs in Oregon. While this appears to be a fruitful area, much work needs to be done. Most of the consensus ideas clustered around creating reward (not punishment) systems and about harnessing purchaser power via Medicaid and Insurers.

- Emphasize rewards. Use process measures and standard measures of HAI to support financial rewards and underscore responsibility. Allow time for facilities to implementing process and improvement before rewards/consequences.
- Encourage Medicaid and insurers to agree on consistent set of measures to be used as basis of financial rewards and consequences (payment methods would remain individual).
- Begin where there are clear agreements and expand/grow sophistication. Don't start with an issue so complex that people can't agree upon.

The Office for Oregon
Health Policy & Research

Infections Due to Medical Care in Oregon Hospitals, 2003-2005

November 2006

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This report is also available at: http://www.oregon.gov/DAS/OHPR/RSCH

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Infections Due to Medical Care in Oregon Hospitals, 2003-2005

Key Findings

- The average estimated cost per stay at Oregon hospitals is approximately $32,000 higher for a patient with a healthcare associated infection compared to a patient without a healthcare associated infection.
- The estimated excess Medicaid costs in Oregon for healthcare associated infections exceeded $2.4 million in 2005.
- The estimated excess costs in Oregon for all payers for healthcare associated infections exceeded $15 million in 2005.
- The excess costs are not explained by differences in age, gender, comorbidities, or severity of illness.

Background

The U.S. Centers for Disease Control and Prevention (CDC) estimates that healthcare associated infections contracted in U.S. hospitals account for approximately two million infections, 90,000 deaths and an estimated $4.5 billion in excess costs annually.[1] It has also been estimated that 5-15% of all hospitalized patients experience an HAI and that these cases are widely under-reported.[2-4]

Healthcare Associated Infections (HAI) are defined as infections contracted in healthcare settings while receiving treatment for other conditions. HAI, which include infections at surgical or trauma sites, infections caused by the use of IVs and catheters and ventilator-associated pneumonias, extend hospital stays and complicate medical care, causing worse clinical outcomes and higher rates of mortality.[5-8]

While there is little doubt that HAIs have serious clinical, financial, and policy implications for patients, hospitals and the state of Oregon, beginning to quantify the extent of those impacts is difficult. There is no consensus about how to define and measure HAI, and existing methods may not accurately and consistently detect HAI cases.[9] This is partially because some HAIs, such as surgical site infections, often show up only after discharge[10] while others, such as ventilator-associated pneumonias, can be difficult to detect. Nevertheless, a wide and growing body of literature utilizing various methods has reported dramatic differences in clinical outcomes and costs in hospitalized patients with HAI compared to hospitalized patients without HAI.

This Brief is an initial attempt to describe the extent and state-level financial impact of healthcare associated infections in hospitals in Oregon from 2003 to 2005. Because there is no "gold standard" data source in Oregon, the Office for Oregon Health Policy and Research (OHPR) applied a case-finding approach developed by the U.S. Agency for Healthcare Research and Quality (AHRQ), which utilizes readily available hospital discharge data to develop an estimate of HAI cases and their costs.

AHRQ Patient Safety Indicators

The AHRQ has constructed a series of evidence-based formulas, or algorithms, known as Patient Safety Indicators (PSIs), to work with hospital discharge records.[11] Two of the AHRQ PSIs, *Selected Infections Due to Medical Care (PSI 07)* and *Post-Operative Sepsis (PSI 13)*, are intended to detect HAI cases. The PSIs were developed and refined by a panel of clinicians and peer reviewers facilitated by the Evidence-based Practice Center at UCSF-Stanford. The AHRQ

Patient Safety Indicators tend to conservatively identify HAI cases, probably underestimating the true number of events.

Estimated Cost of HAIs

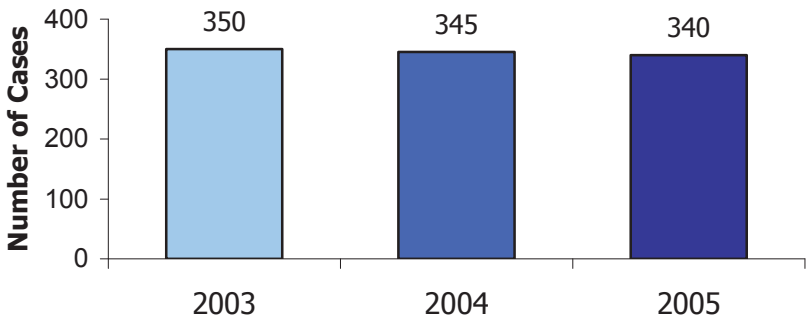
In order to estimate the "excess" costs associated with the HAIs included in this analysis, OHPR used data available in the annual hospital discharge data collected by the Oregon Association of Hospitals and Health Systems (OAHHS). The hospital discharge data consists of patient-level billing extracts which include "total charges," or the dollar amount charged for the hospitalization, not the amount paid or the actual cost of care. To obtain a better estimate of true costs, total charges for each case were multiplied by hospital cost-to-charge ratios produced by the U.S. Centers for Medicare and Medicaid Services (CMS). This is a rough estimate since the available cost-to-charge ratios are averages for groups of Oregon hospitals and may not accurately reflect the true costs incurred at a specific hospital. The estimated costs were aggregated to the state level by year and then stratified by primary payer; outliers, or cases with excessively high or excessively low costs, were excluded. The average cost was then calculated at the state level and by primary payer. Finally, the estimated costs of HAIs are calculated as "excess" costs, or those risk-adjusted costs that are above what would be expected for the same condition or procedure had there been no infection.

Selected Infections Due to Medical Care

The AHRQ Indicator for *Selected Infections Due to Medical Care (PSI 07)* flags two secondary diagnosis codes, primarily related to the use of intravenous devices (IVs). Cases are excluded if the patient has compromised immunity (e.g., cancer, HIV); if one of the two diagnosis codes is the primary diagnosis; or if the length of stay is less than two days.

Overall, the annual number of cases identified by the AHRQ indicator remained relatively unchanged from 2003 to 2005 (Figure 1).

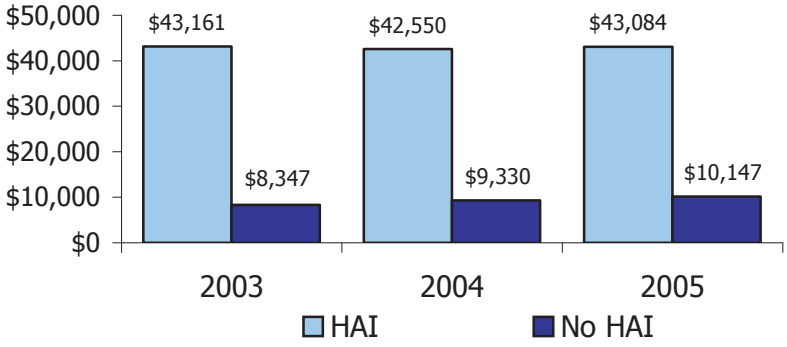
Figure 1: Infection due to medical care (Oregon)



As expected, there was a dramatic difference in average estimated costs for patients with HAI compared to patients with no HAI (Figure 2). The potential ***excess*** costs average over $32,000 per patient.

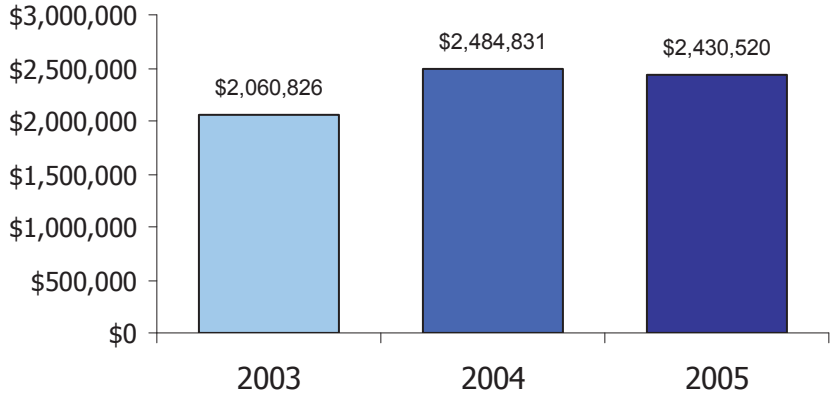
Statewide, the potential excess cost across all payers for selected infections due to medical care is greater than $11 million per year.

Figure 2: Average Cost per Stay (Oregon)



The estimated excess Medicaid costs for selected infections due to medical care were about $2.4 million in 2005 (Figure 3).

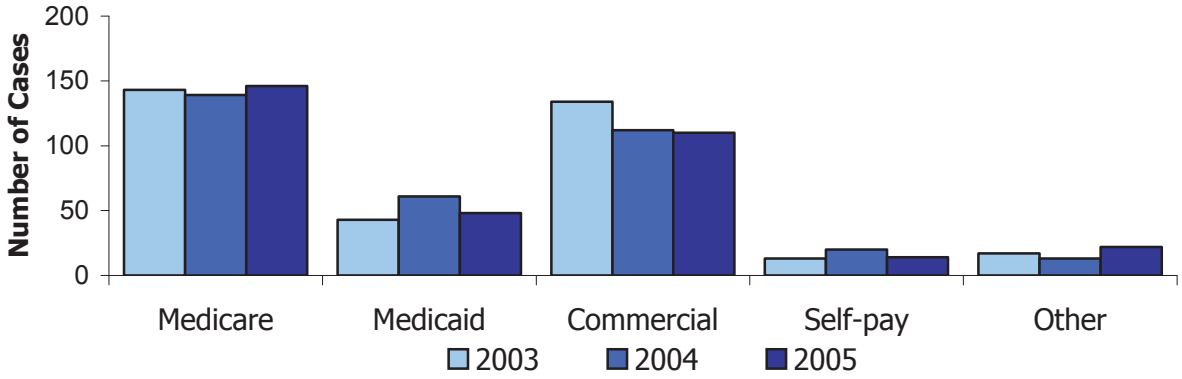
Figure 3: Potential Excess Medicaid Costs (Oregon)



Most HAI cases were paid by Medicare or commercial insurance (Figure 4).

Post-Operative

Figure 4: Infections Due to Medical Care by Payer (Oregon)



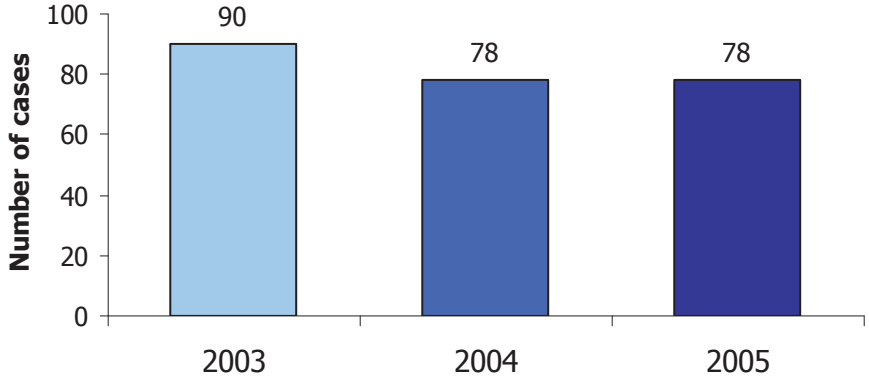
Sepsis

The AHRQ indicator for *Post-Operative Sepsis (PSI 13)* flags 20 secondary diagnosis codes in patients with an elective surgical procedure (verified by a surgical DRG and a surgical procedure code).

Cases are excluded as described above for the *Infections Due to Medical Care* indicator with the following differences: the length of stay exclusion is less than four days rather than two, and pregnancy and childbirth cases are excluded.

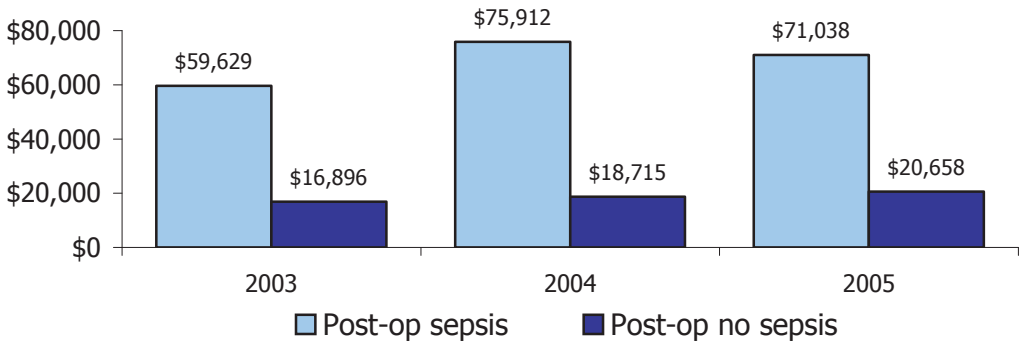
Overall, a relatively small number of cases are detected in the hospital discharge data (Figure 5).

Figure 5: Post-Operative Sepsis (Oregon)



As with infections due to medical care, there were dramatic differences in the average estimated cost for post-operative hospital patients with sepsis compared to post-operative hospital patients without sepsis (Figure 6). ***Statewide, the potential excess costs for post-operative sepsis were over $12 million from 2003 to 2005, and approximately $1.1 million of the total were costs to Medicaid.***

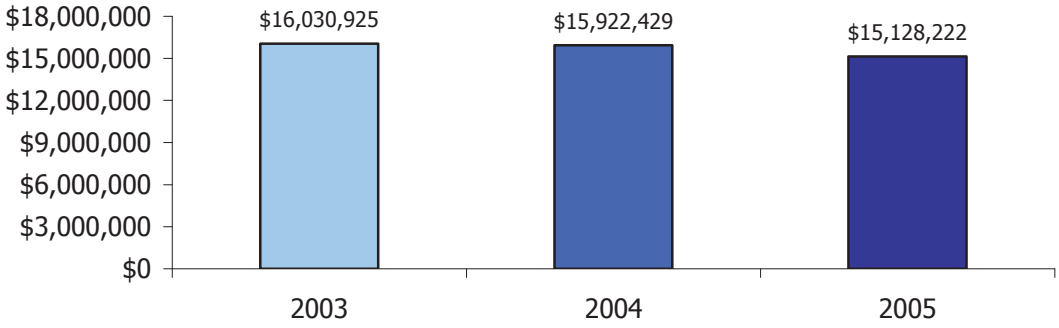
Figure 6: Average Estimated Cost per Stay (Oregon)



Total Estimated Excess Costs

Statewide, the estimated total excess costs for *Infections Due to Medical Care and Post-Operative Sepsis* combined resulted in $8.1 million in costs to Medicaid during calendar years 2003, 2004, and 2005. The estimated total statewide costs for all payers exceeded $47 million during calendar years 2003, 2004, and 2005 (Figure 7).

Figure 7: Total Excess Costs for All Payers (Oregon)



Other Potential Explanations

Any of the estimates of excess cost are influenced by many factors that might also affect the overall costs of care, and these must be accounted for in any model which attempts to assign these costs to the presence of an HAI. For instance, the AHRQ *Post-Operative Sepsis* indicator is impacted to some degree by age, gender, and the severity of illness. The age and gender differences are quite modest and cannot explain the significant cost differences between patients with HAI and without HAI.

One could easily argue, however, that much of the differences in cost could be explained by the severity of a patient's illness aside from HAI. One way to examine the impact of severity of illness is to examine the relationship between severity and cost using a risk-adjustment methodology such as 3Ms APR-DRG program. The APR-DRG program assigns each patient a Severity of Illness (SOI) score based on his or her diagnoses, procedure undergone, age, gender, and patient status at discharge.[12] Patients with higher SOI scores are more severely ill. In patients who are otherwise identical, patients with HAI can generally be expected to have

Table 1: Severity of Illness

Year	Severity of Illness (SOI)	All Patients	Medical-Surgical Patients with No HAI	Medical-Surgical Patients with HAI
2003	Minor	32.0%	32.0%	3.4%
	Moderate	45.9%	45.9%	27.7%
	Major	18.5%	18.5%	28.3%
	Extreme	3.7%	3.6%	40.6%
2004	Minor	36.7%	36.8%	4.1%
	Moderate	42.3%	42.3%	20.0%
	Major	17.7%	17.6%	44.9%
	Extreme	3.3%	3.2%	31.0%
2005	Minor	35.4%	35.5%	4.4%
	Moderate	42.3%	42.4%	20.0%
	Major	18.5%	18.4%	35.0%
	Extreme	3.7%	3.7%	40.6%

higher SOI scores than patients without HAI. This proved to be true for Oregon's medical and surgical inpatients with HAI from 2003 through 2005 (Table 1).

Even after stratifying by minor, moderate, major, and extreme severities of illness, dramatic differences in the average estimated cost remain (Table 2).

Table 2: Estimated Average Cost by Severity of Illness

Year	Severity of Illness (SOI)	Medical-Surgical Patients with No HAI	Medical-Surgical Patients with HAI
2003	Minor	$6,094	$11,364
	Moderate	$7,409	$15,285
	Major	$11,155	$31,551
	Extreme	$26,496	$72,486
2004	Minor	$6,568	$8,715
	Moderate	$8,556	$16,541
	Major	$13,030	$37,809
	Extreme	$31,176	$71,049
2005	Minor	$7,108	$13,562
	Moderate	$9,156	$18,925
	Major	$13,951	$31,476
	Extreme	$31,952	$69,002

Costs can be further stratified by principal diagnosis so that average costs for patients with the same diagnoses and severity of illness with and without HAI can be compared (Table 3). Again, the cost differences remain.

Thus, severity of illness does not explain the estimated cost differences in patients with HAI compared to patients without HAI. These results are consistent with national studies that found excess costs for patients with HAI after controlling for severity of illness.[13-18]

Table 3: Estimated Average Costs by Selected Diagnoses

Principal diagnosis	Severity of Illness (SOI)	Medical-Surgical Patients with No HAI	Medical-Surgical Patients with HAI
Acute respiratory failure	Extreme	$28,442	$88,552
Subarachnoid hemorrhage	Major	$40,251	$68,791
Acute renal failure	Major	$8,267	$30,902

Another possible explanation for the estimated differences in costs is the number of other illnesses, or comorbidities, per patient. The median number of severe comorbidities is not dramatically different in patients with HAI compared to those without HAI (Table 4), even when

stratified by severity of illness and selected principal diagnoses (Table 5). Severe comorbidities do not explain the large cost differences in patients with HAI compared to those without HAI.

Table 4: Median number of severe comorbidities

Severity of Illness (SOI)	Medical-Surgical Patients with No HAI	Medical-Surgical Patients with HAI
Minor	1	1
Moderate	2	1
Major	2	2
Extreme	2	1

Finally, the results reported here are also extremely unlikely to be due to random chance or misclassification. As previously noted, HAI are probably widely under-reported, which serves only to underestimate the true number of patients with HAI. If 5 -15% of all hospitalized patients develop HAI, then at least 17,000 Oregonians suffered from HAI each year from 2003-2005. Under-reporting HAI also causes substantial under-estimation of total excess healthcare costs resulting from HAI.

Table 5: Median number of severe comorbidities

Principal diagnosis	Severity of Illness (SOI)	Medical-Surgical Patients with No HAI	Medical-Surgical Patients with HAI
Acute respiratory failure	Extreme	3	2
Subarachnoid hemorrhage	Major	1	2
Acute renal failure	Major	3	2

Policy Implications

Healthcare acquired infections have serious clinical, financial and policy implications for Oregon. ***Using AHRQ's conservative estimates of infections due to medical care and post-operative sepsis, the total estimated expenses to the state for Medicaid costs during calendar years 2003, 2004, and 2005 is at least $8.1 million, or approximately $2.7 million per calendar year on average.*** The excess costs are not explained by differences in age, gender, severity of illness, or severe comorbidities. Due to the conservative estimates and the high likelihood of under-reporting, the true costs are probably much higher.

Statewide, the overall excess costs of HAI during 2003, 2004, and 2005 averaged approximately $15.5 million per calendar year. At minimum, these estimates of excess costs represent an opportunity to redirect scarce resources currently spent treating HAI. Reducing HAI and therefore the costs associated with HAI could contribute to a reduction in the rate of increase in insurance premiums.

As part of the effort to improve the transparency of health care quality and cost, the state should work with hospitals to improve reporting and to develop practical interventions to eradicate HAI. The potential savings from eliminating most or all HAI could reduce Medicaid costs to the state as well as mitigate the financial and health impacts of HAI on Oregonians.

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Appendix A: Comorbidities Flagged by AHRQ PSI Indicators

AIDS
Alcohol abuse
Congestive heart failure
Chronic blood loss anemia
Chronic pulmonary disease
Coagulopathy
Deficiency anemia
Depression
Diabetes
Diabetes with chronic complications
Drug abuse
Fluid and electrolyte disorders
Hypothyroidism
Hypertension
Liver disease
Lymphoma
Metastatic cancer
Obesity
Other neurological disorders
Paralysis
Peptic ulcer disease with bleeding
Peripheral vascular disease
Pulmonary circulation disease
Psychoses
Renal failure
Rheumatoid arthritis
Solid tumor without metastasis
Valvular disease
Weight loss