



Measuring Healthcare-Associated Infections (HAI)

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Objectives

- HAI detection
 - Methods
 - Case definitions
 - Traditional case finding
 - Electronic case finding
- HAI metrics
- Challenges / Opportunities



Methods

- Systematic, ongoing surveillance of endemic HAI in hospitals
 - First CDC system started in 1965 in 6 community hospitals
 - Current CDC system, National Healthcare Safety Network (NHSN), includes >2200 hospitals
- Metrics designed to help drive local decision-making regarding prevention and intervention strategies (i.e., for internal quality improvement)



Methods

- Active, prospective surveillance by trained personnel (Infection Preventionists [IPs])*
- CDC systems have been voluntary and confidential
 - No disincentive for under-reporting

*http://www.cdc.gov/nhsn/PDFs/pscManual/1PSC_OverviewCurrent.pdf



Definitions

- Standardized HAI definitions*
- For surveillance not for clinical decision-making
- Credible with clinical care staff, but able to be consistently applied across different patient populations and types of acute-care hospitals
 - Combine clinical signs/symptoms with diagnostic and laboratory test results

*Horan TC, Andrus ML, Dudeck MA. CDC/NHSN surveillance definition of healthcare-associated infection and criteria for specific types of infections in the acute care setting. *Am J Infect Control* 2008;36:309-32.



Traditional Case Finding

- Reasonable accuracy of HAI detection by IPs¹
- IPs generally detect HAI better compared to others (QI personnel) and to coded data²
- IP detection of certain infections not ideal and can be enhanced³

¹Larson EL et al. AJIC 1991;19:259-267; Emori TG et al. ICHE 1998;19:308-16.

²Simonds D et al. AJIC 1997;25(3):202-208; Wright SB et al. ICHE 2003;24:946-9; Moro et al. J Hosp Inf 2004;56:239-41; Sherman ER et al. ICHE 2006;27:332-7; Julian KG et al. ICHE 2006;27:926-30; Stone PS et al. AJIC 2007;35:145-9; Stevenson KB et al. AJIC 2008;36:155-64.

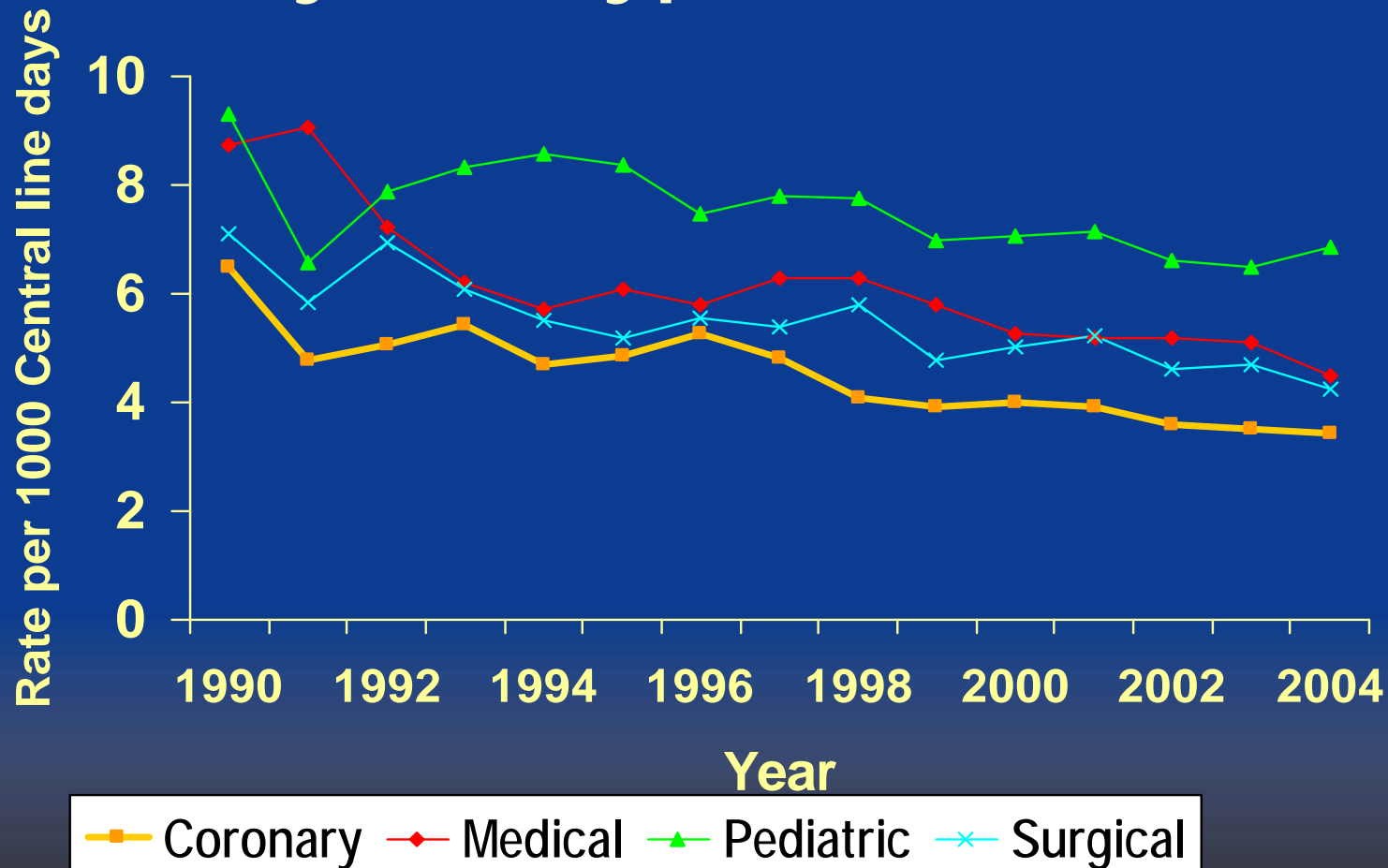
³Sands KE et al. ICHE 2003;24:741-3; Platt R et al. EID 2001;7:212-6; Yokoe DS et al. ICHE 1998;19:317-22.



Traditional Case Finding Challenges

- Time-consuming
- Expensive
- Subjective case definitions can lead to variability across data collectors
- Post-discharge loss to follow up

Central Line-associated BSI Rates, By ICU Type, 1990-2004



Source: NNIS System, incomplete for 2004

What and When States Using NHSN are Reporting (n=19)



CLABSI	CO, CT, DE, IL, MA, MD, NH, NJ, NY, OK, OR, PA, SC, TN, VA, VT, WA
CAUTI	PA
SSI	CO, MA, NH, NJ, NY, OR, PA, SC, TN, VT
VAP	NH, OK, PA, WA
Dialysis events	CO, PA
Process measures	CA, DE, MD, NH, NJ, PA, VT



Electronic Case Finding

- Computer algorithms for screening
 - Limits number of patient charts to review
- Computer algorithms for detection
 - Fully-defined case
 - Partially-defined case presented to IP for additional information and/or final determination
- Both types of algorithms save time and may be less subjective
 - May not accurately discern “true infections”

Yokoe DS et al. EID 2004;10:1924-30; Miner AL et al. EID 2004;10:1931-7;
Woeltje KF et al. ICHE 2008;29:842-6; Yokoe DS et al. Abstract 494 SHEA 2009;
Yokoe DS et al. ICHE 1998;19:657-60; Trick WE et al. EID 2004;10:1612-20;
Klompas M et al. ICHE 2008;29:31-7; Oda G et al. Abstract 499 SHEA 2009



HHS Action Plan to Prevent Healthcare-Associated Infections



- HAI surveillance automation
 - FY09 funds for NHSN
 - Request for ARRA (“stimulus”) funds for joint AHRQ, CDC, and CMS projects

***<http://www.hhs.gov/ophs/initiatives/hai/exsummary.html>**



HHS Action Plan to Prevent Healthcare-Associated Infections



- Set 5-year national prevention targets
- Create systems for gathering data and assessing progress (metrics)
- Learn what strategies and practices work best to improve processes and outcomes
- Create system-improvement programs
- Create and extend distribution channels
- Create payment incentives and other accountability systems
- Engage consumers and employers



HHS Action Plan to Prevent Healthcare-Associated Infections



- Proposed metrics include:
 - NHSN incidence metrics (CLABSI, CAUTI, SSI, HO-MRSA BSI)
 - Process of care metrics
 - 100% compliance with CLABSI and VAP prevention bundles
 - 95% compliance with CMS SCIP measures (to prevent SSI)
 - 100% compliance with contact precautions, hand hygiene for CDI



Current NHSN Incidence Metrics

- Device-associated HAI rates per 1000 device days stratified by type of patient care location
- Surgical site infection rates stratified by operative procedure and risk index category
- Multidrug-resistant organism HAI rates per 1000 patient days (e.g., MRSA and CDI)

Pooled Means and Key Percentiles of the Distribution of Central Line-associated Bloodstream Infection (BSI) Rates, By Type of ICU, NHSN DA Module, 2006-2007

Central line-associated BSI rate**				Percentile				
Type of ICU	No. of Units	Central Line-Days	Pooled Mean	10%	25%	50% (median)	75%	90%
Burn	22	42,452	5.6	0.0	1.5	3.8	8.2	13.5
Coronary	121	181,079	2.1	0.0	0.0	1.3	2.8	5.3
Cardiothoracic	97	275,194	1.4	0.0	0.0	1.2	1.9	3.4
Medical	144	454,839	2.4	0.0	0.6	1.9	3.6	5.3
Medical-Surgical								
Major teaching	104	342,214	2.0	0.0	0.5	1.5	3.0	4.2
All others	343	662,489	1.5	0.0	0.0	0.6	2.0	3.6
Pediatric Med-Surg	71	140,848	2.9	0.0	0.0	2.1	3.8	6.0
Neurosurgical	39	68,550	2.5	0.0	0.0	1.9	3.8	6.2
Surgical	128	383,126	2.3	0.0	0.5	1.7	3.1	5.1
Trauma	32	107,620	4.0	0.3	1.5	4.0	5.7	7.7

** $\frac{\text{Number of central line-associated BSI}}{\text{Number of central line-days}} \times 1000$

SSI Rates* by Operation and Risk Index Category, NHSN PA Module, 2006-2007

		Risk Index			
	Duration Cut Point	0	1	2	3
Colon surgery	188 min	4.18	6.07	8.01	10.86
Knee arthroplasty	122 min	0.68	1.12	1.82	**
Hip arthroplasty	123 min	0.75	1.68	2.97	**
CABG – Chest & donor site	300 min	0.30	2.96	4.88	**
Abdominal hysterectomy	138 min	1.12	2.41	4.37	**

* # surgical site infections per 100 operations

NNIS Report. AJIC 2008 36:609-26



HHS Action Plan to Prevent Healthcare-Associated Infections



- Additional proposed metrics include:
 - Derived from administrative discharge data (e.g., CDI, dialysis-associated BSI, CAUTI, MRSA)
 - Derived from population-based surveillance (e.g., invasive MRSA incidence)



Challenges with Current HAI Metrics



- Labor intensive to collect HAI and denominator data
- Not easily understood by public
 - Propose use of standardized infection ratio (SIR) instead (i.e., Observed / Expected)
- Usefulness for assessing performance quality remains to be explored



Opportunities

- HHS Action Plan, state mandatory HAI reporting, and CMS' value-based purchasing initiative are galvanizing us to:
 - Rethink and retool existing systems of HAI measurement
 - Definitions, methods, metrics
 - Integrated and interoperable
 - Create and foster strong interagency and community partnerships
 - Prioritize research needs to address existing knowledge gaps