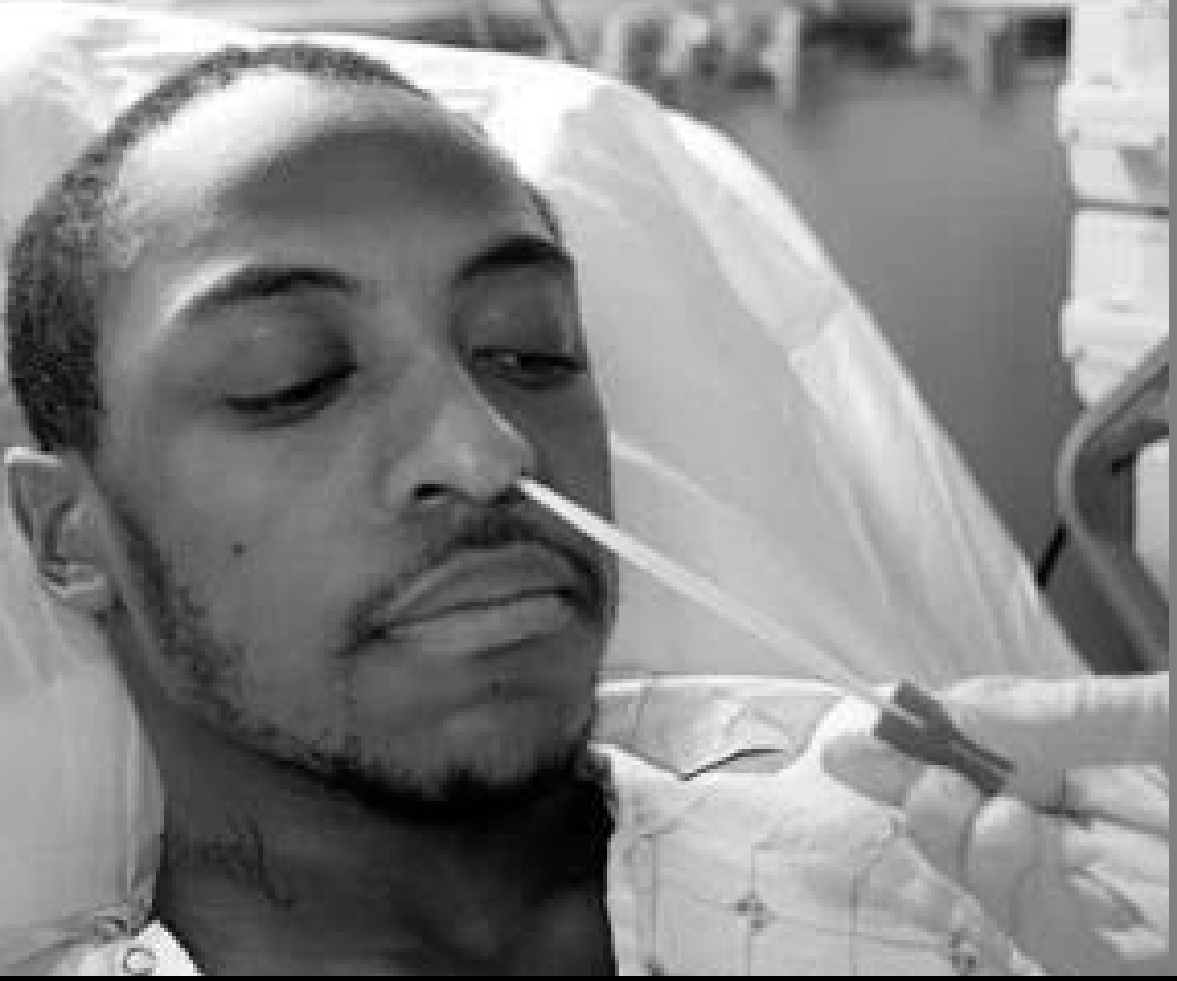


Should We Screen for AROs?

No!

Michael Edmond, MD, MPH, MPA

Richard P. Wenzel Professor of Internal Medicine | Hospital Epidemiologist

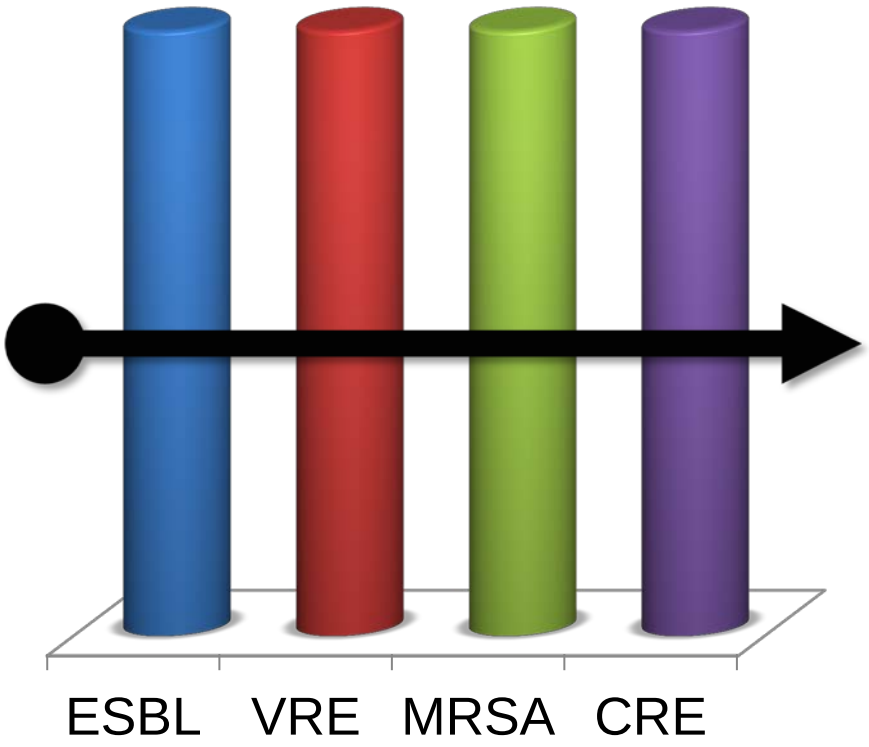
VCU Medical Center

VIRGINIA COMMONWEALTH UNIVERSITY

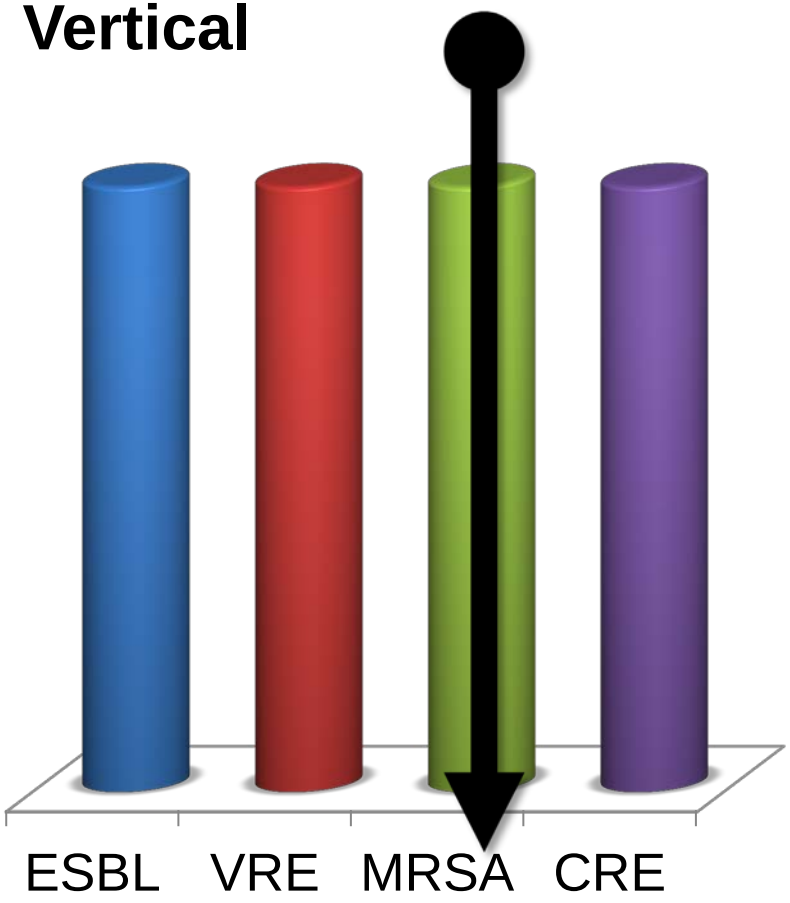
No relevant financial interests to report

Infection prevention strategies

Horizontal



Vertical



Wenzel RP, Edmond MB. Int J Infect Dis 2010;14(S1):S3-S5.
Edmond MB, Wenzel RP. N Engl J Med 2013;368:2314-2315.

Strategic Approaches to Infection Prevention

	Vertical	Horizontal
Goal	Reduce infection or colonization due to specific pathogen(s) [pathogen-based]	Reduce all infections [population-based]
Application	Selective or universal	Generally universal
Interventions	Unipotent	Multipotent
Resource utilization/ opportunity cost	Typically high	Lower
Philosophy	Exceptionalism	Utilitarianism
Values favored	Hospital, infection prevention experts, advocates	Patient
Temporal orientation	Present	Present & future
Examples	ARO active detection & isolation	Hand hygiene Bare below the elbows Chlorhexidine bathing Care bundles Environmental hygiene

Comparative effectiveness review of MRSA screening

Strength of evidence domains	
Risk of bias	study design and study conduct
Consistency	degree of similarity in the effect sizes of different studies within an evidence base; consistent evidence bases have the same direction of effect and a narrow range of effect sizes
Directness	whether the evidence being assessed reflects a single, direct link between the interventions of interest and the outcome; if multiple links are involved, strength of evidence can be only as strong as the weakest link
Precision	degree of certainty for estimate of effect with respect to a specific outcome (is one treatment inferior, superior, or equivalent to another?); includes considerations of statistical significance and confidence intervals for effect estimates

AHRQ. effectivehealthcare.ahrq.gov/ehc/assets/File/Grading.ppt

Summary of studies on MRSA screening, 1990-2012

Type of screening	Outcome	Studies	Overall SOE
Universal vs none	Transmission	1 QEX	Insufficient
	Infection	2 QEX	Low
Universal vs targeted	Transmission	0	Insufficient
	Infection	2 QEX	Insufficient
Screening of ICU pts vs no screening	Transmission	1 RCT, 3 QEX	Insufficient
	Infection	2 QEX	Insufficient
	BSI	2 QEX	Insufficient
Screening of surgical pts vs no screening	Transmission	1 QEX-XR	Insufficient
	Infection	1 QEX-XR, 1 QEX	Insufficient
	SSI	1 QEX-XR	Insufficient
Screening of high-risk pts vs no screening	Transmission	1 QEX	Insufficient
	Infection	1 QEX	Insufficient
	BSI	2 QEX	Insufficient
Expanded screening vs limited screening	Transmission	2 QEX	Insufficient
	Infection	1 QEX	Insufficient

Glick S et al. Am J Infect Control 2014;42:148-55.

QEX = quasi-experimental
XR = crossover

STAR ICU Trial

- Cluster randomized trial
  - 18 ICUs
  - 9,139 patients
  - Compared ADI (active detection and isolation) to standard care (contact precautions for clinical cultures only) for MRSA and VRE

New colonization or infection	Events/1,000 patient days		
	ADI	Standard	*P*
MRSA	16.0	13.5	0.39
VRE	38.9	33.4	0.53
MRSA or VRE	40.4	35.6	0.35

Huskins WC et al. New Engl J Med 2011;364:1407-18.

Comparison of MRSA Control Strategies

- Cluster randomized trial: 74 ICUs at 43 hospitals; 74,256 patients
- Compared 3 strategies for MRSA control:
  - Active detection and isolation (ADI)
  - Targeted decolonization: patients found to be MRSA colonized treated with intranasal mupirocin + daily chlorhexidine bathing x 5 days
  - Universal decolonization: no screening cultures; all patients treated with intranasal mupirocin x 5 days + daily chlorhexidine bathing for entire ICU stay

	Hazard Ratio (CI 95)			
	ADI	Targeted decolonization	Universal decolonization	P
MRSA clinical cultures	0.92 (0.77-1.10)	0.75 (0.63-0.89)	0.63 (0.52-0.75)	0.01
MRSA BSI	1.23 (0.82-1.85)	1.23 (0.80-1.90)	0.71 (0.48-1.08)	0.11
BSI (any pathogen)	0.99 (0.84-1.16)	0.78 (0.66-0.91)	0.56 (0.49-0.65)	<0.001

Huang SS et al. New Engl J Med 2013;368:2255-65.

Impact of contact precautions on patient throughput

Studies comparing isolated vs. non-isolated patients

Ref	Delay studied	Impact
1	Time to CT scan for inpatients	+10 hours
2	Time from ER to inpatient bed	+30 minutes
3		+2.5 hours
4		+1 hour
5	Transfer from surgical ICU to ward	18% of delays due to isolation
6	Transfer from hospital to nursing home	+7days

1. Karki S et al. Am J Infect Control 2013;31:1141-2.
2. Shenoy ES et al. Infect Control Hosp Epidemiol 2012;34:849-52.
3. Gilligan P et al. J Hosp Infect 2010;75:99-102.
4. McLemore A et al. Infect Control Hosp Epidemiol 2011;32:298-299.
5. Johnson DW et al. Crit Care 2013;17:R128.
6. Goldszer RC et al. J Clin Outcomes Manage 2002;9:553-6.

Psychological Effects of Contact Precautions

Ref	Impact of contact precautions (hospital day of measurement)			
	Anger	Depression	Anxiety	Delirium
1	▲(≥14)	▲(≥14)		
2		▲(7)	▲(7)	
3	▲		▲	
4		▲ (7)	▲ (7)	
5	● (3)	● (3)	● (3)	
6				● All pts in CP (OR 1.40) ▲ Pts transferred to CP (OR 1.75)

1. Kennedy P. Spinal Cord 1997;35:617-9.
2. Gammon J. Int J Nurs Pract 1998;4:84-96.
3. Tarzi S. J Hosp Infect 2001;49: 250-4.
4. Catalano G. South Med J 2003;96:141-5.
5. Day HR. Infect Control Hosp Epidemiol 2013;34:251-8.
6. Day HR. Infect Control Hosp Epidemiol 2012;33:34-9.

▲= significant increase
● = no significant difference

Impact of Isolation on Patient Satisfaction

Ref	Venue	Data source	Satisfaction
1	US, teaching hospital	HCAHPS on/after HD 3	●
2	CA/US, 2 teaching hospitals	Chart review, complaint files, post-discharge	▼ Formal/informal complaint, OR 23.5
3	US, teaching hospital	HCAHPS, post-discharge	▼ Worse MD communication & staff responsiveness
4	US, teaching hospital	Interview on HD 3,7,14	▼ Lack of respect, poor care coordination
		HCAHPS, post-discharge	●
5	CA, children's hospital	PFSQ on/after HD 2	●

HD = hospital day
HCAHPS = Hospital Consumer Assessment of Healthcare Providers and Systems survey
PFSQ = Pediatric Family Satisfaction Questionnaire

1. Gasink LB. Infect Control Hosp Epidemiol 2008;29:275-8.
2. Stelfox HT. JAMA 2003;290:1899-905.
3. Vinski J. Infect Control Hosp Epidemiol 2012;33:513-6.
4. Mehrotra P. Infect Control Hosp Epidemiol 2013;34:1087-93.
5. Cohen E. Pediatrics 2008; 122:e411-5.

▼= significant decrease
● = no significant difference

Impact of Isolation on HCW Visits

HCW visits:

Ref	Setting	HCWs	Isolated pts	Non-isolated pts	△
1	ICU	All	3.9/hr	7.9/hr	-4.0 (49% ↓)
2	ICU	All	6.1/hr	13.8/hr	-7.7 (44% ↓)*
	Ward	All	4.2/hr	7.9/hr	-3.7 (47% ↓)*
3	ICU	All	4.3/hr	5.2/hr	-0.9 (17% ↓)*
4	ICU+ward	All	2.8/hr	4.4/hr	-1.6 (36% ↓)*
5	Ward	Senior residents Attending MDs	83%/d 35%/d	87%/d 73%/d	RR 0.96 RR 0.49*

1. Kirkland KB, Weinstein JM. Lancet 1999;354:1177-8.
2. Evans HL et al. Surgery 2003;134:180-8.
3. Harris AD et al. JAMA 2013;310:1571-80.
4. Morgan DJ at al. ICHE 2013;34:69-73.
5. Saint S et al. Am J Infect Control 2003;31:354-6.

*$P<0.05$

Impact of Isolation on HCW Visits

HCW contact time with patients:

Ref	Setting	Metric	Isolated pts	Non-isolated pts	△
1	ICU	Min/hr	17.5	22.1	-4.6 (21% ↓)
2	ICU	Min/hr	41.5	47.0	-5.5 (12% ↓)*
	Ward	Min/hr	16.9	27.9	-11.0 (39% ↓)*
3	ICU+ward	Min/hr	14.0	17.0	-3.0 (18% ↓)*
4	Ward, attending MD on AM rounds	Min	9.3	9.0	+0.3 (3%↑)

1. Kirkland KB, Weinstein JM. Lancet 1999;354:1177-8.
2. Evans HL et al. Surgery 2003;134:180-8.
3. Morgan DJ at al. ICHE 2013;34:69-73.
4. Cohen E et al. Pediatrics 2008; 122:e411-5.

*P<0.05

Impact of Isolation on Patient Safety

Metric type	Ref	Event	Impact
Process	1	Days w/ no vital signs recorded	▲ RR 2.5
		Days w/ no nursing notes	▲ RR 1.8
		Days w/ no MD progress note	▲ RR 2.9
Outcome	1	Adverse events/1000 days	▲ RR 2.2
		Supportive care failure*	▲ RR 8.3
	2	Anticoagulation errors	▲ HR 1.7
		Hypoglycemia	▲ HR 1.5
		Hyperglycemia	▲ HR 1.5
	3	Preventable adverse events (per IHI trigger tool)	● -0.6/1,000 pt days

1. Stelfox HT et al. JAMA 2003;290:1899-1905.
2. Zahar JR et al. Intensive Care Med 2013;39:2153-60.
3. Harris AD et al. JAMA 2013;310:1571-80.

▲= significant increase
● = no significant difference

Ethical Implications

- ADI should be considered a QI measure
  - Primary purpose is to provide a safer healthcare environment by reducing risk for transmission of AROs

- Ethical issues arise when QI activities "inadvertently cause harm, waste scarce resources, or affect some patients unfairly"

Lynn J et al. Ann Intern Med 2007;146: 666-673.

Ethical Requirements for QI Activities

	Requirement	Does ADI meet requirement?
1	Value: benefits gained justify the resources consumed & the associated risks	?
2	Valid methodology	?
3	Fair participant selection	Yes
4	Favorable risk–benefit ratio	?
5	Respect for participants: protection of privacy & confidentiality	Yes
6	Informed consent obtained if a QI activity more than minimal risk compared to standard care	No
7	Ethical review & supervision appropriate to the level of potential risk & project worth	No

Lynn J et al. Ann Intern Med 2007;146: 666-673.

ADI Ethical Issues

- Given the potential for harm, should informed consent be obtained?
- Does patient autonomy trump public health?
  - What to do with patients who refuse cultures?
- Unfair distribution of burdens & benefits
  - Colonized patient bears burden of isolation (& no benefit) while the benefit accrues to uncolonized patients
- Is it fair to isolate colonized patients, when the data for ADI effectiveness are questionable?
- Impact on throughput can reduce the quality of care (ER crowding, inpatient boarding in ERs, ambulance diversion)
- Should hospitals implementing ASC-CP increase nurse:patient ratios to mitigate the safety concerns?
- Can the cost of active surveillance be justified? What is the opportunity cost?

Edmond MB et al. Public Health Ethics 2008;1:235-245.

Device Associated HAIs

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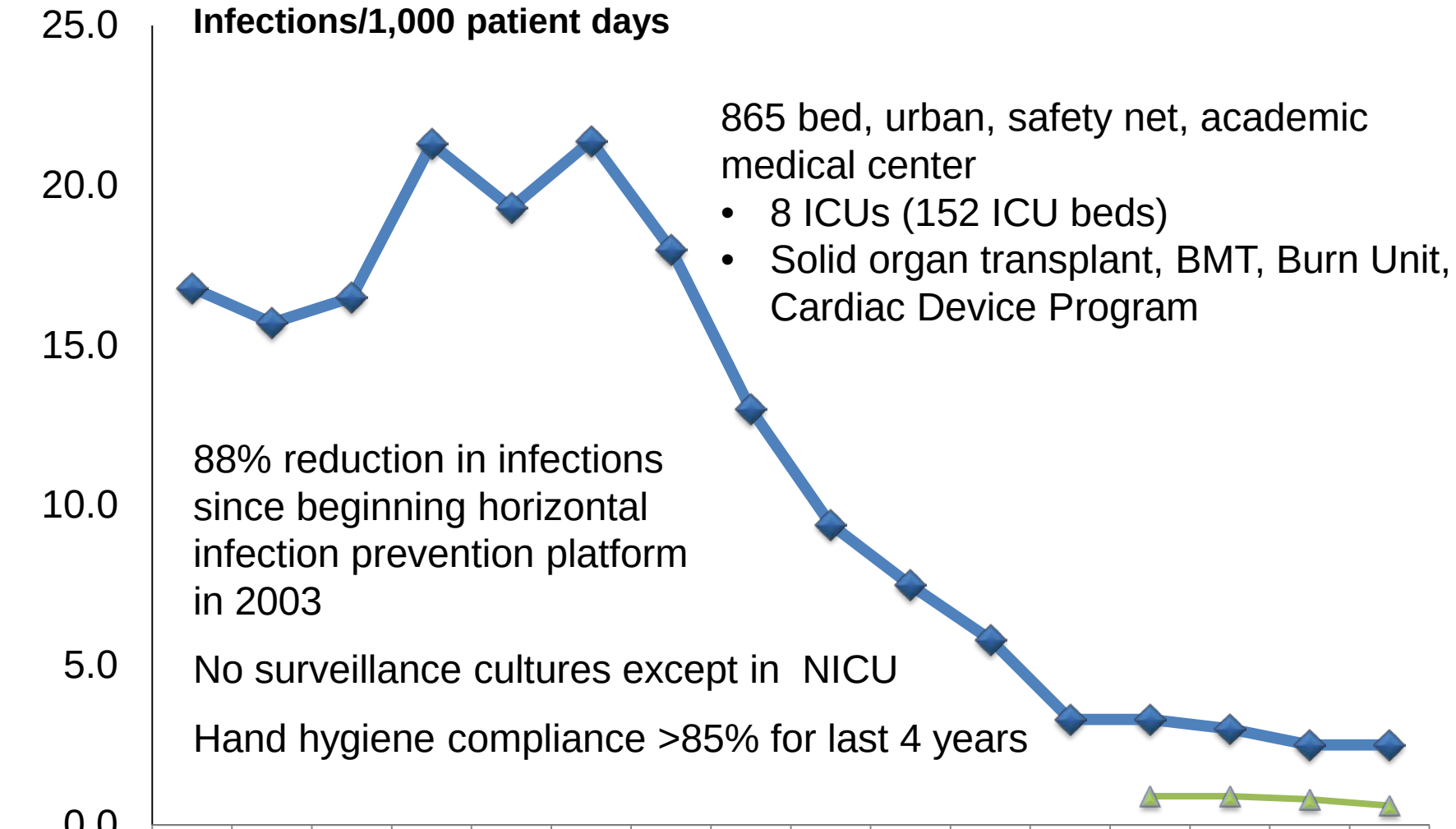

	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13
ICUs	16.8	15.7	16.5	21.3	19.3	21.4	18.0	13.0	9.4	7.5	5.8	3.3	3.3	3.0	2.5	2.5
Wards													0.9	0.9	0.8	0.6

Interventions to reduce HAIs

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Start date	Intervention
1998	Began concurrent surveillance for HAIs in ICUs
2003	Impregnated (chlorhexidine/silver sulfadiazine) CVCs
2004	Hand hygiene campaign
2004	Feedback on HAIs and practices to all ICU via quarterly posters
2006	Central line insertion bundle
2006	Mandatory housestaff education on central line insertion
2007	Roving hand hygiene observers
2007	Chlorhexidine bathing of ICU patients
2009	"Wash up, wipe down" and "bare below the elbows" campaigns
2010	Integration of antimicrobial utilization with infection prevention efforts
2010	Began concurrent surveillance for HAIs in all inpatient areas
2010	Enhanced surveillance for multidrug resistant organisms
2011	Implementation of urinary catheter bundle
2011	Chlorhexidine perineal care outside ICUs
2012	Chlorhexidine bathing of all adults patients hospital-wide
2013	Limit contact precautions for MRSA, VRE

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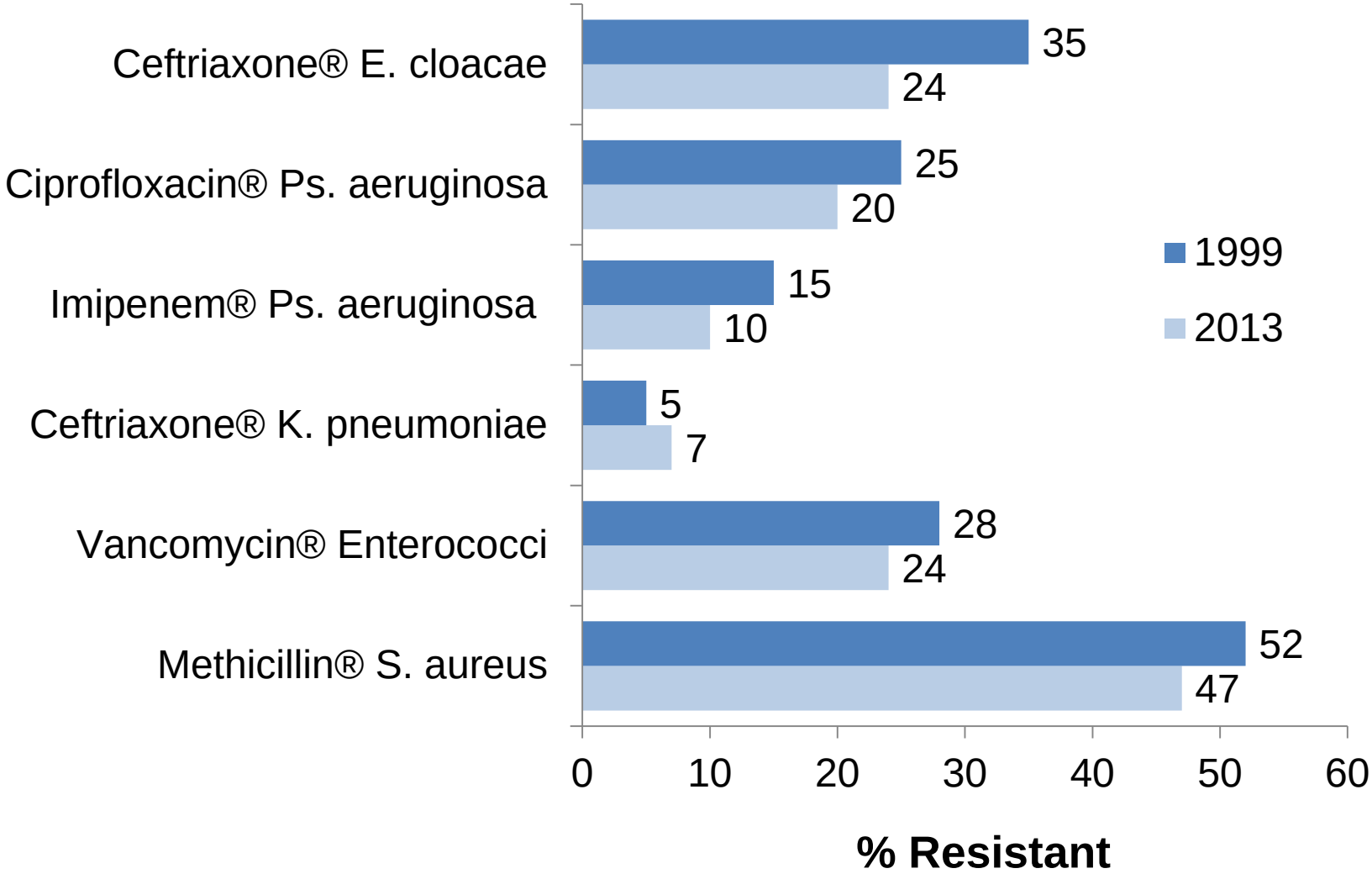
Antibiogram, 1999 vs. 2013



MRSA Device Associated Infections in ICUs

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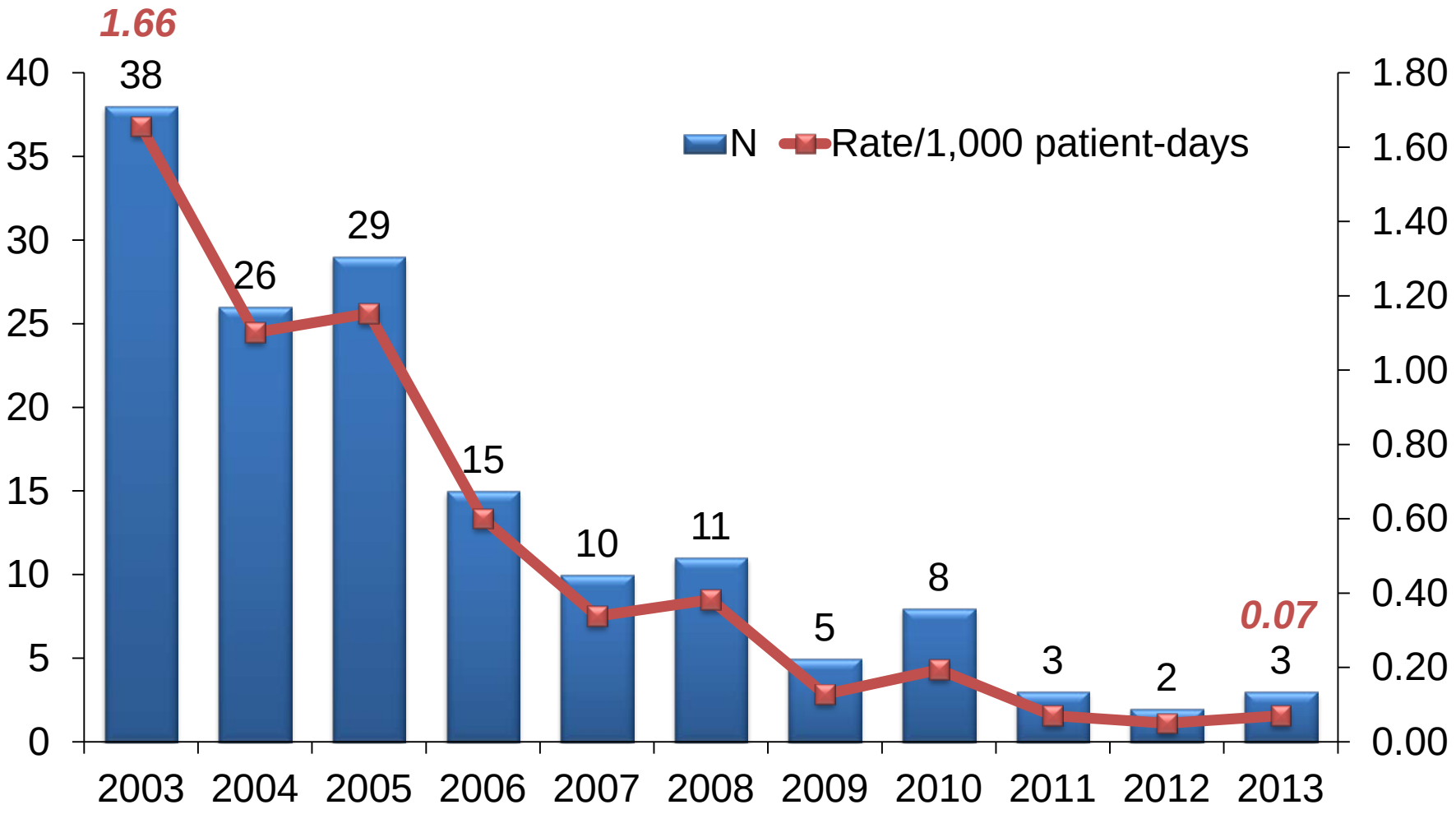
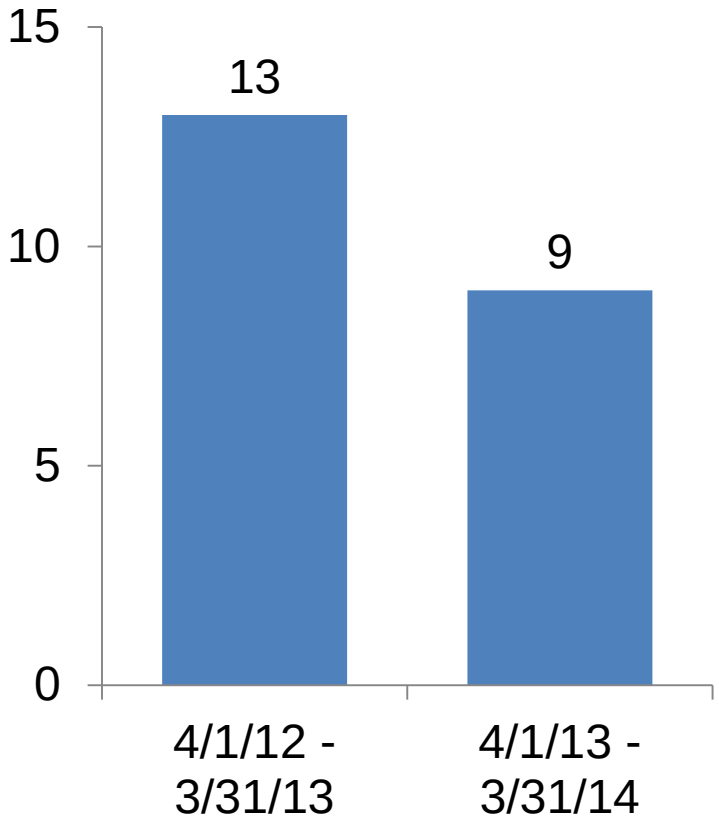


Scaling back contact precautions

Effective 4/1/13

- Patients colonized or infected with MRSA or VRE are placed on contact precautions only under the following conditions:
  - Outbreak situation
  - Wound drainage that is not contained within a dressing
  - Uncontained respiratory secretions
- Contact precautions still used for all patients with MDR-GNR and C. difficile



Hospital-wide MRSA device HAIs

Conclusions

- ADI has not been proven to control AROs that are endemic in hospitals
- ADI is a vertical infection prevention approach that is unipotent and lacks a future orientation
- Contact precautions impede patient care, impact patient throughput and pose ethical issues
- Hospitals should focus on population-based, horizontal infection prevention strategies that reduce infections due to all organisms transmitted via direct or indirect contact