



Contact Isolation for Endemic Pathogens (MRSA and VRE): Universal vs Selective Isolation

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What this Lecture Will Not Cover

- Contact precautions for MDR gram negative rods
- Contact precautions for *Clostridium difficile*
- Contact precautions for ectoparasitic infections
- Contact precautions in non-endemic settings (outbreaks)

How should we best use contact precautions for endemic pathogens such as MRSA and VRE?

The *Satisfice* Approach: Nobel Laureate- Herbert Simon



Satisfice:
combination
of *satisfy* and
suffice

Nobel Prize speech: “..decision makers can satisfice either by finding optimum solutions for a simplified world, or by finding satisfactory solutions for a more realistic world.”

Screening for MRSA: A Flawed Hospital Infection Control Intervention

Richard P. Wenzel, MD, MSc; Gonzalo Bearman, MD, MPH; Michael B. Edmond, MD, MPH, MPA

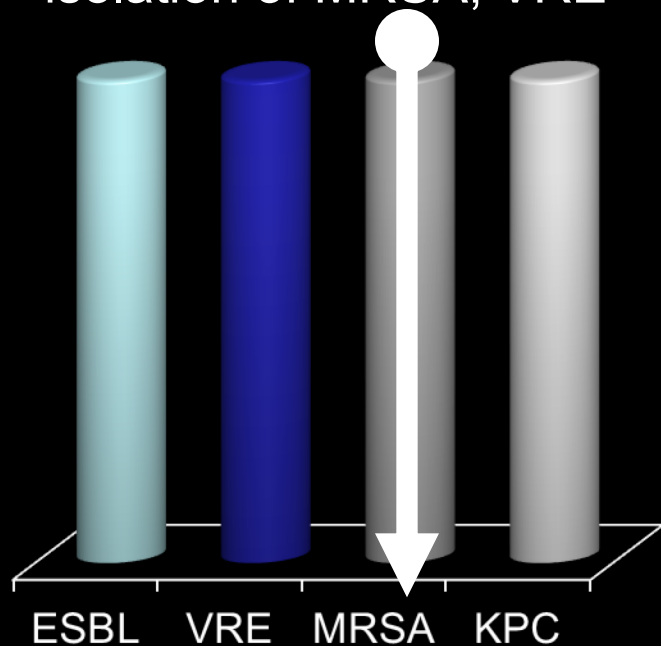
- Focusing resources on a single pathogen as a sole approach to IC is inherently flawed
- New paradigm: multi-potent interventions aimed at reducing risk from all pathogens transmitted in the same mechanism - contact

Wenzel RP, Bearman G, Edmond MB. *Infect Control Hosp Epidemiol* 2008; 29:1012-1018

Strategic Approaches to Infection Prevention

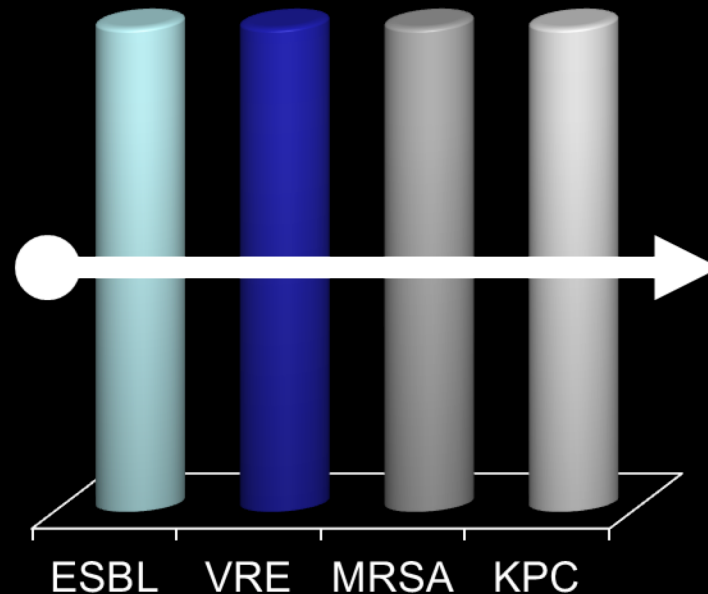
Vertical

- Interventions aimed at reducing risk from a single pathogen
- Involve a microbiologic testing component
- Examples: Active detection & isolation of MRSA, VRE



Horizontal

- Multipotent interventions aimed at reducing risk from all pathogens transmitted in the same mechanism
- Examples: Hand hygiene, chlorhexidine bathing, central line insertion bundle, ventilator bundle, bare below the elbows



Original Investigation

Universal Glove and Gown Use and Acquisition of Antibiotic-Resistant Bacteria in the ICU

A Randomized Trial

Anthony D. Harris, MD, MPH; Lisa Pineles, MA; Beverly Belton, RN, MSN; J. Kristie Johnson, PhD; Michelle Shardell, PhD; Mark Loeb, MD, MSc; Robin Newhouse, RN, PhD; Louise Dembry, MD, MS, MBA; Barbara Braun, PhD; Eli N. Perencevich, MD, MS; Kendall K. Hall, MD, MS; Daniel J. Morgan, MD, MS; and the Benefits of Universal Glove and Gown (BUGG) Investigators

- Cluster randomized trial-universal gloving and gowning
 - 20 medical and surgical ICUs
 - 20 US Hospitals
- Primary outcome:
 - MRSA and VRE on admission and discharge
- Secondary outcomes:
 - Individual MRSA acquisition / VRE acquisition, HCW patient visits, HH compliance, HAIs and adverse events

UGG Study: Highlights

- UGG did not reduce primary VRE or MRSA acquisition
- UGG reduced secondary MRSA acquisition- 40 % (relative risk)
- Decreased HCW patient visits with UGG
- Increased HH observed on room exit with UGG
- No difference in adverse events

Harris AD et al. *JAMA*. 2013;310 (15): 1571-1580

Do We Need To Be So Aggressive?



ORIGINAL ARTICLE

Contact Precautions: More Is Not Necessarily Better

Prospective, observational cohort study 2009- across 11 University Hospitals

Contact Isolation Burden	Hand Hygiene	Compliance Contact Precautions Bundle
20% or less	44% compliance	32% compliance
60% or greater	5% compliance	7% compliance

Dhar S et al. *Infect Control Hosp Epidemiol.* 2014 Mar;35(3):213-21

Adverse Outcomes Associated With Contact Precautions

Outcomes	Significant Findings and Comments
Patient-HCW contact	Less patient-HCW contact
Adverse events	Falls, pressure ulcers, fluid/electrolyte disorders, inappropriate documentation of vital signs , days without a provider note
Psychological	Increased symptoms of depression and anxiety
Satisfaction	Decreased patient satisfaction with care

Systematic literature review of adverse outcomes associated with CP in 15 studies: 1989- 2008

Morgan DJ, Diekema DJ, Sepkowitz K, Perencevich E. *AJIC* 37; 2009: 85-93

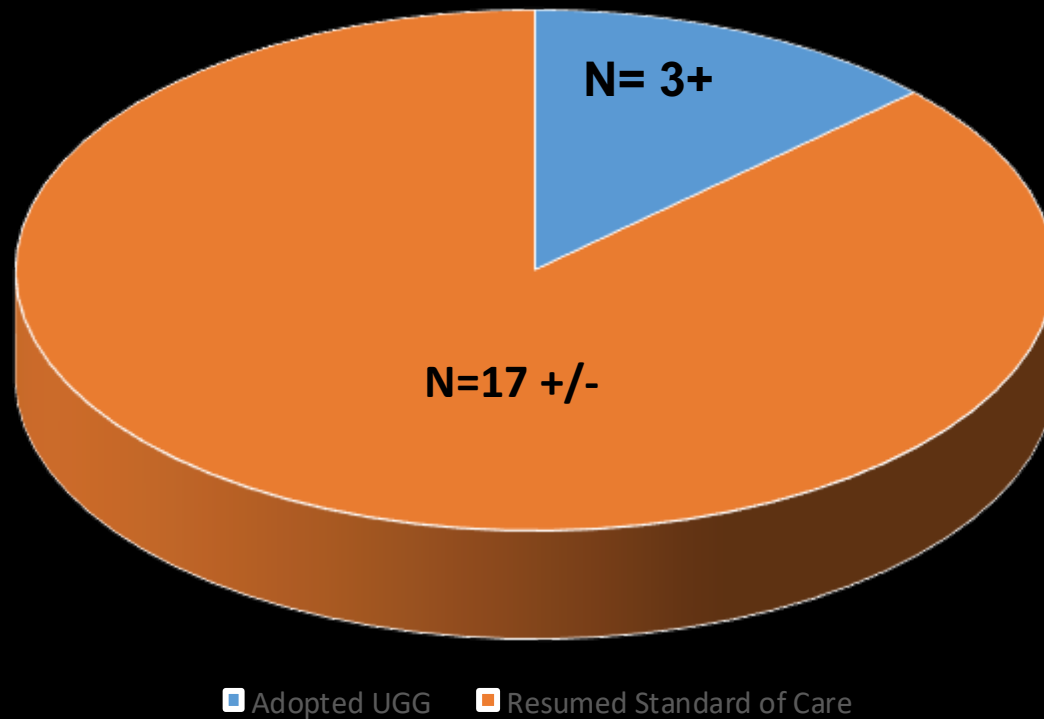
The Effect of Contact Precautions on Frequency of Hospital Adverse Events

Lindsay D. Croft, MS, PhD;¹ Michael Liquori, MD;^{2,5} James Ladd, MD;¹ Hannah Day, MS, PhD;¹ Lisa Pineles, MA;¹ Elizabeth Lamos, MD;² Ryan Arnold, MD;² Preeti Mehrotra, MD;⁴ Jeffrey C. Fink, MD, MS;^{1,3,5} Patricia Langenberg, PhD;¹ Linda Simoni-Wastila, BSPHarm, MSPH, PhD;⁶ Eli Perencevich, MD, MS;^{7,8} Anthony D. Harris, MD, MPH;^{1,5} Daniel J. Morgan, MD, MS^{1,5}

- Single center, matched cohort study
 - 296 non- ICU medical / surgical patients
 - 104 (35%) of patients experienced at least one adverse event
 - Contact precautions associated with fewer non-infectious adverse events (rate ratio 0.75; 95% CI 0.51-0.95, P=0.02)

UGG- Feasibility in the Real World? Adoptability Post UGG Trial:

Institutions Continuing with UGG



N=20 Units:
10 Control
10 Intervention

Source: Personal Communication with a UGG Participant

Cost Benefit of UGG? Controversial

- Farbman et al (2013):
 - Cost/benefit analysis:
 - UGG: ranged 1.7 times higher cost to 13.5 cost savings
- Gidengil et al (2015):
 - Mathematical model
 - UGG was not cost effective
- Opportunity Cost?



Farbman L et al. *Clin Microbial Infect* 2013;19: E582-E593
Gidengil CA et al. *Infect Control Hosp Epidemiol* 2015;36:12-27

Putting Up Physical Barriers: Losing Touch With the Patient ?

“There is a misperception *that infections are the single worst adverse event that can happen in a hospital,*” said Dr. Daniel J. Morgan...

“*In getting overly focused on preventing one type of infection, we fail to see the overall picture for patients.*”

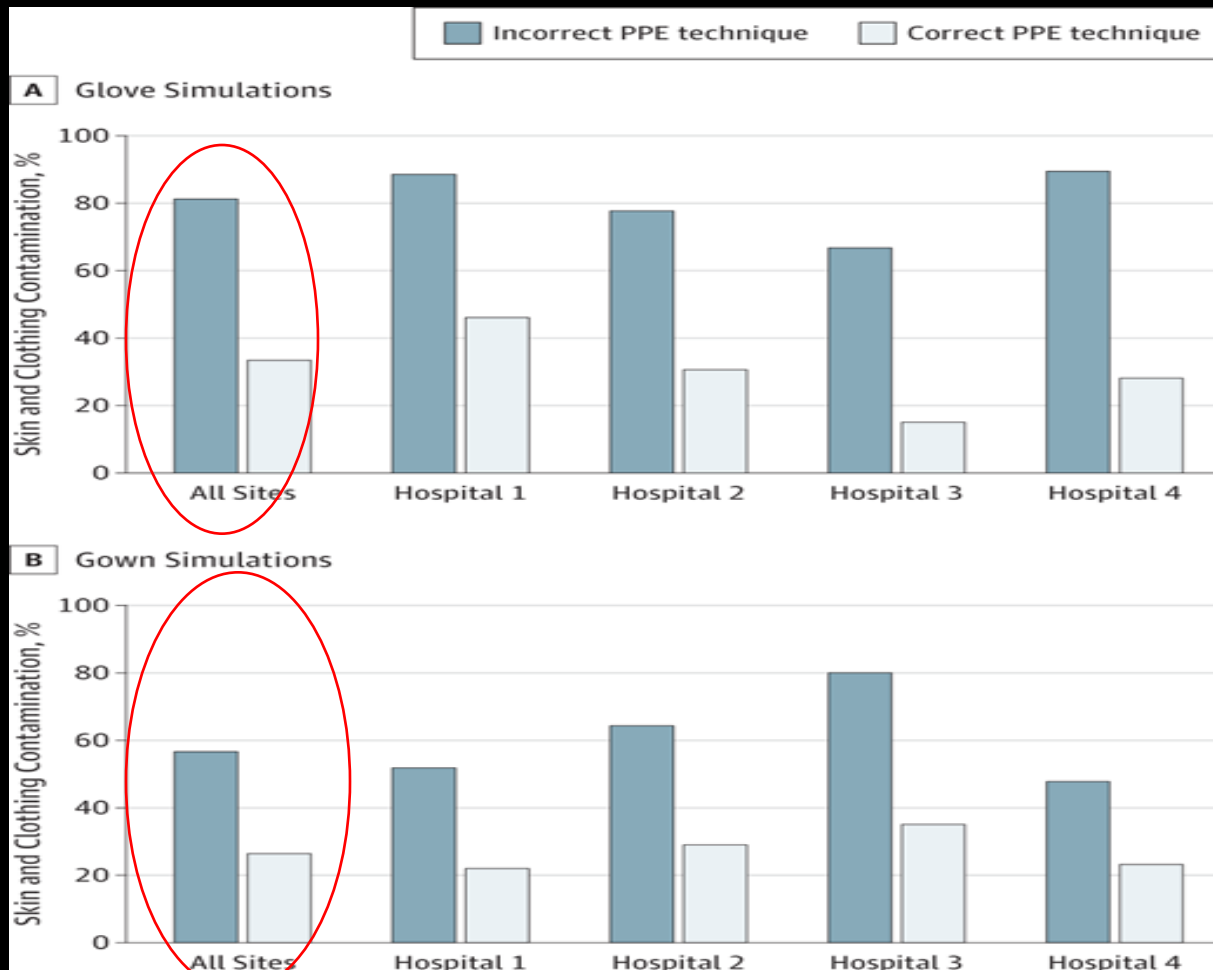


Losing Touch With the Patient- by Pauline Chen, MD

<http://www.nytimes.com/2010/10/21/health/views/21chen.html>

VCU Medical Center

Self-Contamination of Personnel During Removal (Doffing) of PPE is Frequent



**Incorrect
Technique
Results in
Skin and
Clothing
Contamination**

Tomas ME et al. *JAMA Intern Med.* 2015;175(12):1904-1910.

The Increasing Visibility of the Threat of Health Care Worker Self-contamination

- Study assessing PPE use at VCU:
 - 24% of doffs- contact observed between presumably contaminated PPE and provider's skin and clothing
 - Survey data: providers did not generally believe that self-contamination occurred
- In JAMA IM editorial we argue:
 - *'PPE must be used selectively, correctly and judiciously'*

Doll M, Bearman G et al. *Infect Control Hosp Epidemiol*. 2017 Feb;38(2):226-229.

Doll M and Bearman G. *JAMA Intern Med*. 2015;175(12):1911-1912.

Could other strategies be as effective and perhaps easier to both implement and sustain than routine CP?

Infection control: the case for horizontal rather than vertical interventional programs

Richard P. Wenzel*, Michael B. Edmond

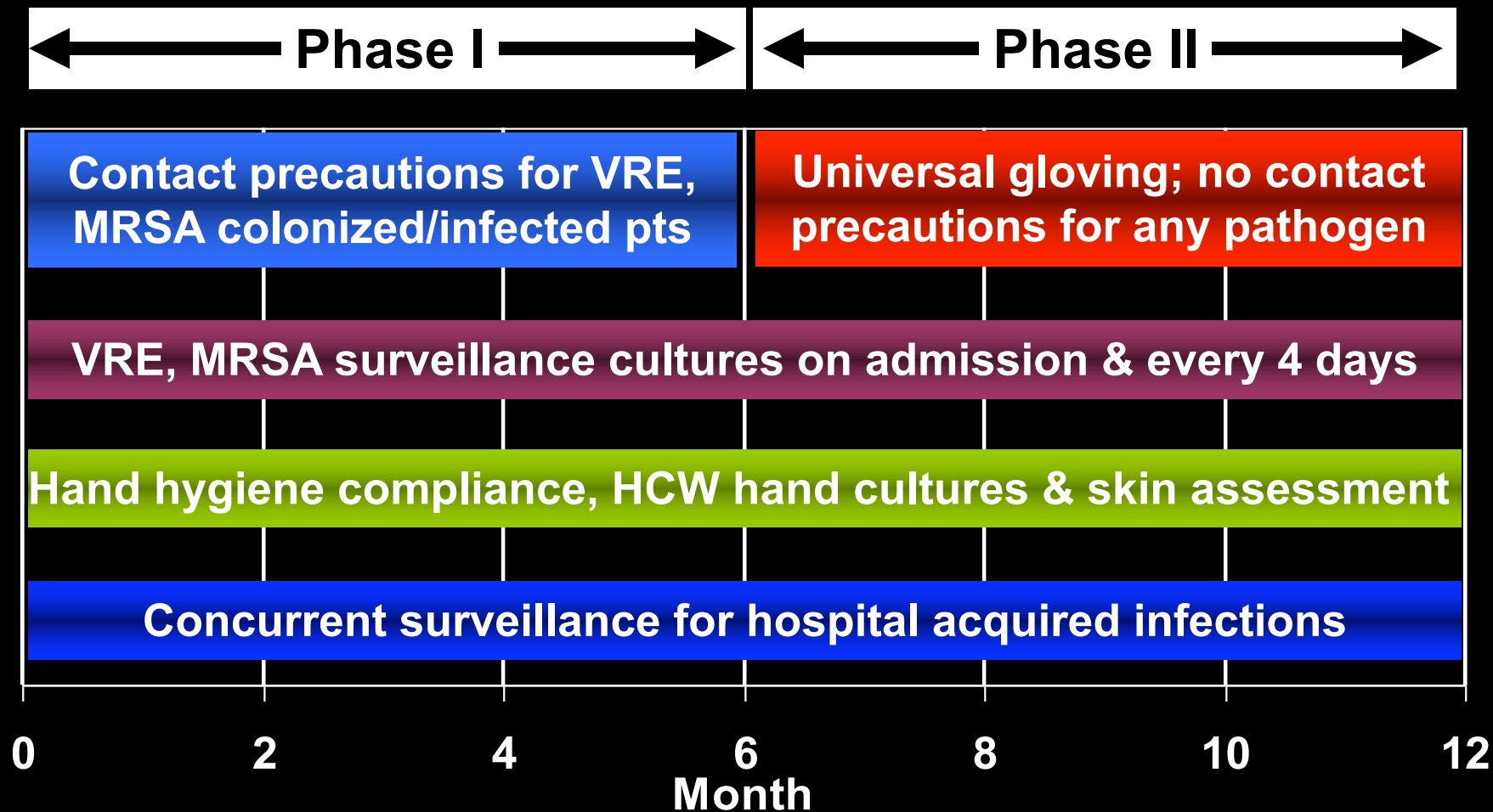
'We suggest that horizontal programs should form the platform of all infection control programs and the key question should be, what is the incremental value of a new vertical program?'

Universal Gloving



Universal Gloving and Gowning

Methods: Universal Gloving Protocol Study Design



Results: Universal Gloving Protocol HAI Rates

Outcome	Phase I	Phase II	P
BSI/ 1,000 catheter days	3.7	2.6	0.096
UTI/ 1,000 catheter days	8.9	7.8	0.096
Pneumonia/ 1,000 ventilator days	1.0	1.1	0.090
Total MRSA/VRE Infections	4	2	NA

Bearman et al. *Infect Control Hosp Epidemiol* 2010 May;31(5):491-7.

Hand Hygiene Compliance

**Hand hygiene is the
cornerstone of any
infection prevention
strategy**

Number of HH observers: 10 - Inter-rater reliability Kappa 0.897

Bearman et al. *Infect Control Hosp Epidemiol* 2010 May;31(5):491-7.

Benefits of Universal Gloving on Hospital-Acquired Infections in Acute Care Pediatric Units

Quasi-experimental study design in acute care pediatrics

	RR	P value
BSI	0.63	<0.001
CLABSI	0.61	0.003
HAP/ VAP/ CDAD	No impact	NA

Yin J et al. *PEDIATRICS*. 2013;131(5):1515-1520.

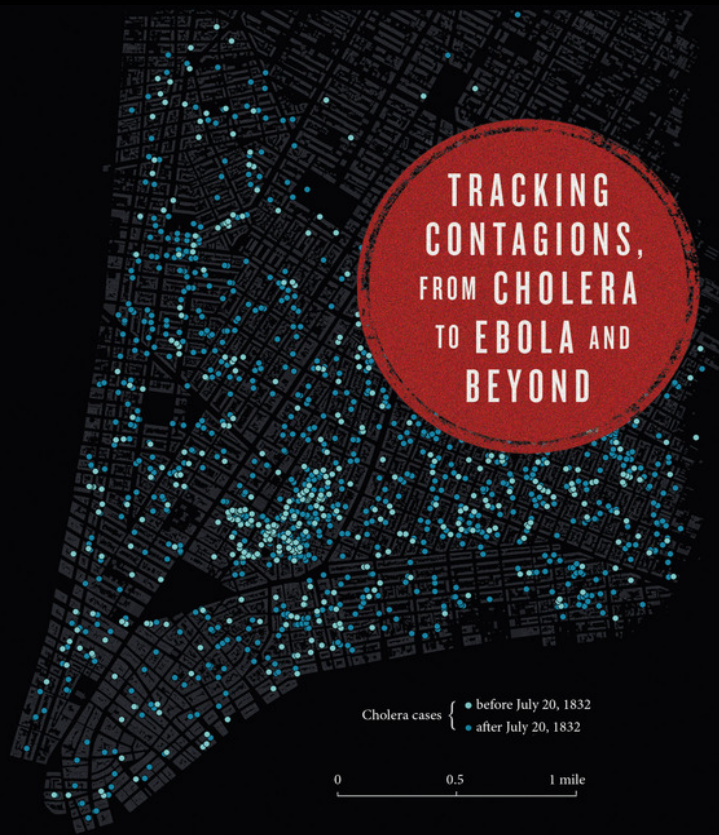
Mandatory gloving in acute care paediatric units associated with decreased risk of hospital-acquired infections

10.1136/eb-2013-101453

“The employment of universal gloving may be a sensible component of a horizontal infection prevention strategy provided that sustained compliance with HH and glove use is ensured.”

Bearman, G. *Evid Based Nursing*. 2014 17:82-3

Contact Precautions: Paradigm Shift in the Making?



PANDEMIC

SONIA SHAH
AUTHOR OF *THE FEVER*

Paradigms – theoretical constructs that provide explanatory frameworks for scientific observations

However:

Paradigms create expectations, which can limit perceptions and result in confirmation bias and change blindness

Control of Drug-Resistant Pathogens in Endemic Settings: Contact Precautions, Controversies, and a Proposal for a Less Restrictive Alternative

Gonzalo Bearman • Michael P. Stevens

“Robust measures for the incremental benefit of contact precautions, gowns, gloves, and active detection and isolation strategies for the prevention of cross-transmission in endemic settings are lacking”

It all starts with a robust horizontal IC strategy

Bearman G, Stevens MP. *Curr Infect Dis Rep* (2012) 14:620–626

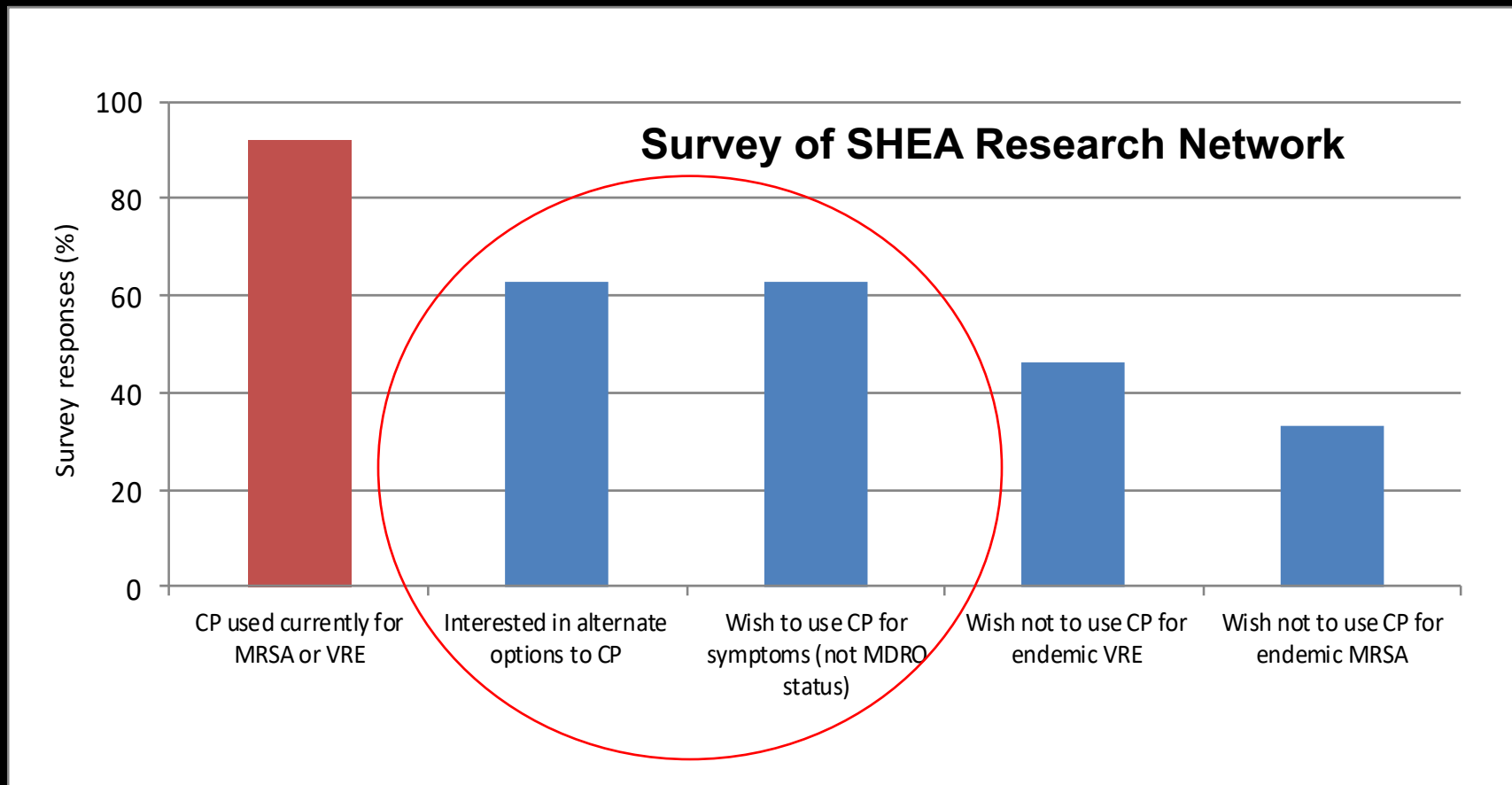
More Recently

Reconsidering Contact Precautions for Endemic MRSA and VRE- Revisited

- Are contact precautions required to control endemic MRSA and VRE?
 - Survey of Society for Healthcare Epidemiology of America (SHEA) Research Network members on use of CP
 - Comprehensive literature review
 - Detailed examination of the experience of hospitals not using CP for MRSA or VRE

Morgan D, Bearman G et al. *Infect Control Hosp Epidemiol.* 2015 Oct;36(10):1163-72.

Reconsidering Contact Precautions for Endemic MRSA and VRE: Results



Morgan D, Bearman G et al. *Infect Control Hosp Epidemiol.* 2015 Oct;36(10):1163-72.

Reconsidering Contact Precautions for Endemic MRSA and VRE

- No high quality data supports or rejects use of CP for endemic MRSA or VRE
- Over 30 US hospitals do not use CP for control of endemic MRSA or VRE
- Until more definitive data are available:
 - Use of CP for endemic MRSA/VRE in acute-care hospitals should be guided by local needs and resources



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State of the science review

Degowning the controversies of contact precautions for methicillin-resistant *Staphylococcus aureus*: A review



Ravina Kullar PharmD, MPH^{a,*}, Angela Vassallo MPH, MS, CIC^b,
Sarah Turkel MPH, MS, MT(ASCP)^b, Teena Chopra MD, MPH^c,
Keith S. Kaye MD, MPH^c, Sorabh Dhar MD^{d,**}

- Comprehensive Literature review of PubMed, Embase and Cochrane Library
- Conclusion: few data to support routine use of CPs to control the spread of MRSA in endemic settings

Kullar R et al. *Am J Infect Control*. 2016 Jan 1;44(1):97-103.

Impact of De-escalating Contact Precautions on MRSA/VRE Infection Rates

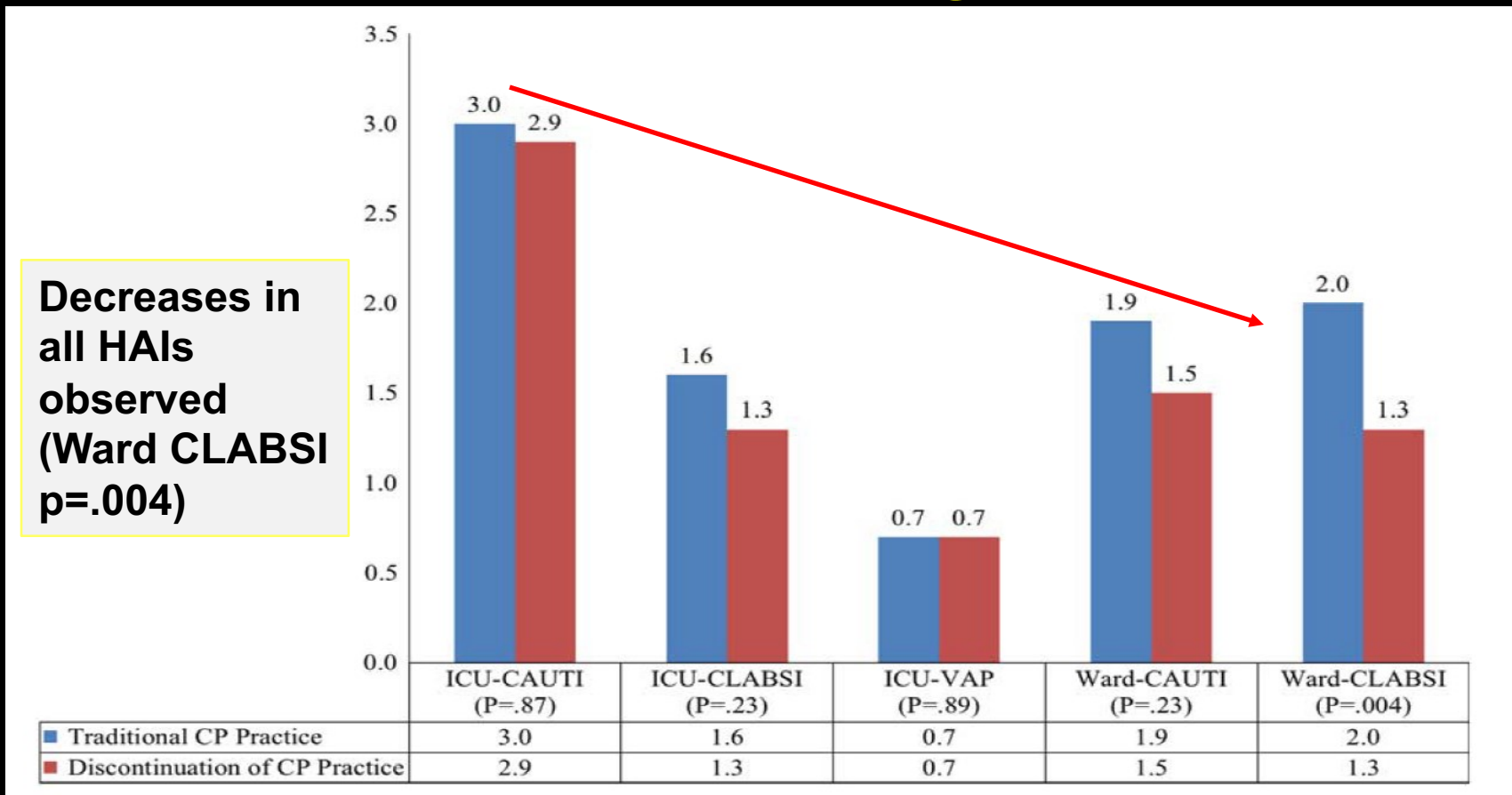
MRSA	Device Associated Infections N (rate/1,000 patient days)		
	Q1 12- Q1 13 (CP)	Q2 13- Q2 14 (No CP)	P
Wards	12 (0.060)	9 (0.043)	0.46
ICUs	3 (0.057)	3 (0.054)	0.95
TOTAL	15 (0.059)	12 (0.046)	0.49

VRE	Device Associated Infections N (rate/1,000 patient days)		
	Q1 12- Q1 13 (CP)	Q2 13- Q2 14 (No CP)	P
Wards	16 (0.080)	13 (0.063)	0.52
ICUs	6 (0.057)	4 (0.072)	0.70
TOTAL	22 (0.087)	17 (0.065)	0.91

MRSA and VRE Contact Precautions Discontinued for Colonized or Infected Patients
Aggressive HH, BBE, chlorhexidine patient bathing and care bundles

Edmond MB, Bearman G, Masroor N, Steven M, Ober J. ICHE, 2015 Aug;36(8):978-80

Impact on all Device Associated Infections- All Pathogens



Edmond MB, Bearman G, Masroor N, Steven M, Ober J. ICHE, 2015 Aug;36(8):978-80

Impact of De-escalating Contact Precautions on MRSA/VRE Infection Rates

- 45 % reduction in contact precaution burden at VCU Medical Center
- \$700,000 in cost savings per annum due to decrease use of PPE
- De-escalation of contact precautions was immensely popular with staff
- Simple and sustainable intervention

Edmond MB, Bearman G, Masroor N, Steven M, Ober J. ICHE, 2015 Aug;36(8):978-80

Elimination of Routine Contact Precautions for Endemic Methicillin-Resistant *Staphylococcus aureus* and Vancomycin-Resistant *Enterococcus*: A Retrospective Quasi-Experimental Study

Elise M. Martin, MD;¹ Dana Russell, MPH;² Zachary Rubin, MD;¹ Romney Humphries, PhD;³ Tristan R. Grogan, MS;⁴ David Elashoff, PhD;⁴ Daniel Z. Uslan, MD, FIDSA, FSHEA¹

Hospital A+B*	Rate Before	Rate After	Rate Ratio	P value
MRSA**	0.40	0.32	0.80	.09
VRE**	0.48	0.40	0.83	.14
<i>C.difficile</i> ***	11.31	11.06	0.98	.81

* Quasi-experimental study 1 year pre/post DC of CP with CHG bathing expansion

**Rate for MRSA and VRE are LabID cultures per 100 admissions

****Rate for *C.difficile* is LabID clinical cultures per 10,000 patient days

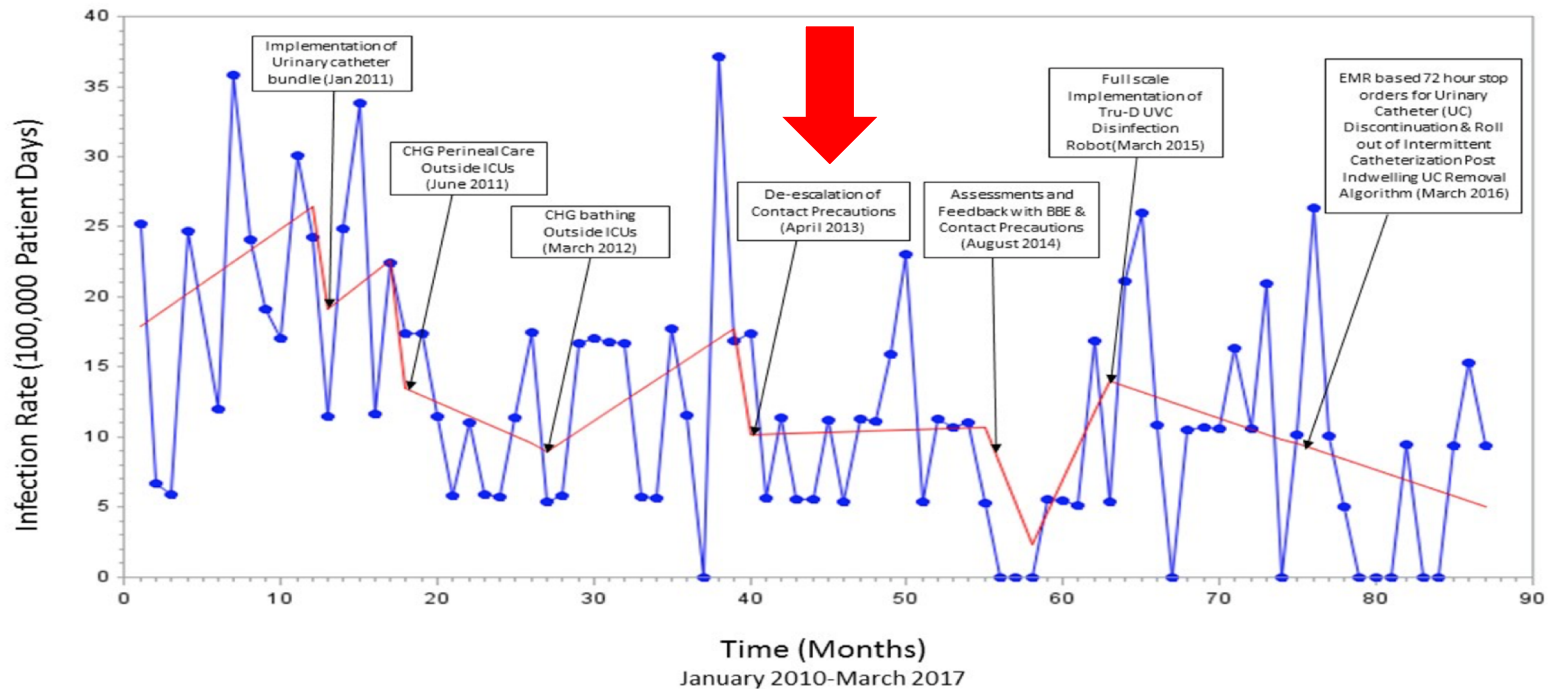
Reported Cost Saving: \$643,776

Martin EM et al. *Infect Control Hosp Epidemiol.* 2016 Jul 26:1-8

VCU De-CP Interrupted Time Series Analysis

Series: MRSA and VRE Infections

Figure 3. Interrupted Time Series Analysis of Device-associated MRSA and VRE HAIs



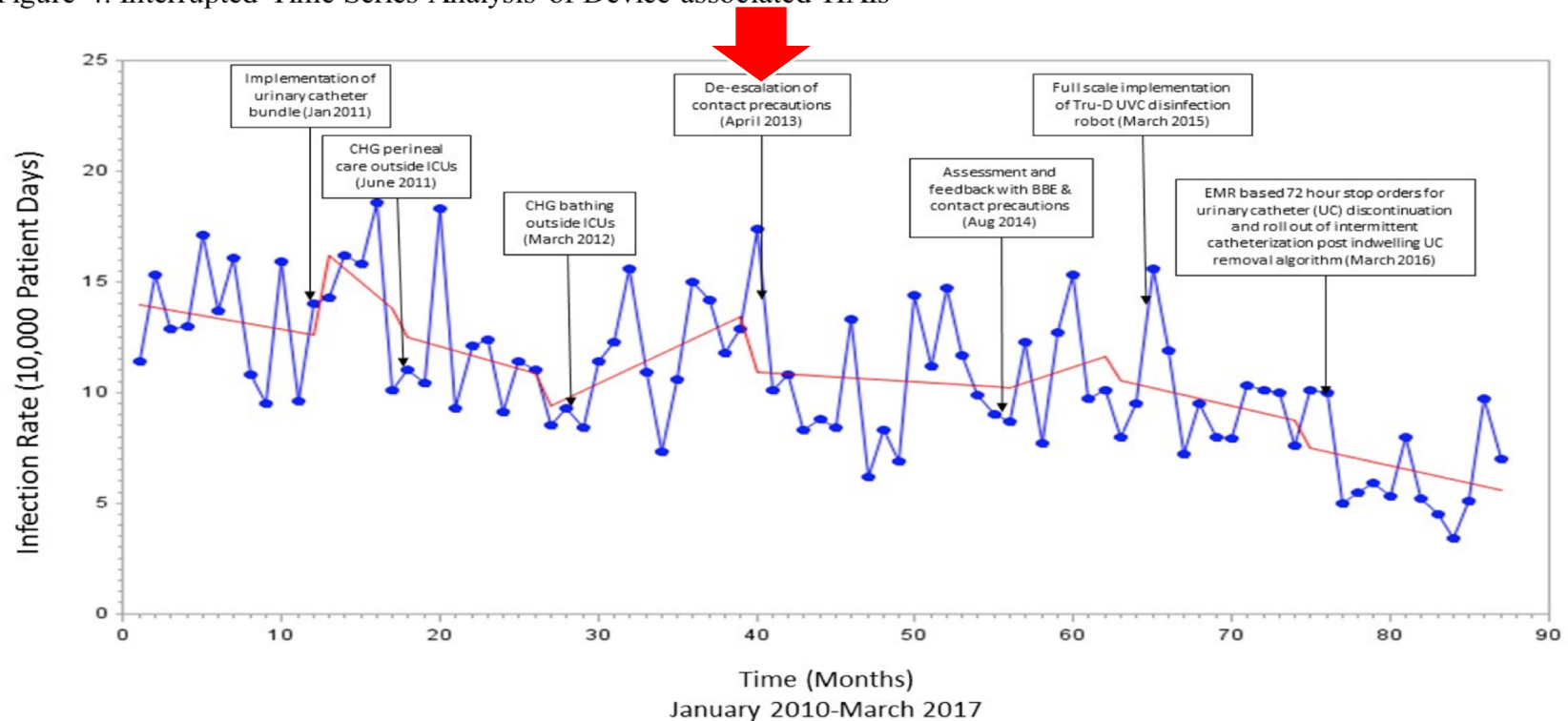
De-escalation of contact precautions: no significant (negative) impact on already decreasing 7-year trends of MRSA and VRE HAIs

Bearman G et al. *Infect Control Hosp Epidemiol*. February 2018. In press

VCU De-CP Interrupted Time Series Analysis of Device-associated HAIs

Series: All Pathogens DAIs

Figure 4. Interrupted Time Series Analysis of Device-associated HAIs



De-escalation of contact precautions: no significant (negative) impact on already decreasing 7-year trends of ALL device associated HAIs

Bearman G et al. *Infect Control Hosp Epidemiol*. February 2018. In press

We Are Not Alone....

- **Virginia Commonwealth University MC**
- **University of Massachusetts (2 hospitals)**
- **Detroit MC (7 hospitals)**
- **Tufts- New England MC**
- **St. Johns MC, Santa Monica, CA**
- **University of Rochester MC**
- **Baylor St. Luke's MC**
- **UCLA (2 hospitals)**
- **University of Nebraska MC**
- **San Francisco General Hospital**
- **University of San Francisco MC**
- **Alta Bates MC, Oakland, CA**
- **University of Cincinnati MC**
- **Oakwood Hospital System, MI (4 hospitals)**
- **Baystate hospitals (multiple hospitals)**
- **Dartmouth MC**
- **Cleveland Clinic (10 hospitals)**



Viewpoint



July 25, 2017

More ▾

Contact Precautions for Endemic MRSA and VRE Time to Retire Legal Mandates

Daniel J. Morgan, MD, MS^{1,2}; Richard P. Wenzel, MD, MSc³; Gonzalo Bearman, MD, MPH³

Editorial published in *Journal of the American Medical Association*:

Hospitals should reconsider best use of contact precautions for endemic MRSA and VRE in the context of a broad approach to infection control targeting the highest-value interventions

Morgan DJ, Wenzel RP, Bearman G. *JAMA*. 2017;318(4):329-330

Conclusion

- Contact Precautions- limited impact on endemic MDROs
 - For control of endemic pathogens is generally backed by weak evidence
 - Although backed by the high quality UGG trial, infection prevention outcomes were modest
- Contact Precautions- important considerations
 - Increase use of CP may lead to poorer adherence
 - May be associated with potential adverse effects
- Alternative approach for the control of endemic pathogens
 - Horizontal IC Program is the starting point
 - Universal gloving may be an infection prevention adjunct
- Contact Precautions for endemic pathogens should be driven by local need and used selectively

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- Dr. Michael Stevens
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