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

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  – Pfizer Pharmaceuticals
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  – Vestagen Technologies
  – Cardinal Healthcare
  – Molnlycke Health Care
  – AO (Orthopedic) Society Grant
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.”
• 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

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

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?
Prospective, observational cohort study 2009- across 11 University Hospitals

<table>
<thead>
<tr>
<th>Contact Isolation Burden</th>
<th>Hand Hygiene</th>
<th>Compliance Contact Precautions Bundle</th>
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</thead>
<tbody>
<tr>
<td>20% or less</td>
<td>44% compliance</td>
<td>32% compliance</td>
</tr>
<tr>
<td>60% or greater</td>
<td>5% compliance</td>
<td>7% compliance</td>
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### Adverse Outcomes Associated With Contact Precautions

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


Morgan DJ, Diekema DJ, Sepkowitz K, Perencevich E. AJIC 37; 2009: 85-93
- 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= 3+
- N=17 +/-

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

Incorrect Technique Results in Skin and Clothing Contamination

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’

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

Phase I
- Contact precautions for VRE, MRSA colonized/infected pts
- VRE, MRSA surveillance cultures on admission & every 4 days
- Hand hygiene compliance, HCW hand cultures & skin assessment

Phase II
- Universal gloving; no contact precautions for any pathogen
- Concurrent surveillance for hospital acquired infections

# Results: Universal Gloving Protocol

## HAI Rates

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Phase I</th>
<th>Phase II</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSI/ 1,000 catheter days</td>
<td>3.7</td>
<td>2.6</td>
<td>0.096</td>
</tr>
<tr>
<td>UTI/ 1,000 catheter days</td>
<td>8.9</td>
<td>7.8</td>
<td>0.096</td>
</tr>
<tr>
<td>Pneumonia/ 1,000 ventilator days</td>
<td>1.0</td>
<td>1.1</td>
<td>0.090</td>
</tr>
<tr>
<td>Total MRSA/VRE Infections</td>
<td>4</td>
<td>2</td>
<td>NA</td>
</tr>
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Hand Hygiene Compliance

Hand hygiene is the cornerstone of any infection prevention strategy

Number of HH observers: 10 - Inter-rater reliability Kappa 0.897
Quasi-experimental study design in acute care pediatrics

<table>
<thead>
<tr>
<th></th>
<th>RR</th>
<th>P value</th>
</tr>
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<tbody>
<tr>
<td>BSI</td>
<td>0.63</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>CLABSI</td>
<td>0.61</td>
<td>0.003</td>
</tr>
<tr>
<td>HAP/ VAP/ CDAD</td>
<td>No impact</td>
<td>NA</td>
</tr>
</tbody>
</table>

“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?
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
“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

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

Reconsidering Contact Precautions for Endemic MRSA and VRE: Results

Survey of SHEA Research Network

Survey responses (%)

- CP used currently for MRSA or VRE
- Interested in alternate options to CP
- Wish to use CP for symptoms (not MDRO status)
- Wish not to use CP for endemic VRE
- Wish not to use CP for endemic MRSA

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

State of the science review

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

Ravina Kullar PharmD, MPH, Angela Vassallo MPH, MS, CIC, Sarah Turkel MPH, MS, MT(ASCP), Teena Chopra MD, MPH, Keith S. Kaye MD, MPH, Sorabh Dhar MD

- 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

<table>
<thead>
<tr>
<th>MRSA</th>
<th>Device Associated Infections</th>
<th>N (rate/1,000 patient days)</th>
<th>Q1 12- Q1 13 (CP )</th>
<th>Q2 13- Q2 14 (No CP )</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wards</td>
<td>12 (0.060)</td>
<td>9 (0.043)</td>
<td>0.46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICUs</td>
<td>3 (0.057)</td>
<td>3 (0.054)</td>
<td>0.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>15 (0.059)</td>
<td>12 (0.046)</td>
<td>0.49</td>
<td></td>
<td></td>
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<table>
<thead>
<tr>
<th>VRE</th>
<th>Device Associated Infections</th>
<th>N (rate/1,000 patient days)</th>
<th>Q1 12- Q1 13 (CP )</th>
<th>Q2 13- Q2 14 (No CP )</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wards</td>
<td>16 (0.080)</td>
<td>13 (0.063)</td>
<td>0.52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICUs</td>
<td>6 (0.057)</td>
<td>4 (0.072)</td>
<td>0.70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>22 (0.087)</td>
<td>17 (0.065)</td>
<td>0.91</td>
<td></td>
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</tbody>
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MRSA and VRE Contact Precautions Discontinued for Colonized or Infected Patients
Aggressive HH, BBE, chlorhexidine patient bathing and care bundles

Impact on all Device Associated Infections - All Pathogens

Decreases in all HAIs observed (Ward CLABSI p=.004)

<table>
<thead>
<tr>
<th></th>
<th>ICU-CAUTI (P=.87)</th>
<th>ICU-CLABSI (P=.23)</th>
<th>ICU-VAP (P=.89)</th>
<th>Ward-CAUTI (P=.23)</th>
<th>Ward-CLABSI (P=.004)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional CP Practice</td>
<td>3.0</td>
<td>1.6</td>
<td>0.7</td>
<td>1.9</td>
<td>2.0</td>
</tr>
<tr>
<td>Discontinuation of CP Practice</td>
<td>2.9</td>
<td>1.3</td>
<td>0.7</td>
<td>1.5</td>
<td>1.3</td>
</tr>
</tbody>
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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

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

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

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

* 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**

VCU De-CP Interrupted Time Series: MRSA and VRE Infections

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

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

We Are Not Alone....

- Virginia Commonwealth University MC
- University of Massachusetts (2 hospitals)
- Detroit MC (7 hospitals)
- Tufts- New England MC
- St. John's 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)
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

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
Acknowledgements

- Dr. Richard Wenzel
- Dr. Mike Edmond
- Dr. Michael Stevens
- Dr. Michelle Doll
- Nadia Masroor BS, MPH
- VCU Hospital Infection Prevention Program