Debate – Contact Precautions are Essential for the Management of Patients with MDROs
Prof. Eli Perencevich and Dr. Fidelma Fitzpatrick
Broadcast live from the Infection Prevention Society conference (www.ips.uk.net)

Debate ....

House believes contact precautions are essential for the management of patients with MDROs

Speaking FOR the motion ..... Prof. Eli Perencevich
University of Iowa

Speaking AGAINST the motion ..... Dr. Fidelma Fitzpatrick
Royal College of Surgeons in Ireland

www.webbertraining.com  September 27, 2016

FOR: House believes contact precautions are essential for the management of patients with MDROs

Eli Perencevich, MD MS
Professor of Internal Medicine
University of Iowa, Carver College of Medicine
PI and Director, VA HSR&D Center for Comprehensive Access and Delivery Research & Evaluation
Controversies Blog: stopinfections.org
eli-perencevich@uiowa.edu
Twitter: @eliowa

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Conflicts of Interest Statement

- No financial conflicts
- Section Editor for Guidelines, Position Papers, and Invited Reviews @ ICHE
- Federal Funding
  - VA HSR&D (COIN and CREATE)
  - CDC Prevention Epicenter
  - AHRQ

Contract Precautions Prevent Transmission

My Experience with Contact Precautions

Basics of How Contact Precautions Work

Review “Side Effects”

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Hand Hygiene Completely Dead

- “Hand Hygiene Compliance: are we kidding ourselves?”¹
- Targets set at >90%, met by most facilities
- 2009-2014 Systematic Review²
  - Mean compliance before intervention 34%
  - After intervention 57%
- If we can’t do hand hygiene, we need SOMETHING to prevent transmission

FOR MORE INFO...

Significant patient-to-patient spread occurring in ICUs

- Prospective cohort, 5 ICUs in 2 hospitals¹
  - Genetically linked 10 pathogens
  - 14.5% of infections could be pt-to-pt
- Prospective cohort, German ICU²
  - PFGE for MRSA and PCR
  - 37.5% of nosocomial infections could be due to cross-transmission

FOR MORE INFO...

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How CP are typically utilized

- Linked to active surveillance of MDRO patients
- Appears we are protecting HCW?

How might CP be better utilized?

- Strategies that isolate MDRO- patients protect them
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Benefits of Active Surveillance (VRE)

Table 2. Estimated number of incident vancomycin-resistant enterococci (VRE) acquisitions and absolute number and proportion of cases prevented in 1 year with 3 competing infection-control strategies, after 1000 model simulations.

<table>
<thead>
<tr>
<th>Infection control strategy</th>
<th>Average no. of incident VRE acquisitions</th>
<th>Estimated no. of incident cases of VRE colonization/infection prevented, compared with no surveillance strategy</th>
<th>Reduction of cases of VRE colonization/infection, compared with no surveillance strategy, %</th>
</tr>
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<tbody>
<tr>
<td>No surveillance</td>
<td>118</td>
<td>...</td>
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<td>Passive surveillance only</td>
<td>113</td>
<td>5</td>
<td>4.2</td>
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<td>Immediate isolation and removal of patient after culture results are determined to be negative</td>
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NOTE: Each strategy is compared with a setting where no surveillance is in place.

For More Info...

Benefits of Isolation for VRE

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You can’t study with Math Models

- The article by Perencevich et al. has potential for moving ... infection-control communities closer to a tipping point on the control of this important pathogen... It has this potential because the model seems to be logical and mathematically correct (and) provides valuable insight into the importance of variables such as the prevalence of culture positivity at ICU admission and the duration of ICU stay.” – Barry Farr, Clin Infect Dis 2003

Interventions Targeting Transmission

Key question: How many colonized become infected? 20:1 vs 10:1 vs 1:1

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Studies don’t include post-discharge infections

- Including 30-day post discharge incident MRSA infections tripled median incidence¹
  - From 12.2 to 35.7/10,000 at risk admissions, p<0.01
  - Limited by use of ICD-9 code for MRSA
- Prospective cohort of 281 MRSA carriers²
  - 40% MRSA infections occurred during later hospitalizations, higher risk for recent carriers
- Prospective cohort of 209 new carriers³
  - 49% of incident MRSA infections were post-discharge

FOR MORE INFO...

Difficult to study contact precautions

- Need surveillance swabs on admission/discharge to measure benefits
  - Sensitivity/specificity/costs of surveillance tests
  - Typically look at only 1-2 organisms
  - Very hard to power/design good efficacy trials
    - More likely to be underpowered/negative studies
- RCTs can’t answer for all conditions
  - Organism prevalence, ICU length of stay
  - Need cohort studies and math models

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Don’t wait for RCT

- Must consider other forms of epidemiological data when assessing benefits of contact precautions
- We will be waiting for years for well-powered RCTs
- Airline safety:
  - Tray tables up before take-off – RCT?
  - No sleeping in aisles of plane – RCT?
  - Parachutes

My Contact Precautions Decade

- July 2002, MICU
- Everyone on vacation, except...
- 5 patients with MDR-AB bacteremia in July
- 4 in August
- Control plan
- Shut MICU
- Press
- Ban artificial nails
What happened?

- Lawsuits
- Closed MICU 2002
- Closed SICU 2007 and 2009
- Closed several Shock Trauma ICUs
- Universal gown/glove in MICU and SICU¹
- Active surveillance on all transfers from OSH; isolated until cultures return
- Statewide AB surveillance (2010)

¹ Wright MO et al, Infect Control Hosp Epi
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Research Questions

- 1. How important are contact precautions for MRSA, VRE, MDR *A. baumannii* or MDR *P. aeruginosa*?
- 2. How important is hand-hygiene after using contact precautions for MDR *A. baumannii*?

FOR MORE INFO...

Methods

- Cultured hands
  - before entry
  - gowns/gloves after exit
  - hands after gown/glove removal before hand hygiene
Transmissibility and Protection

<table>
<thead>
<tr>
<th>Organism</th>
<th>HCW Room Entries</th>
<th>Hand + Before (%)</th>
<th>Gown and/or Glove + After %</th>
<th>Hands + After Removal</th>
<th>Effectiveness of PPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. baumannii¹</td>
<td>202</td>
<td>1.5%</td>
<td>38.7%</td>
<td>4.5%</td>
<td>88%</td>
</tr>
<tr>
<td>P. aeruginosa¹</td>
<td>133</td>
<td>0%</td>
<td>8.2%</td>
<td>0.7%</td>
<td>90%</td>
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<tr>
<td>VRE²</td>
<td>94</td>
<td>0%</td>
<td>9%</td>
<td>0%</td>
<td>100%</td>
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<tr>
<td>MRSA²</td>
<td>81</td>
<td>2%</td>
<td>19%</td>
<td>2.6%</td>
<td>85%</td>
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</tbody>
</table>

FOR MORE INFO...

Effectiveness of Gloves

- 50 HCW contacts with VRE+ patients
- 44 with Hands negative for VRE prior to contact
  - 6 were VRE+ before enrollment and excluded
- 17 of 44 HCW (39%) acquired VRE on their gloves
- 12 of these 17 (71%) HCW hands were VRE negative
- Thus, gloves reduce VRE transmission by ~70%

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More evidence for gloves

- Cultured patient, environment and 103 HCW hands/gloves before and after 131 observations
- 52% contaminated on gowns/gloves after touching environment
- 70% contaminated after touching patient/environment
- Hands contaminated 37% of time if no gloves
- Only 5% hand contamination if gloves worn
- **86% benefit of gloves**

FOR MORE INFO...
Hayden M et al. ICHE 2008 Feb;29(2):149-54

Transmission Matrix

How likely is a HCW to be contaminated after leaving room?

- Transmission data for MDR *A. baumannii*
- In relationship to compliance rates
- Assumption of independence of rates and 100% eradication with hand-hygiene

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### A. baumannii: Transmission from Pt to HCW with Variable Compliance

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Compliance with Gloves (patients on contact precautions)

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### Transmission from Patient to HCW with 50% hand hygiene compliance

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Compliance with Gloves (patients on contact precautions)
## What about 90% hand hygiene compliance?

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## What about 90% hand hygiene and 70% CP compliance?

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Compliance with Gloves (patients on contact precautions)

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Contact Precautions Improve Hand Hygiene Compliance

- In long-term care, contact precautions associated with higher hand hygiene compliance\(^1\)
  - Before interaction RR 1.76 (0.71-4.33)
  - After interaction RR 2.68 (1.67-4.30)
- 4 acute care hospitals with 7,743 HCW visits\(^2\)
  - Entry compliance: 42.5% on CP vs 30.3%, p=0.14
  - Exit compliance 63.2% on CP vs 47.4%, p<0.001
- 38% hand hygiene after gloves vs 9.8% in ICUs\(^3\)

FOR MORE INFO...

But what about this famous study?

“The Dirty Hand in the Latex Glove”: A Study of Hand Hygiene Compliance When Gloves Are Worn

Christopher Fuller, MSc\(^1\) Joanne Savage, MSc\(^1\) Sarah Beser, MSc\(^1\) Andrew Hayward, MD\(^2\)
Barry Cookson, FRCPATH\(^3\) Ben Cooper, PhD\(^3\) Sheldon Stone, MD\(^3\)

- 56 wards in 15 hospitals
  - England and Wales
  - International Press

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### Table 2. Rates of Compliance with Hand Hygiene When Gloves Were Worn and When Gloves Were Not Worn

<table>
<thead>
<tr>
<th>Type of moment</th>
<th>Proportion (%) of moments with hand hygiene compliance</th>
<th>RR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>When gloves were worn</td>
<td>When gloves were not worn</td>
</tr>
<tr>
<td>All</td>
<td>415/1,002 (41.4)</td>
<td>1,344/2,686 (50.0)</td>
</tr>
<tr>
<td>By location</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intensive therapy unit</td>
<td>246/514 (47.9)</td>
<td>488/896 (54.5)</td>
</tr>
<tr>
<td>ACE/GM ward</td>
<td>169/488 (34.6)</td>
<td>856/1,790 (47.8)</td>
</tr>
<tr>
<td>By risk level</td>
<td></td>
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</tr>
<tr>
<td>High-risk contact</td>
<td>213/484 (44.0)</td>
<td>72/123 (58.5)</td>
</tr>
<tr>
<td>Low-risk contact</td>
<td>203/518 (39.2)</td>
<td>1,272/2,563 (49.6)</td>
</tr>
<tr>
<td>By timing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before contact</td>
<td>98/330 (29.7)</td>
<td>170/424 (40.1)</td>
</tr>
<tr>
<td>After contact</td>
<td>317/672 (47.2)</td>
<td>1,174/2,262 (51.9)</td>
</tr>
</tbody>
</table>

**Note:** ACE/GM; acute care of the elderly and general medical; CI, confidence interval; RR, risk ratio.

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**FOR MORE INFO...**

Fulmer C. et al. ICHE 2011

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**Minimal change AFTER contact**
AND no need to perform hand hygiene before donning gloves

- Prospective randomized trial of 230 HCW entering ICU rooms
  - Directly don nonsterile gloves
  - Perform hand hygiene and then don nonsterile gloves
- No significant difference in colony counts of gloved hands between groups, \( p=0.52 \)
  - Ratio of mean colony counts 0.86 (0.53-1.37)

But do they work?

- Medical ICU implemented universal contact precautions during Maryland’s Acinetobacter outbreak
- Quasi-experimental study, 6 months before/after
- Outcome: Acquisition of VRE and MRSA assessed with admission, weekly and discharge cultures
  - VRE acquisition declined, 21% to 9%, \( p=0.05 \)
  - MRSA acquisition declined 14% to 10%, \( p=0.5 \)
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BUGG

Original Investigation
Universal Glove and Gown Use and Acquisition of Antibiotic-Resistant Bacteria in the ICU
A Randomized Trial

- Match-paired cluster-RCT, 9 months
- 20 medical and surgical ICUs, 20 US Hospitals
- Powered to detect 25% reduction in VRE or MRSA
- $5.7 million dollars

Harris AD, et al. JAMA 2013

FOR MORE INFO...

BUGG Intervention

- 26,180 patient admissions
- 92,241 swabs collected, over 84% compliance
- Intervention ICUs
  - Glove compliance 86%, gown 85%
- Control ICUs (10.5% on contact precautions)
  - Glove compliance 84%, gown 81%
- Comparing 85% patients under CP vs 8.5%

Harris AD, et al. JAMA 2013

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MRSA and/or VRE

- MRSA and VRE -1.71 acquisitions per 1000 patient days (-6.15 to 2.73, p=0.57)
- VRE 0.89 acquisitions/1000 patient days, p=0.70
- MRSA reduced -2.98 acquisitions/1000 patient days, (-5.58 to -0.38, p=0.046)

- 40.2% reduction in MRSA in the intervention group vs 15% reduction in the control group

Other outcomes

- HCW visited one fewer time per hour
  - 4.28 vs 5.24, p=0.02
- Hand hygiene compliance on entry didn’t differ
- Hand hygiene on exit improved with CP
  - 78.3% vs 62.9%, p=0.02
- No change in CLABSI, CAUTI, VAP or mortality rates

FOR MORE INFO...
Harris AD, et al. JAMA 2013

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Other infection related outcomes?

- HCW visited one fewer time per hour
  - 4.28 vs 5.24, p=0.02
- Hand hygiene compliance on entry didn’t differ
- Hand hygiene on exit improved with CP
  - 78.3% vs 62.9%, p=0.02
- No change in CLABSI, CAUTI, VAP or mortality rates

For more info...
Harris AD, et al. JAMA 2013

No difference in adverse events

- Random selection (N=90/ICU), chart review
- IHI Global trigger tool

<table>
<thead>
<tr>
<th>Adverse events</th>
<th>All</th>
<th>Preventable</th>
<th>Nonpreventable</th>
<th>Severe</th>
<th>Not severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>266</td>
<td>134</td>
<td>132</td>
<td>163</td>
<td>103</td>
</tr>
<tr>
<td>Adverse events</td>
<td>4585</td>
<td>4585</td>
<td>4585</td>
<td>4585</td>
<td>4585</td>
</tr>
<tr>
<td>Days</td>
<td>58.7</td>
<td>29.0</td>
<td>33.0</td>
<td>36.5</td>
<td>23.6</td>
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<tr>
<td>(95% CI)</td>
<td>(58.7 to 75.2)</td>
<td>(20.0 to 42.1)</td>
<td>(24.3 to 45.0)</td>
<td>(25.2 to 52.8)</td>
<td>(15.7 to 35.5)</td>
</tr>
<tr>
<td>Median</td>
<td>369</td>
<td>156</td>
<td>213</td>
<td>245</td>
<td>124</td>
</tr>
<tr>
<td>(IQR)</td>
<td>4846</td>
<td>4846</td>
<td>4846</td>
<td>4846</td>
<td>4846</td>
</tr>
<tr>
<td>(74.4 to 95.6)</td>
<td>(30.4 to 42.7)</td>
<td>(43.3 to 60.4)</td>
<td>(48.1 to 64.8)</td>
<td>(25.0 to 33.2)</td>
<td></td>
</tr>
</tbody>
</table>

FOR MORE INFO...
Harris AD, et al. JAMA 2013

A Webber Training Teleclass
www.webbertraining.com
But what about the other bad side effects of contact precautions studies?

<table>
<thead>
<tr>
<th>General Cohort</th>
<th>Controls n=156</th>
<th>Congestive Heart Failure Cohort</th>
<th>Controls n=144</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precautions n=78</td>
<td>Precautions n=72</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Outcomes:

- **Length of Stay**
  - General Cohort: 31 vs. 12 days
  - Congestive Heart Failure Cohort: 8 vs. 6 days

- **Any Adverse Event**
  - General Cohort: 17% vs. 7%
  - Congestive Heart Failure Cohort: 47% vs. 25%

- **Preventable AE**
  - General Cohort: 12% vs. 3%
  - Congestive Heart Failure Cohort: 29% vs. 4%

- **Death**
  - General Cohort: 27% vs. 18%
  - Congestive Heart Failure Cohort: 21% vs. 15%

---

**FOR MORE INFO...**

Stelfox et al. JAMA October 2003
Debate – Contact Precautions are Essential for the Management of Patients with MDROs  
Prof. Eli Perencevich and Dr. Fidelma Fitzpatrick  
Broadcast live from the Infection Prevention Society conference (www.ips.uk.net)

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</table>

### Outcomes:
- **Length of Stay***: 31 vs. 12 days, 8 vs. 6 days
- **any Adverse Event***: 17% vs. 7%, 47% vs. 25%
- **Preventable AE***: 12% vs. 3%, 29% vs. 4%
- **Death**: 27% vs. 18%, 21% vs. 15%

**Study never adequately controlled for severity of illness**

<table>
<thead>
<tr>
<th>Preventable AE*</th>
<th>Controls n=156 vs. Precautions n=72</th>
<th>Controls n=144 vs. Precautions n=72</th>
</tr>
</thead>
<tbody>
<tr>
<td>12% vs. 3%</td>
<td></td>
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<tr>
<td>27% vs. 18%</td>
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</table>

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Stelfox et al. JAMA October 2003

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Contact Precautions associated with reduced healthcare worker visits

<table>
<thead>
<tr>
<th>Design</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kirkland &amp; Weinstein 1999</td>
<td>Cohort 2.1 vs. 4.2 hourly contacts with HCWs</td>
</tr>
<tr>
<td>Saint et al 2003</td>
<td>Cohort 35% vs. 73% patients examined by attending physicians</td>
</tr>
<tr>
<td>Evans et al 2003</td>
<td>Matched cohort 5.3 vs. 10.9 contacts HCWs 22% less contact time overall</td>
</tr>
<tr>
<td>Morgan et al 2013</td>
<td>Cohort 2.78 vs. 4.37 visits/hour 17.7% less contact time 23.6% fewer visitors</td>
</tr>
<tr>
<td>Harris et al 2013</td>
<td>Randomized controlled trial 4.28 vs. 5.24 visits/hour</td>
</tr>
</tbody>
</table>

Are reduced visits “independently” bad?

- Independently = bad for patients without causing other problems
- If no adverse events in RCT then reduced visits could be good for patients (or at least not bad)
- Fewer visits = fewer opportunities to transmit infections
- Fewer visits = fewer disruptions
  - Detsky and Krumholz, reducing trauma of hospitalization (post-hospital syndrome)

Detsky AS and Krumholz HM, JAMA June 2014

FOR MORE INFO...

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Psychology of Isolation

<table>
<thead>
<tr>
<th>Setting</th>
<th>Design</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kennedy &amp; Hamilton 1997</td>
<td>Spinal Cord</td>
<td>85% believed CP limited rehab, More Anger</td>
</tr>
<tr>
<td></td>
<td>rehab unit</td>
<td>12.3 vs. 16.5 depression scores (NS)</td>
</tr>
<tr>
<td></td>
<td>16 cases/16</td>
<td>controls</td>
</tr>
<tr>
<td>Gammon 1998</td>
<td>Wards, 3 hospitals</td>
<td>30% higher depression and anxiety scores</td>
</tr>
<tr>
<td></td>
<td>20 cases/20</td>
<td>controls</td>
</tr>
<tr>
<td>Tarzi et al 2001</td>
<td>Rehab unit</td>
<td>33% vs. 77% depression</td>
</tr>
<tr>
<td></td>
<td>20 cases/20</td>
<td>controls</td>
</tr>
<tr>
<td>Wassenberg et al. 2010</td>
<td>Tertiary Hospital</td>
<td>Small, nonsignificant difference in depression/anxiety at admission</td>
</tr>
<tr>
<td></td>
<td>42 cases/84</td>
<td>controls</td>
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<tr>
<td>Day et al. 2011</td>
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</tr>
<tr>
<td></td>
<td>20 cases/83</td>
<td>controls</td>
</tr>
<tr>
<td>Day et al. 2011</td>
<td>Tertiary Hospital</td>
<td>40% more diagnoses of depression</td>
</tr>
<tr>
<td></td>
<td>Cohort of 28,564</td>
<td>No difference in diagnosis of anxiety</td>
</tr>
</tbody>
</table>

Cross-sectional studies. Studies have not controlled for baseline characteristics and underlying disease severity

Isolated patients are sicker independent of contact precautions exposure

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<th>Effect</th>
</tr>
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</table>

A Webber Training Teleclass
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Patients on contact precautions are not more likely to develop depression or anxiety

- Prospective cohort of medical/surgical patients
  - Matched on hospital ward and month
- 148 exposed (contact precautions) vs 148 controls
- Enrolled on admission
  - 36-item questionnaire
  - Medical/Psychiatric history
  - Hospital Anxiety and Depression Scale (HADS)
  - Visual analog mood scales (VAMS)

Stable Depression Symptoms with CP

![Graph showing HADS-D scores over time for patients on and not on contact precautions.](image)
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Prof. Eli Perencevich and Dr. Fidelma Fitzpatrick
Broadcast live from the Infection Prevention Society conference (www.ips.uk.net)

Stable Anxiety Symptoms with CP

Contact Precautions Associated with Fewer Adverse Events

<table>
<thead>
<tr>
<th>Type of Adverse Event</th>
<th>RR (95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noninfectious adverse events&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.70 (0.51–0.95)</td>
<td>.02</td>
</tr>
<tr>
<td>Prior hospitalization in previous 30 days</td>
<td>1.22 (0.87–1.70)</td>
<td>.25</td>
</tr>
<tr>
<td>Charlson comorbidity score ≥2</td>
<td>1.04 (0.75–1.45)</td>
<td>.80</td>
</tr>
<tr>
<td>Male gender</td>
<td>0.73 (0.54–0.99)</td>
<td>.05</td>
</tr>
<tr>
<td>Preventable noninfectious adverse events&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.85 (0.59–1.24)</td>
<td>.41</td>
</tr>
<tr>
<td>Male gender</td>
<td>0.67 (0.46–0.98)</td>
<td>.04</td>
</tr>
<tr>
<td>Charlson comorbidity score ≥2</td>
<td>0.89 (0.60–1.33)</td>
<td>.57</td>
</tr>
</tbody>
</table>

FOR MORE INFO...
Croft LD etc., ICHE November 2015

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USE CONTACT PRECAUTIONS – NO FEAR

- Hand hygiene compliance remains poor
  - Contact Precautions 80-100% effective in reducing hand contamination
- Contact Precautions often bundled with active surveillance, but are effective alone
  - Data strongest for MRSA (also VRE, Acinetobacter)
- Side-effects greatly overblown
- Longer, less frequent HCW visits could be beneficial

Acknowledgements

- Anthony Harris
- Daniel Morgan
- Hannah Day
- J Kristie Johnson
- Jon Furuno
- Marin Schweizer
- Daniel Diekema
- Kent Sepkowitz
- Graeme Forrest
- Heather Reisinger
- Margaret Graham
- Michelle Shardell
- Lisa Pineles
- Kerri Thom
- Peter Kim
- Mary Claire Roghmann

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Thank you

Thank you – Questions?

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  - Data strongest for MRSA (also VRE, Acinetobacter)
- Side-effects greatly overblown
- Longer, less frequent HCW visits could be beneficial

QUESTIONS? @eliowa eli-perencevich@uiowa.edu stopinfections.org

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“This house believes that contact precautions are essential for the management of patients with MDROs”

Dr. Fidelma Fitzpatrick,
Senior Lecturer, Royal College of Surgeons in Ireland,
Consultant Microbiologist, Beaumont Hospital,
Dublin, Ireland
@ffitzP

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WHAT ARE CONTACT PRECAUTIONS?

Standard Precautions \textit{plus something else}

- Containment
  - Patients: Single room – cohort
  - Staff
- Dedicated equipment and supplies
- PPE
  - What?
    - Gloves
    - Apron
    - Long sleeved gown
    - Mask (???)
  - When to put on?
    - Before entering or red zone
  - Who?
    - Staff
    - Visitors?

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Approx 15% hospitalised patients under contact precautions at any one time

28.5% ICU / 19% ward

MRSA/VRE alone

HOW DO WE USUALLY DECIDE WHO GETS THEM?

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- Active screening
  - All
  - ‘high risk’ (whatever that is)
- Positive clinical cultures
- Previous MDRO
  - Forever
  - If not decolonised
- All of the above

WHY DO WE DO IT?

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OUTBREAKS

- July 1991-Jan 1992
- Contact precautions (CP) vs. none in NICU
  - Mask + gown + gloves + isolation + staff screening
  - Rate of MRSA transmission/d
    - CP 0.009 vs. none 0.140
- Discussion – older papers with failure of CP

Endemic MDRO
No study of Contact Precautions (CP) vs. none!

1. ICU:
   Universal gown/glove vs. CP MRSA/VRE
   - Decrease MRSA transmission (not VRE)
2. ICU + wards:
   CP - no CP (+ daily chlorhex + HH + bare below elbows)
   - No change MRSA/VRE device infection
3. ICU + wards:
   MRSA bundle (included CP)

<table>
<thead>
<tr>
<th></th>
<th>ICU</th>
<th>Non ICU</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRSA transmission</td>
<td>Down 17%</td>
<td>Down 21%</td>
</tr>
<tr>
<td>HCA MRSA infection</td>
<td>Down 62%</td>
<td>Down 45%</td>
</tr>
<tr>
<td>HCA VRE infection</td>
<td>Down to zero</td>
<td>Down 73%</td>
</tr>
</tbody>
</table>
Debate – Contact Precautions are Essential for the Management of Patients with MDROs
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Endemic MDRO

<table>
<thead>
<tr>
<th>No study</th>
<th>Strategies</th>
<th>Domains</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ICU:</td>
<td>Vertical Interventions</td>
<td>MRSA-specific interventions</td>
<td>Active surveillance screening</td>
</tr>
<tr>
<td>Universal</td>
<td>Contact precaution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decrease</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. ICU +</td>
<td>Expansion of local human resources</td>
<td>MPC position</td>
<td></td>
</tr>
<tr>
<td>CP - no CP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>No change</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. ICU +</td>
<td>Educational resources</td>
<td>Training resources for MPCs</td>
<td></td>
</tr>
<tr>
<td>MRSA but</td>
<td></td>
<td>Patient education materials</td>
<td></td>
</tr>
<tr>
<td>MRSA training</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HCA MRSA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leadership involvement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HCA VRE</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- ICU (n=18)
  - MRSA/VRE screening
  - Universal gloves till negative screen
  - CP if positive
  - Training after randomisation

Control
- Did the screens but did not tell staff the results
- Existing procedures to ID MRSA/VRE and CP if +
- Everybody else standard precautions

No difference in colonisation/infection with MRSA or VRE
ICU-level incidence of MRSA not associated with % ICU patient days on CPs

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Interventions to reduce colonisation and transmission of antimicrobial-resistant bacteria in intensive care units: an interrupted time series study and cluster randomised trial

13 EU ITUs
1. Baseline
2. Universal CHG + Hand hygiene improvement
   Reduced acquisition of MDRO – principally MRSA.
3. Screening (conventional/rapid) + contact precautions
   No incremental effect on acquisition.

Reconsidering Contact Precautions for Endemic Methicillin-Resistant Staphylococcus aureus and Vancomycin-Resistant Enterococcus

Mainly ICUs
CP rarely analysed separately from other interventions

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<table>
<thead>
<tr>
<th>Lead author</th>
<th>Trial design</th>
<th>Setting</th>
<th>Given</th>
<th>Colony</th>
<th>Universal</th>
<th>Targeted</th>
<th>Main findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burman et al</td>
<td>Before-after</td>
<td>ICU</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>No difference in VRE acquisition risk between CP and UG use</td>
</tr>
<tr>
<td>Burman et al</td>
<td>Before-after</td>
<td>ICU</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>No difference in VRE acquisition risk between CP and UG use</td>
</tr>
<tr>
<td>Bokler et al</td>
<td>RCT of 10</td>
<td>ICU</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Universal CP and UG had no effect on VRE acquisition but was associated with lower MSA acquisition</td>
</tr>
<tr>
<td>Hall et al</td>
<td>RCT 20</td>
<td>ICU</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>No impact of surveillance culturing and isolation for MDROs</td>
</tr>
<tr>
<td>Dele et al</td>
<td>Before-after</td>
<td>ICU</td>
<td>✓</td>
<td>✓</td>
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OTHER FACTORS RARELY TAKEN INTO ACCOUNT

• Sensitivity of screening (including staff technique)
• Endogenous MDRO
• Patients not screened = reservoir
• Other sources of transmission
  – Staff
  – Environment
  – Equipment….not everything can be dedicated
  – Outside healthcare – Food / water / agriculture etc

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WHAT HAPPENS IF WE DON’T USE THEM?

The Impact of Discontinuing Contact Precautions for VRE and MRSA on Device-Associated Infections

‘In the setting of a strong horizontal infection prevention platform, discontinuation of contact precautions had no impact on device-associated hospital-acquired infection rates’

ICHE 2015 35(8) 978-980
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Broadcast live from the Infection Prevention Society conference (www.ips.uk.net)

- Before: CP (contact precautions)
- After: No CP for MRSA/VRE unless draining wounds

  plus
  - Chlorhexidine bathing for most patients (except NICU etc)

- 2 hospitals

- No increase MRSA/VRE clinical culture rates

- $643,776/yr saved (no gowns / plus CHG)

- Nursing time on PPE before = 45,277hrs/year (estim $4.6 million).

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Prospective Validation of Cessation of Contact Precautions for Extended-Spectrum β-Lactamase–Producing Escherichia coli

- Transmission in 2/133 (1.5%) - Stopped CP
- 4.8% transmission
  - 4/151 – 2.6% (University Hospital)
  - 7/80 – 8.8% (Long term centre)

- Other Swiss studies
  - Hospitals: 2.8% transmission with contact precautions
  - Long term care: 6.5% transmission

WHAT DO THE EXPERTS (US) DO AND BELIEVE?

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Reconsidering Contact Precautions for Endemic Methicillin-Resistant
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<table>
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<tr>
<th>Institution/State</th>
<th>MRSA</th>
<th>VRE</th>
<th>C. difficile</th>
<th>MDR-GNB</th>
<th>Year (if known)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virginia Commonwealth University MC</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>2013</td>
</tr>
<tr>
<td>University of California (2 hospital campuses)</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>2010</td>
</tr>
<tr>
<td>Drexel MC (2 hospitals)</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>2016</td>
</tr>
<tr>
<td>Tufts-New England MC</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Prior to 2008</td>
</tr>
<tr>
<td>St. John's, Santa Monica, CA</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>University of Rochester</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>2014</td>
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<tr>
<td>Baylor St. Luke's</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>2015</td>
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<tr>
<td>UCSF (7 hospitals)</td>
<td>No</td>
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<td>Yes</td>
<td>No</td>
<td>2017</td>
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<tr>
<td>University of Nebraska MC</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
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<td>2012</td>
</tr>
<tr>
<td>San Francisco General Hospital</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>2011</td>
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<tr>
<td>University of San Francisco Medical Center</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>2011</td>
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<td>Rady Children's Hospital - San Diego</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>2010</td>
</tr>
<tr>
<td>Cleveland Clinic (9 hospitals)</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>2012</td>
</tr>
<tr>
<td>Hospital that practiced enhanced focus on hand hygiene compliance and HAI prevention bundles (horizontal interventions)</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Prior to 2008</td>
</tr>
<tr>
<td>Hospital that practiced enhanced focus on hand hygiene compliance and HAI prevention bundles (vertical interventions)</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Prior to 2008</td>
</tr>
</tbody>
</table>

Routine Use of Contact Precautions for Methicillin-Resistant
Staphylococcus aureus and Vancomycin-Resistant Enterococcus: Which Way Is the Pendulum Swinging?

- Triggers for Contact Precautions
  - clinical culture (97% MRSA, 98% VRE)
  - active surveillance (87% MRSA, 65% VRE),
  - preexisting HER alert (91% MRSA, 85% VRE),
  - suspicion of infection (36% MRSA, 20% VRE)

- Duration of isolation
  - Indefinite (18% MRSA, 31% VRE),
  - Until negative (69% MRSA, 54% VRE),
  - 1 year after + (17% MRSA, 13% VRE),
  - Specific inpatient encounters (7% MRSA, 8% VRE)
Debate – Contact Precautions are Essential for the Management of Patients with MDROs
Prof. Eli Perencevich and Dr. Fidelma Fitzpatrick
Broadcast live from the Infection Prevention Society conference (www.ips.uk.net)

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  - Specific inpatient encounters (7% MRSA, 8% VRE)

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ARE THERE ANY DOWNSIDES TO CONTACT PRECAUTIONS?

- The effect of contact precautions on healthcare worker activity in acute care hospitals. ICHE 2013;34:69-73
- Do physicians spend less time with patients in contact isolation? A time-motion study of internal medicine interns. JAMA Intern Med 2014;174:814-5
- Safety of patients isolated for infection control. JAMA 2003;290:1890-5.
- Depression, anxiety, and mood of hospitalized patients under contact precautions. ICHE 2009;34:251-8.

Taking Off the Gloves: Toward a Less Dogmatic Approach to the Use of Contact Isolation
Kathryn R. Kirkland

- Public health intervention to interrupt transmission
- Intended benefits not for the isolated patient but for other patients who may be at risk of acquiring infection if isolation is not imposed.
- Infringes on the personal rights of the individual in the name of protection of the public health

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PROBLEMS WITH CONTACT PRECAUTIONS?

- Patient:
  - Restricts free movement
  - Psychological
    - Loneliness – 23% fewer visitors
    - Stigma /depression (?) / anxiety (?)
    - X2 likely to perceive issues with their care
  - Receives different levels of care from staff?????
    - Reduced frequency of staff visits (36-50% less)
    - Less contact time (17-22% less)
    - Less likely to have vital signs recorded (51 vs 31%)
    - More likely to have no MD note (26 vs 13%)
    - More adverse events??
  - Delays in discharge
  - Patient satisfaction? More likely to complain

- Other Patients:
  - Admission delays

DELAYS

- Median time for CT
  9.8 hrs vs. 18.9 hrs (Contact Precautions)

MRSA status = predicted a longer ED stay
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COSTS

- Mean cost associated with MRSA/VRE isolation
  $400–$2000 per positive-patient per day

- PPE / isolation room

- Screening: + follow up + repeat testing -laboratory /
  ward / IPCT

- Hidden costs - time: Patient flow / IPCT managing
  isolation rather than more strategic issues / ward

- Unfactored costs: delayed discharge / postponed
  surgeries.
  - patients on CPs stay longer while awaiting transfer: mean 10.9 vs.
    4.3 days

- Who pays??

CONTACT PRECAUTIONS
- WE ARE NOT GREAT AT COMPLIANCE

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ETHICAL PRINCIPLES TO CONSIDER?

• Do we have justifiable goals and evidence for the effectiveness of contact precautions?
• Benefits vs. Harm
• Have we considered less harmful alternatives

Clinical Infectious Diseases 2009; 48:766–71

ISSUES OF FAIRNESS

• Why not use universally rather than variably to subsets of patients that you have just happened to ID as MDRO?
• Only isolating a subset of colonised patients =
  – unfairly subjects some patients to the risk of potential harm associated with contact precautions
  – unfairly deprives others from the transmission of MDRO
• Screening for select bugs will miss others that can equally be as pathogenic (e.g., MSSA)

Clinical Infectious Diseases 2009; 48:766–71

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### Vertical / Bug specific vs Horizontal

<table>
<thead>
<tr>
<th>Vertical / Bug specific</th>
<th>Horizontal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target specific pathogens</td>
<td></td>
</tr>
<tr>
<td>Active surveillance</td>
<td></td>
</tr>
<tr>
<td>Followed by measures to prevent transmission from colonised/infected patients to others.</td>
<td></td>
</tr>
<tr>
<td>- contact precautions,</td>
<td></td>
</tr>
<tr>
<td>- decolonisation</td>
<td></td>
</tr>
<tr>
<td>Narrow – specific pathogen</td>
<td></td>
</tr>
<tr>
<td>High resource utilization</td>
<td></td>
</tr>
<tr>
<td>? promotes exceptionalism (some organisms are more important that others)</td>
<td></td>
</tr>
<tr>
<td>Short term</td>
<td></td>
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</table>

*Debate – Contact Precautions are Essential for the Management of Patients with MDROs*

Prof. Eli Perencevich and Dr. Fidelma Fitzpatrick

Broadcast live from the Infection Prevention Society conference (www.ips.uk.net)

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Prof. Eli Perencevich and Dr. Fidelma Fitzpatrick
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<table>
<thead>
<tr>
<th>Vertical / Bug specific</th>
<th>Horizontal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Target specific pathogens</strong></td>
<td>Many pathogens</td>
</tr>
</tbody>
</table>
| Active surveillance | • Antimicrobial stewardship  
| Followed by measures to prevent transmission from colonised/infected patients to others.  
- contact precautions,  
- decolonisation | • Standard precautions – hand hygiene / environmental cleaning  
• Device Infection Prevention  
• Universal decolonization  
-Chlorhexidine bathing / SDD  
• Universal use of gloves or gloves and gowns |

| Narrow – specific pathogen | Broad – all pathogens |
| High resource utilization | Lower resource utilization |
| ? promotes exceptionalism (some organisms are more important than others) | utilitarian |
| Short term | Longer term |

---

THE KNOCK ON EFFECTS OF MRSA PREVENTION....WITH HORIZONTAL MEASURES?

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Domains</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical Interventions</td>
<td>MRSA-specific interventions</td>
<td>Active surveillance screening</td>
</tr>
<tr>
<td>Horizontal Interventions</td>
<td>Expansion of local human resources</td>
<td>MPC, position</td>
</tr>
</tbody>
</table>

- Cultural transformation  
  "Positive deviance" approach  
  "Emphasis on hand hygiene  
- Educational resources  
  Training resources for MPCs  
- Leadership involvement  
  Clarification of leadership responsibility

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WHY DO WE NEED TO RECONSIDER?

- Confusion and lack of evidence in endemic situation for additional benefit of Contact Precautions (CP)
  - What do we actually mean by CP?
  - Lots of studies in ICU
  - No studies of CP versus none
  - Those that abandon them to date mainly US
- Possible harm associate with them
- Active screening and implementation of contact precautions costs money and time (ward / lab / IPCT / patient flow)
- What about the patients we don’t screen?

VERTICAL APPROACHES AND MDRO

- CPE / other new or unusual MDRO
- Outbreaks
ENDEMIC MDRO

• When and where CP may provide additional benefits over standard precautions?
  – How?
  – Who and where?
    • All
    • High risk ??........what is this exactly anymore??
    • Contacts?
    • Long term care
    • OPD
    • Etc etc etc

Irl: only 55% MDR K. pneumoniae isolated in 24 hours of ID

• What do our patients want?
• What can we afford??
  – Screen everybody for all bugs?
  – Concentrate on doing the basics right?

BUG OR PERSON CENTERED CARE???

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HORIZONTAL + VERTICAL APPROACHES
NOT MUTUALLY EXCLUSIVE
CONTEXT MATTERS

• Isolation ‘fatigue’
• One size does not fit all
• CP as part of standard precautions (eg, with drainage that can’t be contained, use CP).

• Decision re CP not simple (hence variation in what we actually do in practice)
  – Institutional (MDRO epidemiology /infrastructure / staffing / culture)
  – Patient population
  – Regulatory
  – Scientific (eg evidence re colonisation duration)

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• No change VRE BSI.
• # VRE isolation = 32 to 6 beds/day (100% occupancy)
• Significant reductions CDI / MRSA rates

• Cost savings

• Value added features
  • 566 bed days for CDI isolation saved / less repairs and better turn around time etc

A USEFUL FRAMEWORK?

Table 1. Locally variable factors that may influence the likelihood of benefit of contact isolation.

<table>
<thead>
<tr>
<th>Local factor</th>
<th>Lower likelihood of benefit</th>
<th>Higher likelihood of benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand hygiene compliance by health care workers</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Epidemiology of health care-associated infections</td>
<td>Low endemic rates</td>
<td>Epidemic or uncontrolled rates</td>
</tr>
<tr>
<td>Organism of concern</td>
<td>All or easily treatable</td>
<td>Selected or difficult to treat</td>
</tr>
<tr>
<td>Prevalence of organism</td>
<td>Common</td>
<td>Rare</td>
</tr>
<tr>
<td>Clinical features of source patient</td>
<td>Asymptomatic</td>
<td>Vulnerable to infection because of age, immune status, or other risks</td>
</tr>
<tr>
<td>Clinical features of patients at risk of infection</td>
<td>Healthy</td>
<td></td>
</tr>
<tr>
<td>Physical environment</td>
<td>Clean, spacious, single rooms</td>
<td>Crowded, dirty wards</td>
</tr>
<tr>
<td>Available resources</td>
<td>Limited</td>
<td>Plentiful</td>
</tr>
</tbody>
</table>

Clinical Infectious Diseases 2009; 48:766–71

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FOR YOUR CONTEXT THINGS TO CONSIDER

• Resources
  – Infrastructure
  – Ward and infection control staffing
  – Laboratory capability
• Outbreak or endemic or unusual/rare MDRO
• MDROs are not all the same
  – Epidemiological reservoir
  – Potential to cause outbreaks
  – Environmental survival
  – Evidence to support contact precautions in the endemic setting
• Your transmission rates
• The patient!
  – Benefits vs. potential harm

ACKNOWLEDGEMENTS

• Ms. Sheila Donlon, Beaumont Hospital, Dublin.
• Ms. Catherine Lee, RCSI Library Beaumont Hospital, Dublin
• Dr. Sarah Tschudin Sutter, Basel, Switzerland.
• Mr. Martin Kiernan, Visiting Clinical Fellow, University of West London

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Prof. Eli Perencevich and Dr. Fidelma Fitzpatrick
Broadcast live from the Infection Prevention Society conference  (www.ips.uk.net)

September 28  (Free Teleclass – Broadcast live from the annual conference of the
Infection Prevention Society – www.ips.uk.net)
USING SCIENCE TO GUIDE HAND HYGIENE SURVEILLANCE AND
IMPROVEMENT
Prof. Eli Perencevich, University of Iowa

September 29  ADHERENCE ENGINEERING TO REDUCE CENTRAL LINE
ASSOCIATED BLOODSTREAM INFECTIONS
Prof. Frank Drews, University of Utah

October 13  UPDATE ON STRATEGIES FOR CLEANING AND DISINFECTION OF
ENVIRONMENTAL SURFACES IN HEALTHCARE
Prof. John Boyce, J.M. Boyce Consulting
Sponsored by Sealed Air Diversey Care (www.sealedair.com)

October 19  (South Pacific Teleclass)
TECHNOLOGY FOR MONITORING HAND HYGIENE IN THE 21ST
CENTURY – WHY ARE WE USING IT?

www.webbertraining.com/schedulept.php

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