

MDRO: Epidemiology & Control strategy

LONA MODY, MD, M.Sc

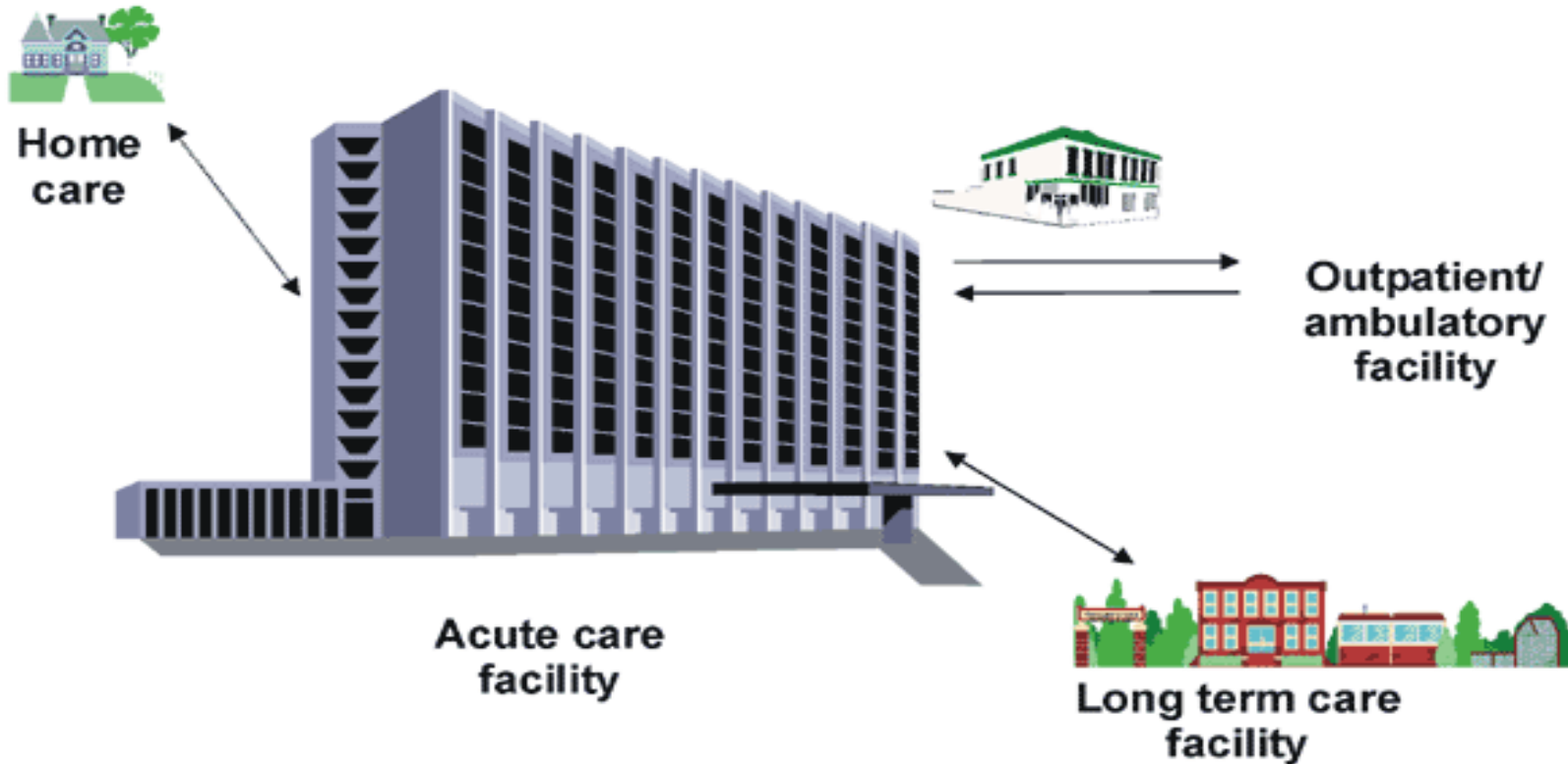
**Associate Professor, Internal Medicine
University of Michigan**

**Associate Director, Clinical Programs,
Geriatrics Research Education and Clinical Center (GRECC)
VA Ann Arbor Healthcare System**

Outline

- Changing spectrum of Healthcare System
- Emerging and resistant pathogens
 - MRSA
 - Evolving epidemiology (nasal and extra-nasal) and clinical relevance
 - Infection control and prevention measures
 - R-GNB
 - Epidemiology and clinical relevance
 - Cephalosporin and quinolone resistance
- TIP Bundle in Nursing Homes (An ongoing study)
- Challenges and opportunities in NH research

Healthcare system of the past




Growth of LTC facilities: 2011

- Increase in elderly population
- Increasing prevalence of chronic illness
- Growth in the need of formal and informal long-term care
- NH a crucial part of formal health care
 - Significant Medicare expenditures each year devoted to post acute care
 - Medicaid dollars devoted to traditional long-term care
- Prevalence of NH residents reduced from 1.6 m in 1999 to 1.5 million in 2004; but absolute nos. using NHs have gone up

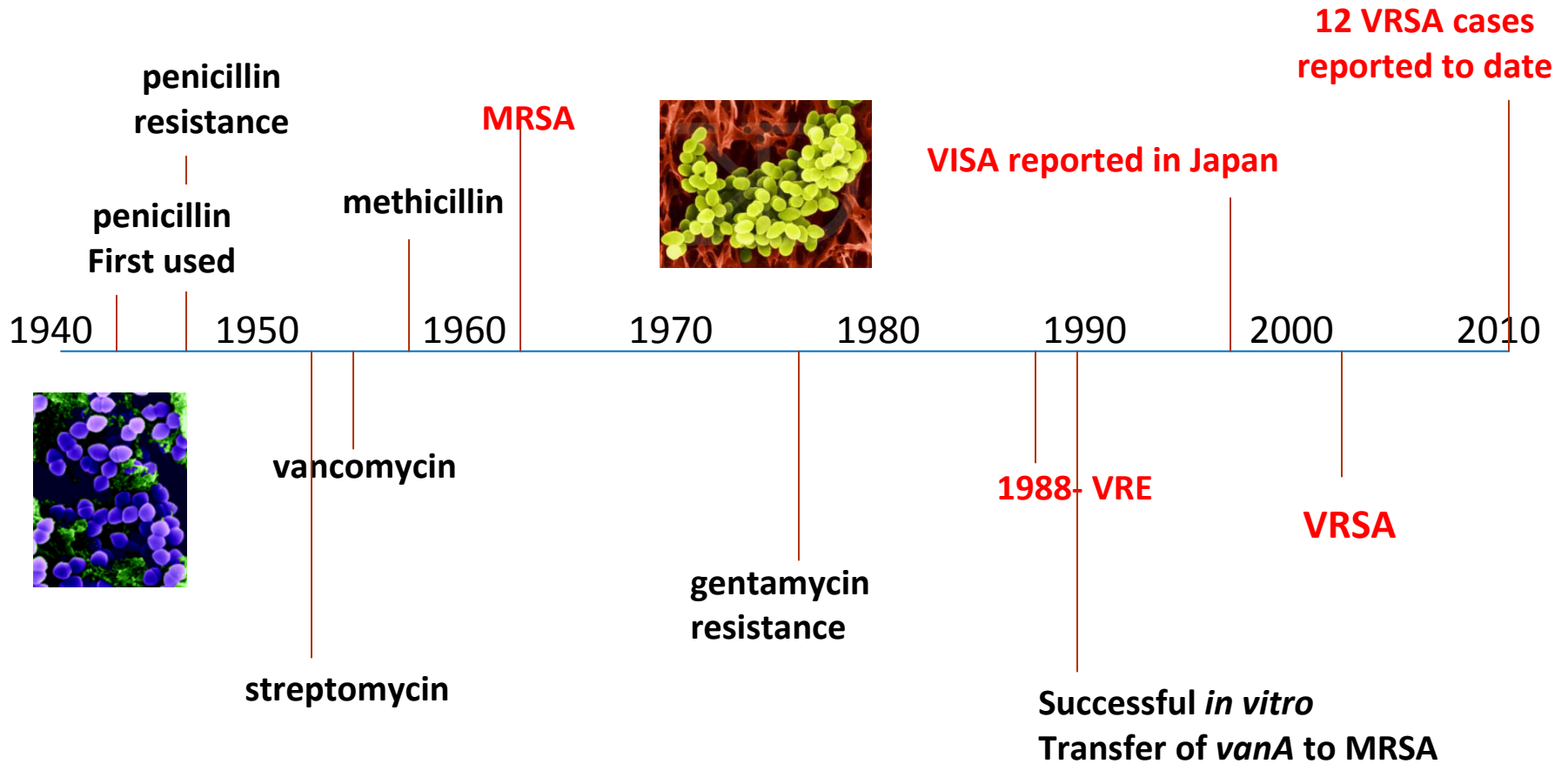
Challenges to high-quality of Care

- Long history of efforts to improve quality of care
- 1987 Omnibus Budget Reconciliation Act (OBRA) created a minimum standard of care
- Challenges to high-quality care
 - Chronic staff shortages
 - Inadequate reimbursement
 - Dynamic changes in case-mix
 - Acuity of care increasing in NHs, yet infection prevention and control seems to be lagging behind
- 90% of US NHs now provide both long-term care and short-term post-acute care

Impact of Multi-drug resistant organisms (MDROs)

- MDROs: one of the greatest healthcare challenge
- Responsible for
 - over 12,000 deaths
 - 3.5 billion dollars (in US)
- Prevalence estimates show an increase in MDROs
- New antibiotics Resistance
- New antibiotics ~~not~~  the only solution, need effective infection prevention strategies

Evolution of MRSA & VRE



MRSA

- Emerged in acute care in 1960s
- Staphylococcal infections due to MRSA
 - 1974: 2%
 - 1995: 22%
 - 2004: 63%
- Transmission

MRSA: Prevalence in NHs (RCHE)

Location	Year	No. Patients	% Colonized	Comment
St. Louis	1985	74	12	Nasal
LA	1987	170	6.0-7.3	Nasal & wound
Pittsburgh VA-ECC	1986	432	13	Nasal
Vancouver	1989	120	34	Nasal & wound
Ann Arbor (VA-ECC)	1990	120	23	Nasal & wound
Ann Arbor (VA-ECC, Co NH)	2000-1	427	17	Nasal & wound

MRSA: Risk factors in NHs

- Impaired functional status
- Indwelling devices such as urinary catheters and feeding tubes
- Prior hospitalization
- Urinary incontinence
- Prior antimicrobial usage
- Wounds and pressure ulcers

MRSA in RCHEs: Functional Status

Ann Arbor VA ECC, N = 341

- Bradley SF et al, Annals Intern Med 1991;115:417-22.

Functional Status	Total N	MRSA N (%)
I (min assist)	90	19 (21)
II (mod assist)	162	57 (35)
III (max assist)	84	41 (49)

MRSA in NHs (RCHE): Other risk factors

- NHs in Leeds, UK; N = 715; Nares culture,
 - Barr B, ICHE 2007;28:853-9

	Proportion (%) with MRSA	P value	Crude OR	Adjusted OR
Gender				
Female	116/574 (20)			
Male	43/141 (30)	0.008	1.8 (1.2,2.8)	1.6 (1.03,2.6)
Presence of device				
No	141/673 (21)			
Yes	16/35 (38)	0.002	3.2 (1.5,6.6)	2.7 (1.3,5.7)
Use of antibiotics				
No	141/657 (22)			
Yes	16/51 (31)	0.13	1.7 (0.9,3.4)	NS
Presence of wound				
No	146/679 (22)			
Yes	11/29 (38)	0.13	1.9 (0.8,4.5)	NS

MRSA in RCHEs: Other risk factors

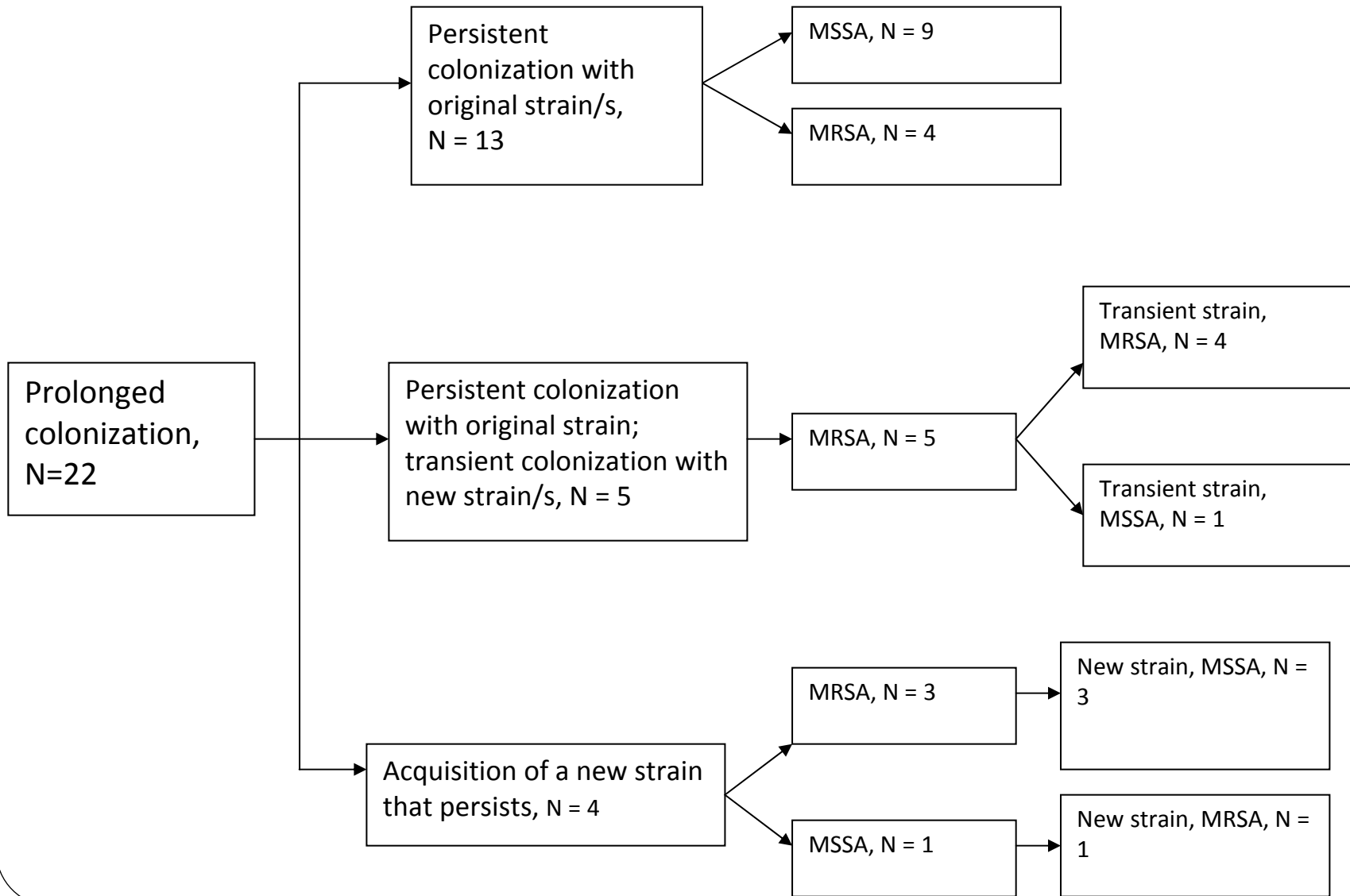
- NHs in Germany; N = 3,236; Nares culture
 - von Baum, Infect Control Hosp Epid 2002;23:511-15

	% with MRSA N = 36	% without MRSA, N = 3200	P value	ORa
Male	32%	26%	NS	
Use of Antibiotics	23%	8%	0.006	1.6 (0.7,3.8)
Presence of wound	19%	4%	0.001	3.3 (1.3,8.0)
Urinary catheter	36%	9.6%	0.001	2.7 (1.2,6.3)
Feeding Tube	19.4%	9.3%	0.002	1.5 (0.6,4.1)

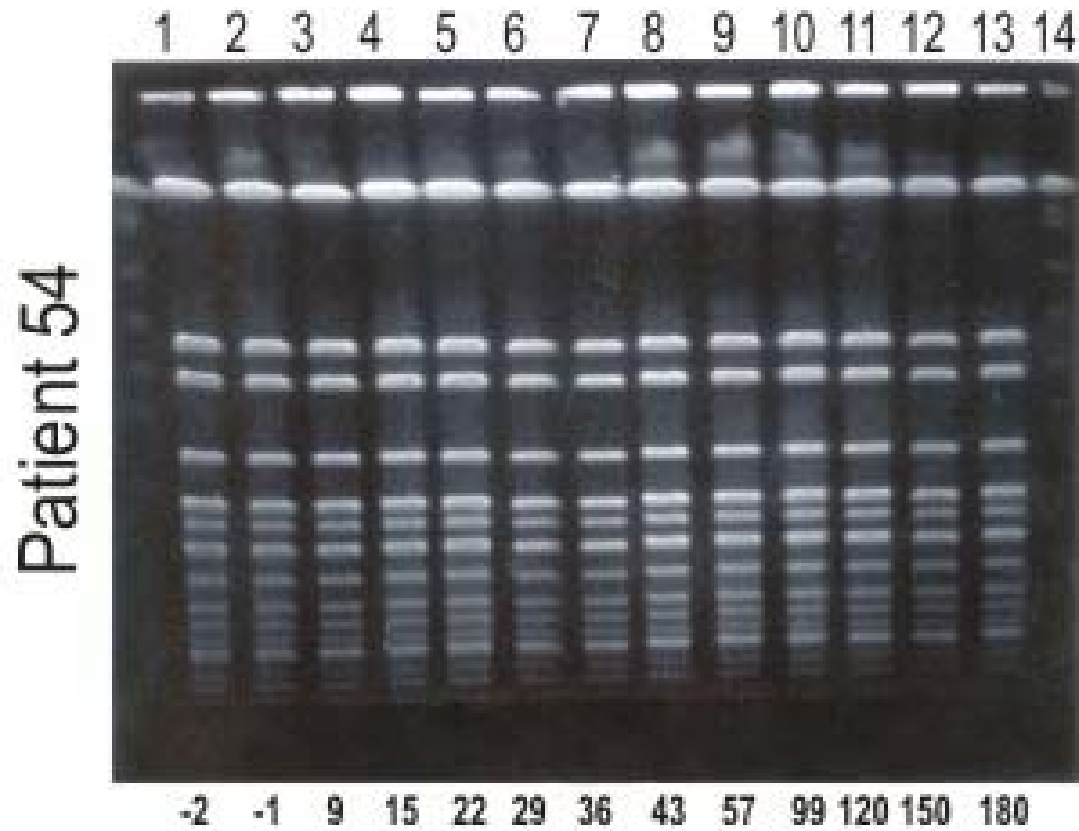
MRSA: Natural history in NHs

- Transfers from acute care
 - 2-25% of new residents colonized
- Persist and spread
 - Enclosed environment, poor functional status, presence of devices
 - HCW to resident and resident to resident spread
 - Serial studies show persistence

MRSA in NHs (RCHEs): Persist and Spread



MRSA persistence



MRSA Infections

- 3-25% of MRSA carriers develop infections
- Skin & soft tissue, urinary tract infections, respiratory infections
- Atypical presentation

MRSA not the only MDRO...

Environmental sampling

MRSA	VRE	MDRGN	<i>C. difficile</i>
Pagers	Stethoscopes	Bedrails	Bed frames
White coats		Sinks	
Blood pressure cuffs		Ventilator water	
		Computer keyboards	

Adapted from: Hebert and Weber, Infection Prevention and Control in the Hospital, 2011

Quinolone Resistance

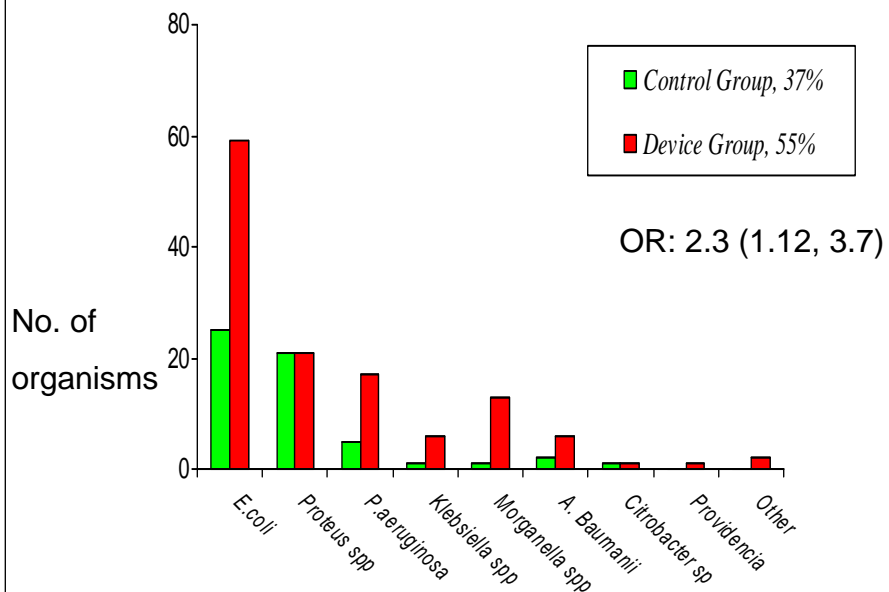
- Frequent use to treat NH infections
- Resistance in GNB
 - *E. coli*: 5-41%
 - *P. aeruginosa*: 27- 67%
 - *K. pneumoniae*: 7-14%
 - *P. mirabilis*: 38-57%
 - Viray M, Infect Control Hosp Epidemiol 2005;26:56-62
 - Bonomo R, Clin Infect Dis, 2000;31:1414-22
- Antibiotic pressure

Odds Ratio of GNB carriage at different body sites in device group compared with control group

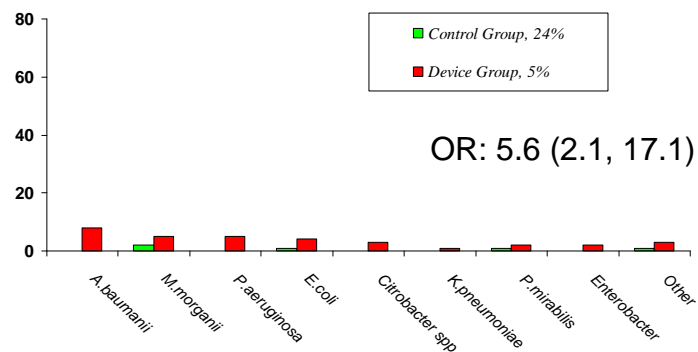
	Odds Ratio	95% Confidence intervals	P-value
Overall GNB carriage	5.4	1.7 – 19.5	0.001
Oropharynx	2.6	1.3 – 5.2	0.004
Groin	2.6	1.5 – 4.5	<0.001
Perianal	2.5	1.2 – 5.2	0.01

Indwelling devices and GNB: quinolone vs. cephalosporin resistance

Quinolone Resistance

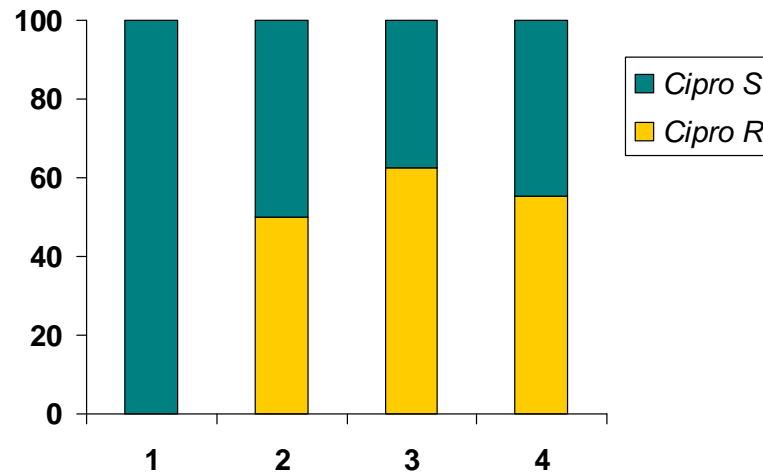


Cephalosporin resistance

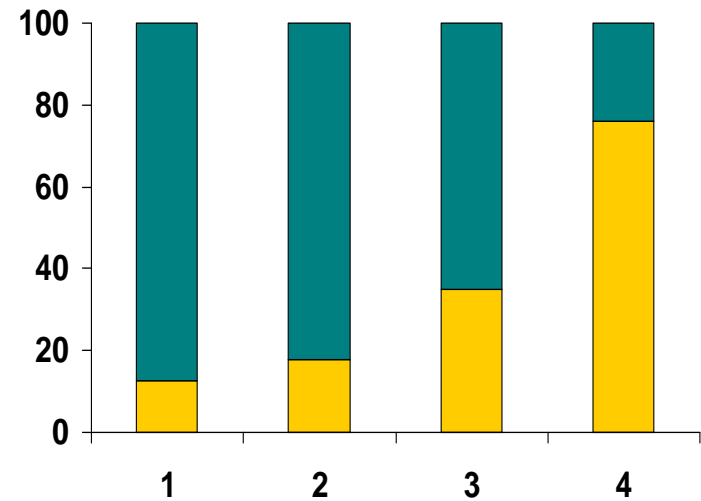


Quinolone resistance and functional status

Device group



Control group



PSMS

6-11-->1, 12-17->2, 18-23->3, 24-30->4

Resistant GNB: VA ECC experience

	Ann Arbor	Portland	Pittsburgh
Ceftriaxone -R	27/286 (9.4%)	26/311 (8.4%)	5/754 (0.7%)
Ceftazidime- R	33/349 (9.5%)	7/121 (5.8%)	20/876 (2.3%)

Risk Factors for R-GNB

- Indwelling devices
- Poor functional status
- Pressure ulcers/wounds
- Quinolone use
- Prior hospitalization

VRE (Vancomycin Resistant Enterococci)

- VRE a relatively recent discovery
 - But widespread, esp. in hospitals with significant mortality and morbidity
- VRE accounts for ~ 30% of ICU isolates of *Enterococcus* in the United States
 - NHs (RCHE):
 - Prevalence varies from 5-20%

Infection Control Strategies in NHs

- Progress in NH infection control
 - Guidelines from various national societies
- Immense variations in practice
 - Do-nothing to do-everything
 - No controlled trials
- Issues to remember
 - NHs are not hospitals
 - Rehab and socialization critical
 - Screening cultures require infrastructure
 - NHs may not want to or need to know their MRSA status (although this is changing)

Infection Control Strategies: MRSA

- Hand Hygiene
- Active Surveillance
 - Nares or multi-site
 - All residents or high risk residents such as new admits or those with indwelling devices
- Mupirocin
 - Effective in eradicating for up to 6 months
 - (Mody, Kauffman, Bradley et al Clin Infect Dis 2003;37:1467-74)
 - Re-colonization risk
 - Mupirocin resistance a concern
 - Reduction in infections needs to be established
- Chlorhexidine baths
 - Some data in acute care, no studies in NHs

Hand Hygiene Products

Good

Better

Best



Plain Soap

Antimicrobial
soap

Alcohol-based
handrub

Hand Hygiene adherence

Year of Study	Adherence Rate	Hospital Area
1994 ⁽¹⁾	29%	General and ICU
1995 ⁽²⁾	41%	General
1996 ⁽³⁾	41%	ICU
1998 ⁽⁴⁾	30%	General
2000 ⁽⁵⁾	48%	General

1. Gould D, *J Hosp Infect* 1994;28:15-30.
2. Larson E, *J Hosp Infect* 1995;30:88-106.
3. Slaughter S, *Ann Intern Med* 1996;3:360-365.
4. Watanakunakorn C, *Infect Control Hosp Epidemiol* 1998;19:858-860.
5. Pittet D, *Lancet* 2000;356;1307-1312.

Hand cleansing in NHs

- Thompson et al, MMWR 1993;42:672-75
 - Hand cleansing
 - 32% before interaction
 - 64% after interaction
 - Glove usage
 - 84% compliance
 - Changed only 15% of times

Hand cleansing in NHs

What do healthcare workers carry on their hands?

Does alcohol gel reduce these pathogens?

Does alcohol gel increase hand hygiene compliance?

Mody L et al *Infect Control Hosp Epidemiol*; 2003;24:165-171

Organisms Isolated from the hands of all HCWs at baseline

Organism

N (%)

GNB

30 (65)

Yeasts

18 (39)

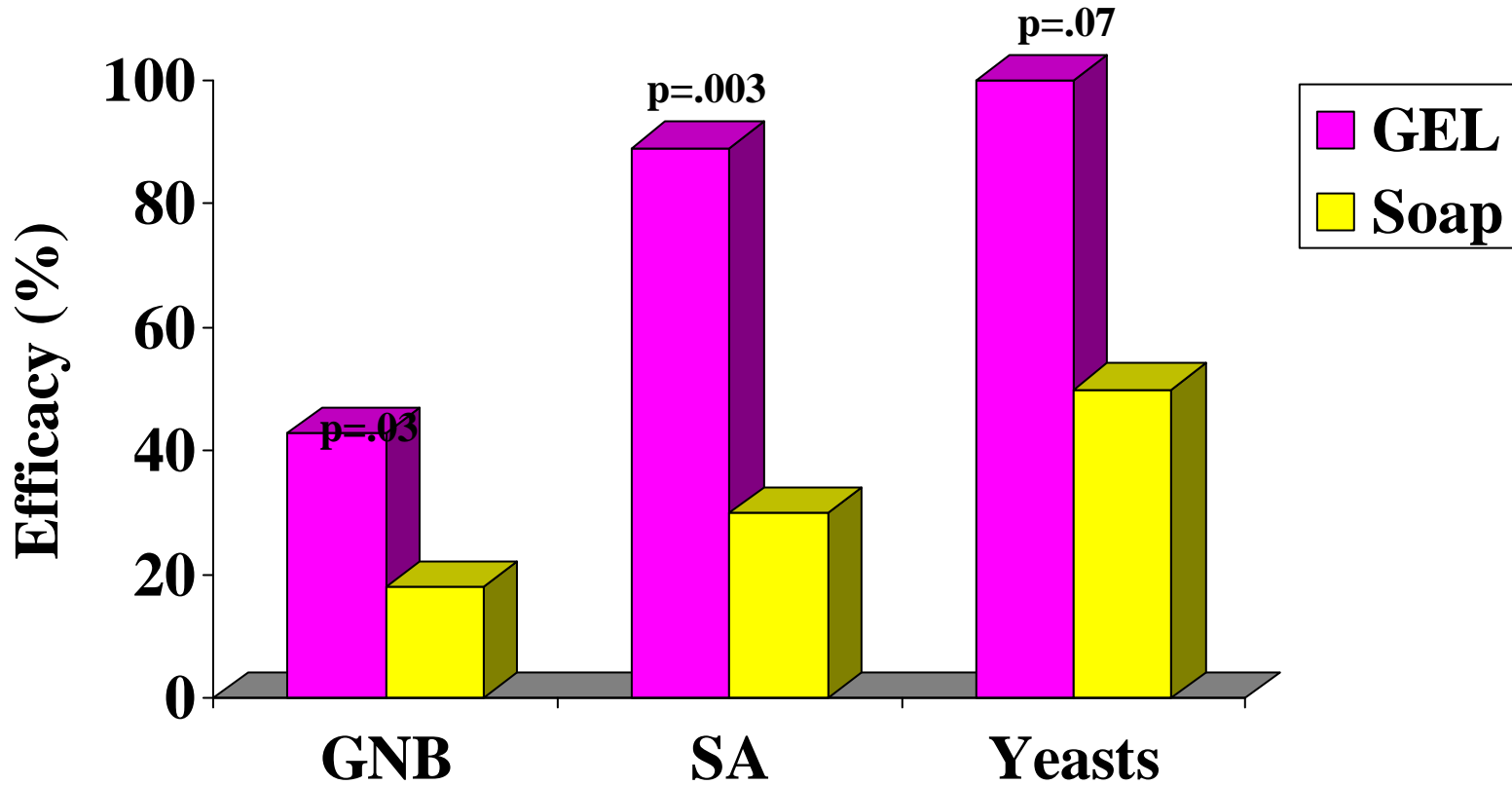
S. aureus

9 (20)

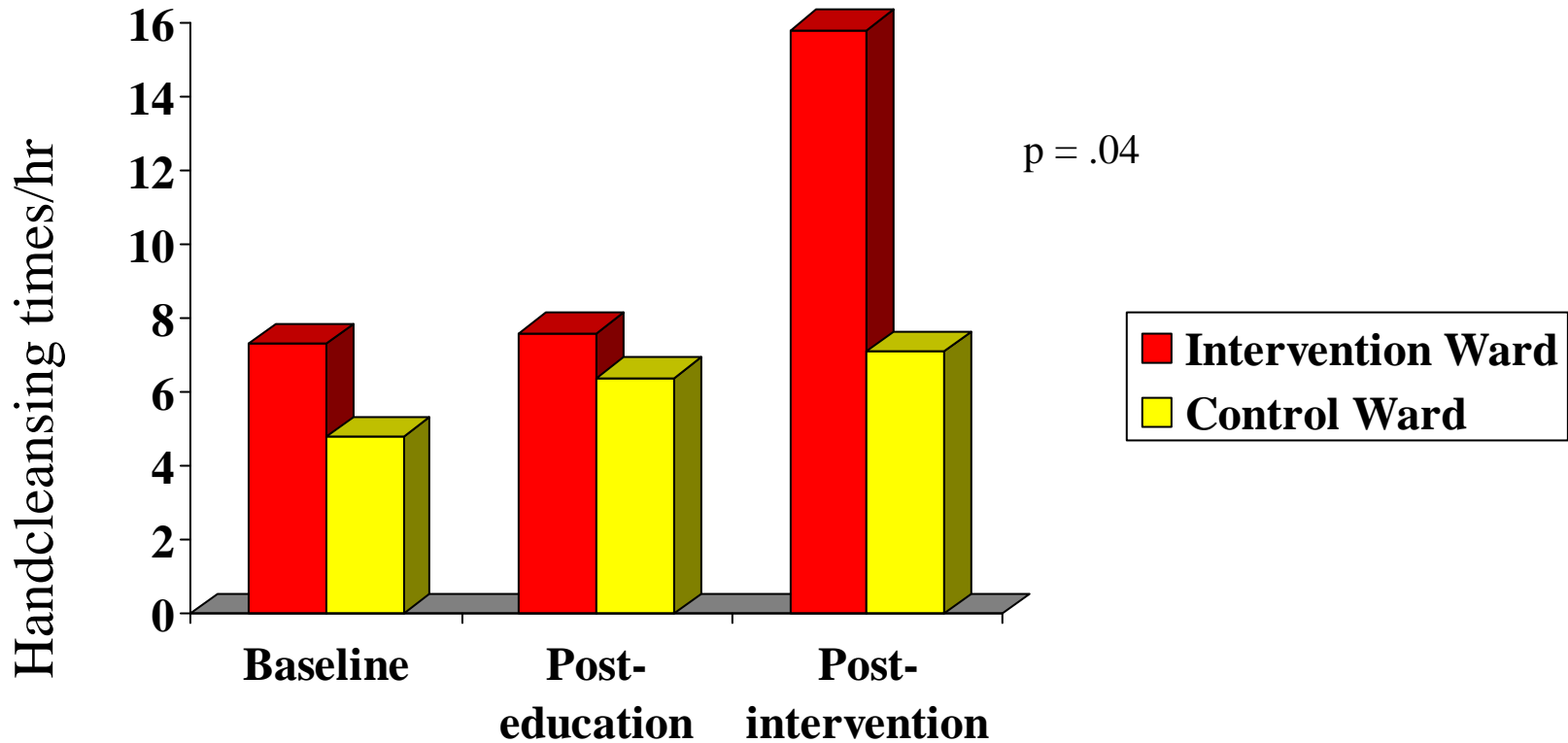
VRE

4 (9)

Efficacy of Soap vs GEL in eliminating pathogens from the hands of HCW



Effect of an educational intervention & introduction of GEL on hand cleansing frequency



Infection Control Strategies: MRSA

- Hand Hygiene
- Active Surveillance
 - Nares or multi-site
 - All residents or high risk residents such as new admits or those with indwelling devices
- Mupirocin
 - Effective in eradicating for up to 6 months
 - Mody L, Kauffman CA, Bradley SF et al CID 2003
 - Re-colonization risk
 - Reduction in infections needs to be established
- Chlorhexidine baths
 - Some data in acute care, no studies in NHs

Infection Control: Other MDROs

- Control of transmission
 - Preventing the spread of resistant organisms principally via the hands of healthcare workers
 - Transient vs. Resident flora on hands
 - Preventing environmental contamination
- Antibiotic Stewardship

Hand Hygiene

- VRE:
 - Can easily pass on HCW hands and contaminate environment
 - Documented on 13-41% of HCWs
 - Can persist for up to an hour
 - Can be successfully removed with soap and water or alcohol based hand rub
- R-GNB
 - Commonly found on environmental surfaces as well as HCW hands
 - Survive longer on inanimate objects than hands
 - Artificial finger nails a risk factor
 - Hand hygiene adherence shown to reduce MDR colonization
- *C. difficile*
 - form spores
 - Isolated from environment; survives for prolonged period
 - Antiseptic hand rubs may not be as effective
 - Physical removal of spores by soap and water required
 - Bleach cleaning for environment

Isolation precautions and PPE

- Isolation precautions one of the oldest form of infection control
- Modern medicine moving away from strict isolation to use of personal protective equipment (PPE)
- Gloves: reduces risk of hand contamination
- VRE: current guidelines recommend isolation
 - few well designed studies; significant circumstantial evidence in favor of using gowns and gloves to prevent transmission
 - Gown free period shown to increase transmission
- R-GNB
 - Few studies to support active surveillance and isolation
 - Some data supporting the use of gowns and gloves in reducing transmission
 - Well-designed studies lacking
- C. difficile
 - If diarrhea, then contact precautions as well as gowns and glove use
 - Several studies now support this approach

Challenges to Isolation Precautions in NHs

- Can compromise quality of care
- Concerns about reduce nurse and physician oversight
- Potential for depression and anxiety especially in older adults

Active surveillance

- MRSA
 - Targeted surveillance for MRSA useful in acute care setting
 - Routine surveillance in ICU with appropriate infection control measures, shown to be useful
 - Universal hospital surveillance can also reduce MRSA
- VRE
 - A large proportion undetected by clinical cultures
 - Some evidence showing active surveillance can reduce VRE bacteremia
 - Can consider surveillance in high-risk patients
- R-GNB
 - Active surveillance not well-studied
 - Heterogeneity of GNB a major challenge
 - Active surveillance can increase appropriate antibiotic usage, but research is lacking
- C. difficile:
 - A significant proportion of asymptomatic carriage
 - Active surveillance generally not recommended

Challenges to Active Surveillance in NH (RCHE)

- At any given time:
 - 30% colonized with MRSA
 - 10-20% with VRE
 - 35-40% with CIP-R GNB
- Issues to consider
 - Is it practical to culture 1.5 million residents?
 - Can we define specific high risk groups?
 - Multi-anatomic site cultures? Nares alone may not suffice
 - How often should they be cultured?
 - Short-stay: 2-3 months; Long-stay: 3-4 yrs
 - If positive then...?

Antimicrobial Stewardship

- Rational use of antibiotics critical
- Balance between effective treatment and avoidance of resistance
- Two major approaches:
 - Prospective auditing/feedback
 - Pre-authorization
- Leads to effective therapy and cost savings
- Computerized decision support emerging
- Research in NHs lacking

Antimicrobial Stewardship: Limitations

- Lack of research to demonstrate sustained decrease in overall burden of MDROs
- Research lacking in NHs
- Only antimicrobial stewardship without other infection control approaches may fail
- Difficult to predict which antibiotic to restrict

Commonality of risk factors:

MRSA, R-GNB, *C. difficile*

- Use of indwelling devices
- Prior hospitalization
- Functional impairment
- Prior antimicrobial usage
- Presence of wounds

Targeted Infection Prevention (TIP) Study

Basic Premise

- 1.5-2.0 m infections in skilled nursing facilities (similar in number to acute care facilities)
- Asymptomatic colonization with antimicrobial-resistant pathogens a major issue (why do we care?)
- Models of infection prevention programs adopted from acute care
- Yet, SNFs are different from acute care
 - Fewer resources
 - Nurse:patient ratio
 - Staff turnover
 - Multiple responsibilities of IC practitioner
 - Isolation precautions and social isolation

Example: Active surveillance for MRSA

VA MRSA Policy

Nasal swab on admission
Nasal swab on discharge
Nasal swab during any transfers
Re-screen every 6 months

Issues:

1. Extra-nasal carriage? Are there specific risk groups at a higher risk?
2. Are we ignoring other resistant pathogens: VRE and resistant gram-negative bacteria (cephalosporin and quinolone?)
3. Can we adopt a similar policy in other community skilled nursing facilities?
4. Should we move from pathogen-based to risk-factor based approach?

NIA K23 project aims and main results: 1

- Define epidemiology of colonization in a specific high risk group
 - NH residents with indwelling devices (enteral feeding tubes and urinary catheters)
- Needs assessment of healthcare workers
 - Knowledge and practices pertaining to research proven infection prevention practices
 - Benefits and risks of isolation practices in older adults

Aim 1: Prevalence of MRSA, VRE and R-GNB

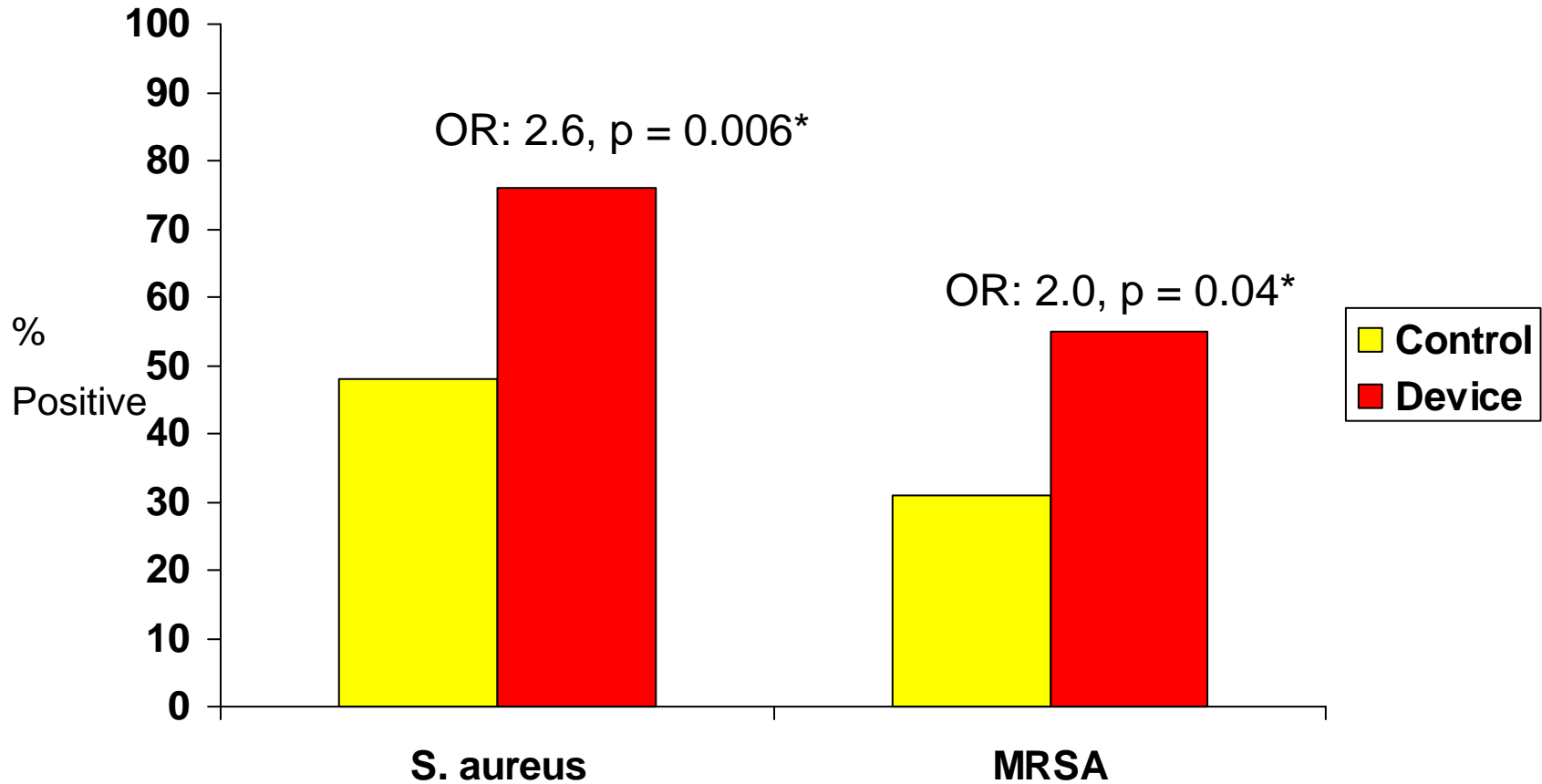
	Device Group (N = 105)	Control Group (N=108)	P value
Mean Age	78 (74-79)	81 (79-83)	0.04*
Female	60%	67%	0.16
Functional Status [#]	26 (24, 27)	20 (18, 21)	0.001*
Co-morbidity Score [‡]	3.0 (2.5, 3.3)	2.5 (2.1, 2.7)	0.04*

Functional Status measured using Lawton and Brody's physical self maintenance scale

‡ Charlson's co-morbidity index

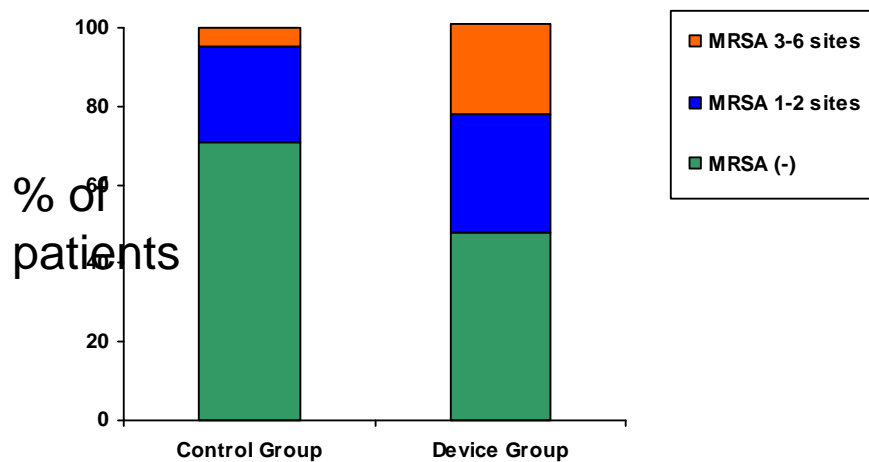
*P < 0.05

S. aureus and MRSA carriage



* Adjusted for age, functional status and co-morbidities

MRSA carriage: Indwelling devices & no. of anatomic sites



N = 108

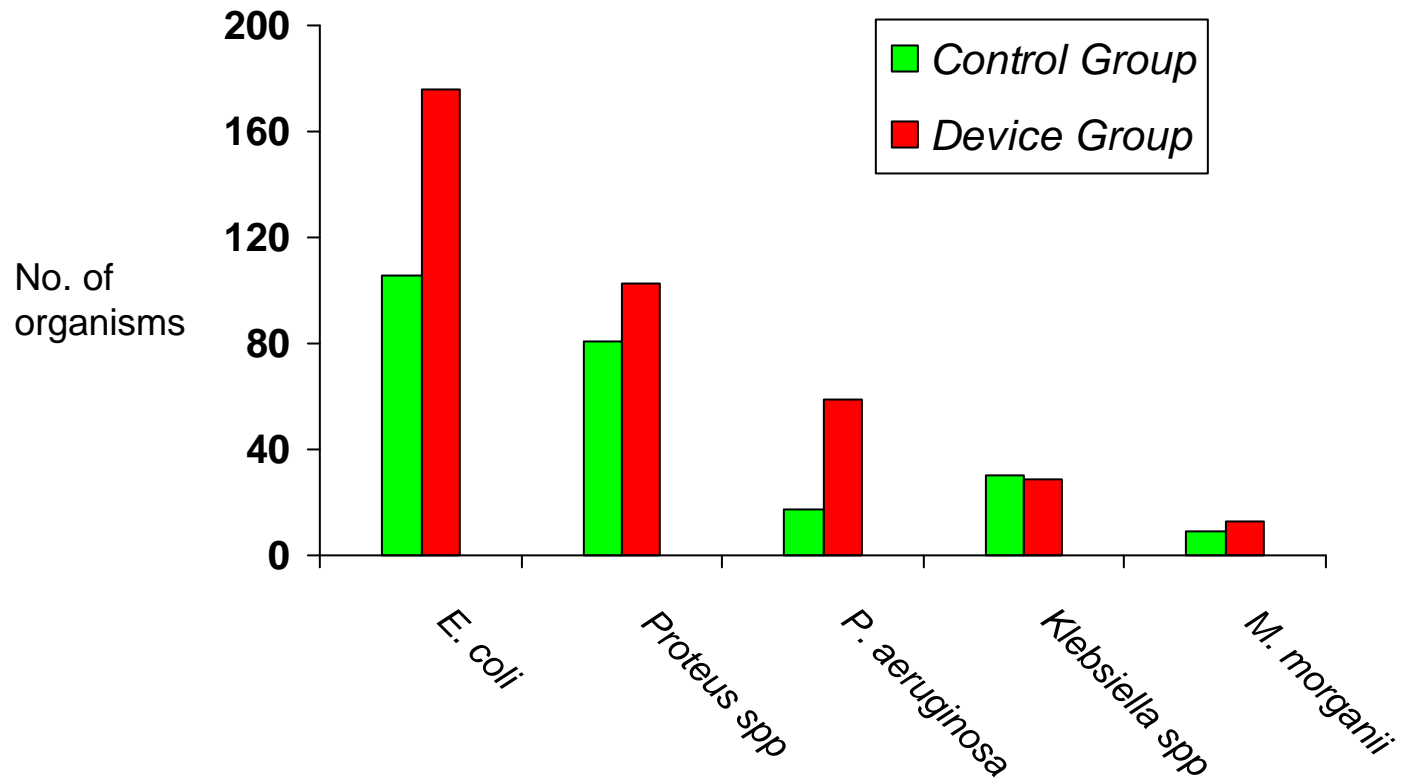
N = 105

P < 0.001 for trend

Extra-nasal MRSA carriage

	Device Group N = 105 % pos	Control Group N = 108 % pos	OR (95% CI)	P value
Any site	52	29	2.0 (1.1,3.8)	0.04
Nares	31	21	1.8 (0.9,3.5)	0.09
Oropharynx	26	11	2.7 (1.3,5.8)	0.006
Groin	25	5	6.8 (2.4, 19.3)	< 0.001
Peri-anal	27	6	5.4 (2.1, 13.5)	< 0.001

Indwelling Devices and overall GNB carriage



Indwelling Devices and GNB carriage at different anatomic sites

	Odds Ratio	95% Confidence intervals	P value
Overall GNB carriage	5.4	1.7-19.5	0.001
Oropharynx	2.6	1.3-5.2	0.004
Groin	2.6	1.5-4.5	<0.001
Perianal	2.5	1.2-5.2	0.01

New Acquisition of MRSA, VRE and R-GNB

- 7 SNFs
- 177 enrolled and prospectively cultured q 30D.
- Monthly cultures are obtained from nares, oro-pharynx, groin, perianal area, and wounds (if present).
- Standard microbiologic tests were used to identify MRSA, VRE, CTZ-R and CIP-R.

Definitions

- Two categories
 - 1) Colonized at the start of the study
 - 2) Newly acquired – colonized during the study
- Sub-categories
 - a) Intermittent carriage = 2 or more “-” cultures after a single “+” culture

<u>V1</u>	<u>V2</u>	<u>V3</u>	<u>V4</u>	<u>V5</u>	<u>V6</u>	<u>V7</u>	<u>V8</u>
-	-	+	-	+	+	-	-

<u>V1</u>	<u>V2</u>	<u>V3</u>	<u>V4</u>	<u>V5</u>	<u>V6</u>	<u>V7</u>	<u>V8</u>
-	-	+	-	-	+	-	-

CIP-R
Residents colonized – 59/82
(72%)

28 (47 %)
colonized at the
start of the study

31 (53 %)
newly acquired at
the facility

27 (46 %) persistent	1 (1.7 %) intermittent
-------------------------	---------------------------

19 (32 %) persistent

12 (20 %) intermittent

MRSA

**Residents colonized –
52/82 (63%)**

**20 (38 %)
colonized at the
start of the study**

**32 (62 %)
newly acquired at
the facility**

**17 (33 %)
persistent**

**3 (6 %)
intermittent**

**16 (31 %)
persistent**

**16 (31 %)
intermittent**

CTZ-R

Residents colonized –
21/82 (26%)

6 (29 %)
colonized at the
start of the study

5 (24 %)
persistent

1 (4.8 %)
intermittent

15 (71 %)
newly acquired at
the facility

2 (9.5 %)
persistent

13 (62 %)
intermittent

VRE

Residents colonized –
15/82 (18%)

5 (33 %)
colonized at the
start of the study

2 (13 %)
persistent

3 (20 %)
intermittent

10 (67 %)
newly acquired at
the facility

2 (13 %)
persistent

8 (53 %)
intermittent

From Research to Practice: e.g. closed drainage system

Research (1965-70)



Publications (Kunin CM NEJM 1974, Garibaldi RA NEJM 1978)



Recommendations/Guidelines (CDC 1981, Category I)



? Provider knowledge, practices

Adopting UC Recommendations into Practice

Study Objectives: To evaluate:

- NH healthcare workers' knowledge and awareness of recommended practices pertaining to UC care
- Any differences between Nurses (RN and LPN) vs. Nurses' Aides
- Source of healthcare workers' knowledge about UC and hand hygiene
- Healthcare workers' opinions on isolation practices for MRSA and VRE

Study sample overview

- 7 Facilities with 733 total beds
- 440 eligible HCWs, 356 responded (response rate 81%)
- Alcohol gel on treatment carts: 7/7
- Alcohol gel in patient rooms: 2/7

Respondent/Facility Characteristics

	NH 1	NH 2	NH 3	NH 4	NH 5	NH 6	NH 7
Number of HCWs eligible	78	67	91	54	50	74	26
Number of HCWs enrolled	73	51	85	43	15	73	15
Gender F:M	66: 7	48:3	84:1	40:3	13:2	69:4	15:0
Yrs at facility, mean (SD)	8.6 SD=8.8	9.7 SD=8.9	9.2 SD=9.8	7.8 SD=7.9	12.6 SD=8.6	8.9 SD=9.5	8.1 SD=11.4
RN hours/ resident/day	1h 53m	1h 19m	1h 10m	1h 5m	1h 11m	1h 2m	1h 22m
Nurse aide hours/ resident/day	2h 19m	2h 19m	2h 40m	2h 54m	2h 3m	2h 9m	2h 11m
Facility ownership	Non-Profit	For-Profit	Non-Profit	Non-Profit	For-Profit	Govt.	Non-Profit

Knowledge and Attitudes about Catheter Care: All Responders, Established Guidelines

Question (CDC - UC recommendations)	Correct response N (%)	Incorrect Response N (%)	Missing N (%)
Area around UC cleaned routinely (recommended)	302 (85)	24 (7%)	30 (8)
UC secured to residents' leg/abdomen (recommended.)	280 (79)	62 (17)	14 (4)
Drainage bags can be disconnected (not recommended)	122 (34)	200 (56)	34 (10)
Bladder should be irrigated 1/wk (not recommended)	68 (19)	258 (73)	30 (8)

Urinary Catheter Care: Nurses vs. Aides

(Established Recommendations)

Question	Nurses N (%) Correct	Aides N (%) Correct	P value
Drainage bags can be disconnected (not recommended)	59 (57)	63 (29)	< 0.001
Bladder should be irrigated 1/wk (not recommended)	40 (58)	18 (8)	< 0.001

Source of knowledge: Urinary catheter care and hand hygiene

	Formal Methods N (%)	Informal Methods N (%)	Both N (%)
Urinary Catheter Care (n=325)	171 (52)	77 (24)	77 (24)
Hand Hygiene (n=329)	167 (51)	49 (15)	113 (34)

Formal methods: Inservices, lectures, nursing school, nurses' aides courses

Informal methods: Experience, nurses, co-workers, facility policies

Survey Responses to Benefits and Harmful Effects of Contact Isolation Practices for MRSA

Survey Items	Nurses (N=114)	Nurses' Aides (N=239)	All (353)
Should residents with MRSA be isolated to their rooms?			
Yes	59 (52)	157 (66)	216 (61)
No	45 (40)	34 (14)	79 (22)
Do not know	10 (8)	48 (20)	58 (16)
Benefits of isolation: HCWs who responded to open-ended question No. of comments[†]	93 (82) 128	188 (77) 282	281 410
<i>None</i>	13	4	17
<i>Benefits to Residents:</i> reducing transmission, privacy	106	243	349
<i>Benefits to facility:</i> to pass inspection	2	5	7
<i>Benefits to staff:</i> protects and reminds staff about contact precautions	7	30	37
Harmful effects of isolation : HCWs who responded to open-ended question No. of comments	89 (78) 190	180 (75) 304	269 494
<i>None</i>	3	3	6
<i>Psychosocial:</i> Confusion, depression, social isolation, compromises resident dignity	164	262	426
<i>Potential neglect:</i> by healthcare providers	4	11	15
<i>Health:</i> Weight loss and loss of appetite, functional decline, pressure ulcers	19	28	47

Survey Responses to Benefits and Harmful Effects of Contact Isolation Practices for VRE

Survey Items	Nurses (N=114)	Nurses' Aides (N=239)	All (353)
Should residents with VRE be isolated to their rooms?			
Yes	54 (47)	91 (38)	145 (41)
No	41 (36)	23 (10)	64 (18)
Do not know	19 (17)	125 (52)	144 (41)
Benefits of isolation: HCWs who responded to open-ended question	76 (67)	133 (56)	209
No. of comments†	101	134	235
<i>None</i>	9	3	12
<i>Benefits to Residents:</i> reducing transmission, privacy	84	120	204
<i>Benefits to facility:</i> to pass inspection	0	0	0
<i>Benefits to staff:</i> protects and reminds staff about contact precautions	8	11	19
Harmful effects of isolation: HCWs who responded to open-ended question	81 (71)	121 (51)	202
No. of comments	155	190	345
None/Do not know	3	40	43
<i>Psychosocial:</i> Confusion, depression and social isolation, compromises resident dignity	141	142	283
<i>Potential neglect by healthcare providers</i>	1	6	7

Conclusions

- Significant gaps between UC recommendations and HCW knowledge/practices
- Self-reported practice of hand hygiene during UC care is high.
- HCWS felt that while contact isolation can lead to reduced transmission of MRSA and VRE
 - However, there is potential of adverse consequences
- Nurses' aides were most likely to advocate for isolation for MRSA than nurses
 - possibly due to the increased time they spent with the residents
- Consider employees opinions on the benefits and harms of isolation practices

Targeted Infection-control Program (TIP) in Skilled Nursing Facilities

- To determine the efficacy of TIP intervention in reducing prevalent and incident colonization with MDROs in NH residents with indwelling devices.
- To evaluate the efficacy of TIP intervention in reducing new incident infections in NH residents with indwelling devices.

Component 1 Rationale: Active surveillance for antimicrobial resistant organisms (MDROs) and enhanced barrier precautions

- Pathogen-based active surveillance in acute care actively debated, based on European data
 - 33% reduction in blood stream infections in Denmark
 - Similar results from Finland and Netherlands
- VA CLC: single nasal swab for MRSA
 - Not studied
 - Unrealistic for all LTC residents in community
- Test this model in high risk patients (8-10% with indwelling devices)
 - But, be more comprehensive (screen for R-GNB, VRE and MRSA)

Component 1: Active surveillance for antimicrobial resistant organisms (MDROs) and enhanced barrier precautions

- Samples to assess MDRO colonization status obtained at the baseline, q monthly thereafter
- Report colonization status back to the intervention facility within 1 week
- Enhanced barrier precautions
 - Place barrier precautions signs at nurses station, nurse aide books, inside the resident cabinet doors
 - Hand hygiene before and after any care to residents with indwelling devices
 - Glove use
 - Protective gowns when providing direct care
 - Cover any wounds or other areas of drainage when they leave their rooms

RESIDENT PRECAUTIONS

This resident is taking place in a Research Study

Resident	Room

BEFORE ENTERING RESIDENT ROOM

Please wash your hands and wear gloves



WHEN
PROVIDING DIRECT CARE

Please wear protective gowns

AFTER LEAVING RESIDENT ROOM

Please remove gloves and wash your hands



Component 2 Rationale: Active surveillance to identify infections and dissemination of surveillance results

- SENIC (Study on Efficacy of Nosocomial Infection Control) study
 - Intensive, uniform surveillance program leads to 30% reduction in UTIs, Surgical site infection, pneumonia and bacteremia
 - MRSA infection surveillance feedback also leads to reduced MRSA infection in intensive care units
 - SNFs do not use uniform definitions to detect infections
- Mody L, Langa K, Saint S et al, AJIC 2005
- Data not fed back to clinicians and healthcare workers taking care of these patients

Component 2: Active surveillance to identify infections and dissemination of surveillance results

- Monthly feedback of all infections in patients with indwelling devices
- Infections defined using standardized SNF appropriate criteria
- Data disseminated to administration, unit managers, nurses, and aides
- Distribute simplified comparisons with other local facilities



U of M TIP Research Study Feedback Report

Westland Nursing and Rehabilitation Center

Month 1: July 2010

Total # of Residents Cultured: **12**

Urinary Catheters: 6

Feeding Tubes: 4

Both: 2

Number of Residents Colonized:

MRSA +	VRE +	CEFT _{Resistant}	CIP _{Resistant}
3	3	4	9

<i># Residents w/ Infection</i>	<i>Total # of Infections</i>
6	6



U of M TIP Research Study Feedback Report

Superior Woods Month 2: July 2010

Total # of Residents Cultured: **4**

Urinary Catheters: 4
Feeding Tubes: 0
Both: 0

Number of Residents Colonized:

MRSA +	VRE +	CEFT _{Resistant}	CIP _{Resistant}
0	1	0	3

<i># Residents w/ Infection</i>	<i>Total # of Infections</i>
1	1

Component 3 Rationale: Hand Hygiene Promotion

- Hand hygiene compliance remains poor
- Averages at 30-50% at the best
- Gloves used often, but changed only 15% of times between patients
- HCWs carry multiple organisms on their hands
 - GNB 65%, yeast 40%, *S. aureus* 20%, VRE 9%
 - Mody L, McNeil S et al *Infect Control Hosp Epidemiol*; 2003;24:165-171
- Multi-component interventions shown to enhance hand hygiene compliance over prolonged periods

Component 3 Rationale: Hand Hygiene Promotion

- Educational intervention
 - Update on recent WHO guidelines/indications/opportunities
 - Didactics to incorporate risk of transmission, staff colonization
 - Educational posters and materials focusing on LTC specific situations such as during feeding, assisting with other ADLs and transfers, during rehabilitation
 - Leadership involvement using 'talking walls' concept

Talking posters: examples




Clean hands save lives
Get with the program!

You can help keep patients as safe and healthy as possible by:

- **cleaning** your hands before and after every patient contact
- **using** either soap and water or alcohol-based hand rubs
- **encouraging** your team to do the same


Together, we can set a new standard for hand hygiene and help stop the spread of infection.

Clean hands save lives 



**The most unlikely patients
may be carrying the worst germs.**

Patients who carry the micro-organisms that cause cross-infection don't necessarily look 'different' or 'special'. Making assumptions isn't the answer. Good hand hygiene is. Please clean your hands before and after every patient contact.

Clean hands save lives 

Talking posters: examples

Patients need our extra assurance that their surroundings are MRO-free. Let's give them a hand.

MROs are bacteria that are resistant to common antibiotics. You can halt their spread by remembering to clean your hands before and after every patient contact.

Clean hands save lives 



NSW HEALTH 

Cleaning hands with soap and water

-  Wet all surfaces thoroughly with water
-  Apply soap
-  Rub vigorously palm to palm
-  Palm to palm vigorously with interlaced fingers
-  Palm over back of each hand
-  Tip and backs of fingers to each palm
-  Clean thumbs
-  Clean wrists
-  Rinse your hands thoroughly
-  Pat dry your hands thoroughly using a disposable paper towel
-  Turn off water using the paper towel

Cleaning hands with alcohol-based hand rub

-  Apply hand rub
-  Rub vigorously palm to palm
-  Palm to palm vigorously with interlaced fingers
-  Palm over back of each hand
-  Tip and backs of fingers to each palm
-  Clean thumbs
-  Clean wrists
-  Keep rubbing until hands are dry

Clean hands save lives 



NSW HEALTH 

RN, Recreation Therapy



Physician, House keeping



The Clean Hands Family !!!



**Mr & Mrs.
Clean Hands**



**Twin Baby
Clean Hands:
"Sharing is
Caring"**



**Nurse Clean
Hands**



Component 4: Educational Intervention

- Program Goals:
 - Design, implement and evaluate a structured infection control education program
 - Develop 'deliverables' for broader dissemination
 - DVDs, educational brochures, web-based training modules
 - Pre and post-tests
- In-services 6/year for 6 intervention facilities
 - Current infection control guidelines
 - MDROs
 - Urinary catheter care
 - Feeding tube care
- Program evaluation: Pre and post tests, direct observations

Certificate of participation



*University of Michigan
Geriatrics Center*



*Certificate of Participation
awarded to*

*In recognition of its participation in
Infection Prevention
&
Quality Enhancement Research Initiatives.*

March 2006

Lona Mody, MD

Jeffrey Hilder, MD

(gold seal)

Educational Topics

Session	Topic	Format (40 min)	Session Leaders
1	Introduction to Infection Control	Slide Presentation (20 minutes) Case Discussion (15 minutes) Question Period (5 minutes)	Dr. Mody & Mr. Olmstead
2	Current Guidelines and Recommendations	Slide Presentation (20 minutes) Question Period (20 minutes)	Drs. Mody, Bradley, Krein
3	Infection Control Practices: Hand Hygiene	Slide Presentation (20minutes) Case Discussion (15 minutes) Question Period (5 minutes)	Drs. Mody & Kauffman
4	Infection Control Practices: Indwelling Urinary Catheter	Slide Presentation (20 minutes) Case Discussion (15 minutes) Question Period (5 minutes)	Dr. Mody & Mr. Olmstead
5	Infection Control Practices: Feeding Tubes	Slide Presentation (20 minutes) Case Discussion (15 minutes) Question Period (5 minutes)	Drs. Mody & Bradley
6	Multidrug-resistant organisms	Slide Presentation (20 minutes) Case Discussion (5 minutes) Question Period (5 minutes)	Dr. Mody & Mr. Olmstead
7	Diagnoses of common infections – Urinary tract infections	Slide Presentation (20 minutes) Case Discussion (15 minutes) Question Period (5 minutes)	Drs. Mody & Krien
8	Diagnoses of common infections – Respiratory tract infections	Slide Presentation (20 minutes) Case Discussion (15 minutes) Question Period (5 minutes)	Drs. Mody & Kauffman
9	Diagnoses of common infections – Skin and soft tissue infections	Slide Presentation (20 minutes) Case Discussion (15 minutes) Question Period (5 minutes)	Dr. Mody & Mr. Olmstead
10	Appropriate antimicrobial use in NHs	Slide Presentation (20 minutes) Case Discussion (15 minutes) Question Period (5 minutes)	Drs. Mody & Bradley

Acknowledgements

- All our participating skilled nursing facilities, their patients and administrators
- Team: Bonnie Lansing, Kathy Simmons, Kay Cherian, Linda Wang, Sue Donabedian
- Collaborators/Mentors:
 - Carol A. Kauffman, MD, Infectious Dis
 - Suzanne F. Bradley, MD, Infectious Dis, Geriatrics
 - Sanjay Saint, MD MPH, General Internal Medicine
 - Sarah Krein, Ph.D, RN, General Internal Medicine
 - Andrzej Galecki, MD Ph.D, Geriatrics
 - Ken Langa, MD, VA HSR &D, General Internal Medicine
 - Marc Zervos, MD, Henry Ford Health System
- Funding Agencies:
 - NIA K 23 Career Development Award (Mody)
 - AGS/ASP T. Franklin Williams Scholars Program (Mody)
 - NIA RO1 (Mody)
 - NIA Pepper Center Pilot Grant (Mody)
 - VA GRECC