Protecting the Vulnerable
MDRO Decolonization in Nursing Homes: The Evidence

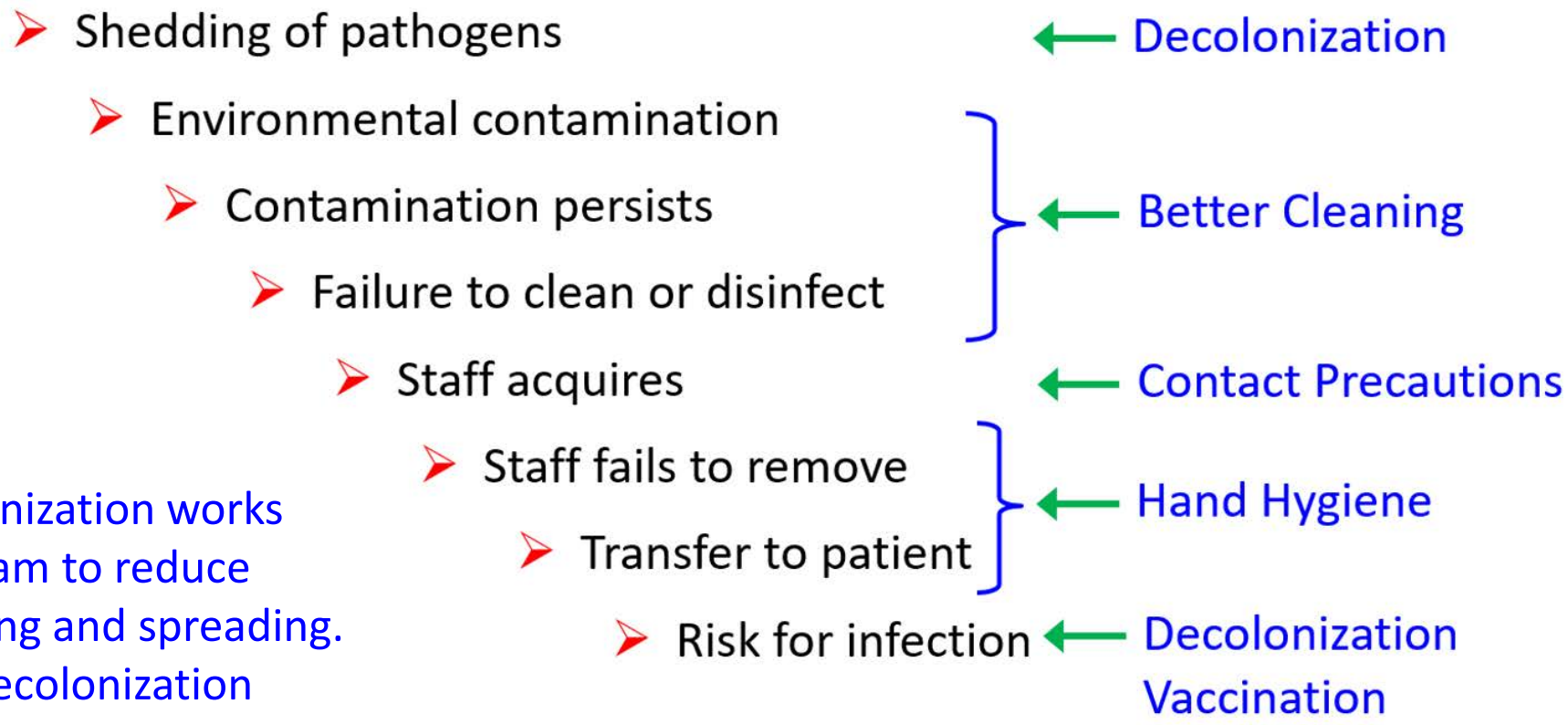
Susan Huang, MD MPH
Professor, Division of Infectious Diseases
Medical Director, Epidemiology & Infection Prevention
University of California Irvine School of Medicine

The Need to Prevent Nursing Home MDRO Infections

- 3 million healthcare-associated infections (HAIs) estimated to occur in nursing homes (NHs) each year, associated with:
  - 150,000 hospital admissions
  - 350,000 deaths
- NHs care for the highly vulnerable, with elderly age, high risk comorbid conditions, high multidrug-resistant organism (MDRO) prevalence, limited self hygiene
- 65% of nursing home residents harbor an MDRO

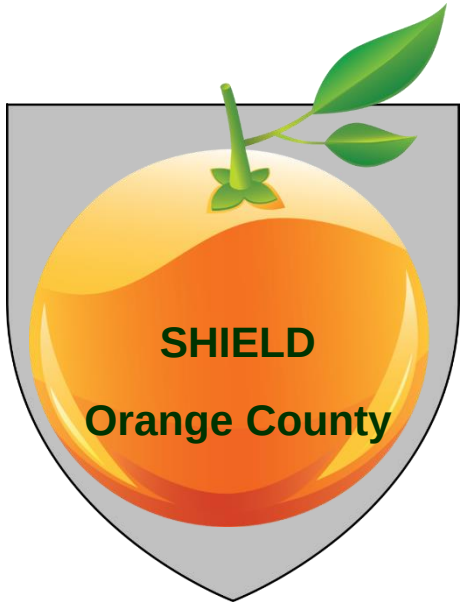
Strausbaugh LJ, Joseph CL. ICHE 2000; 21(10):674-9.
Magaziner J et al. JAGS. 1991; 39(11):1071-8.
Heudorf U et al. Euro Surveill. 2012; 17(35).
McKinnell JA et al. CID 2019; 69(9):1566-73.

How to Prevent Nursing Home MDRO Infections?



Decolonization works upstream to reduce shedding and spreading. Only decolonization addresses MDRO carriage.

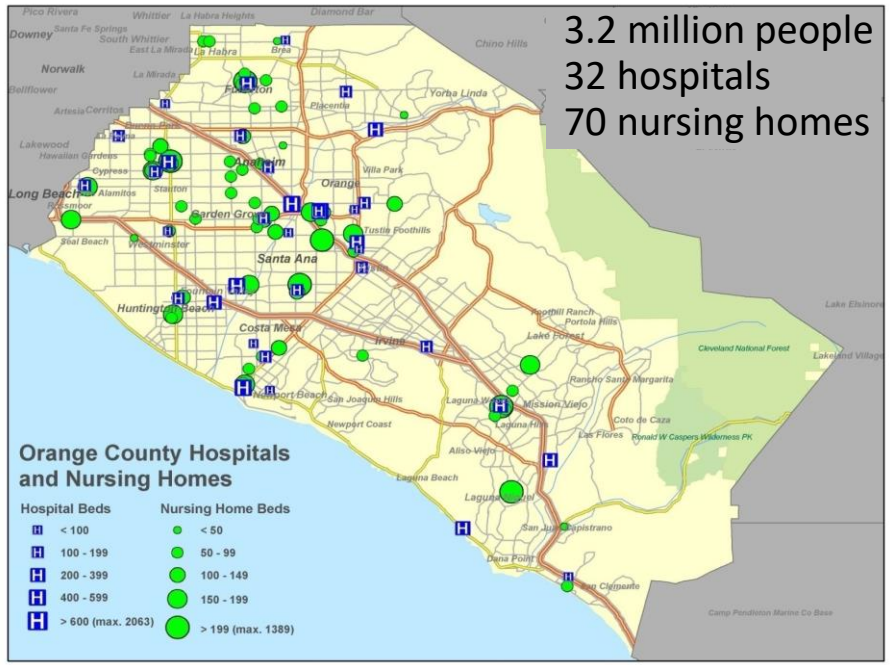
Huang SS. J Hosp Infect. 2019. Nov;103(3):235-243

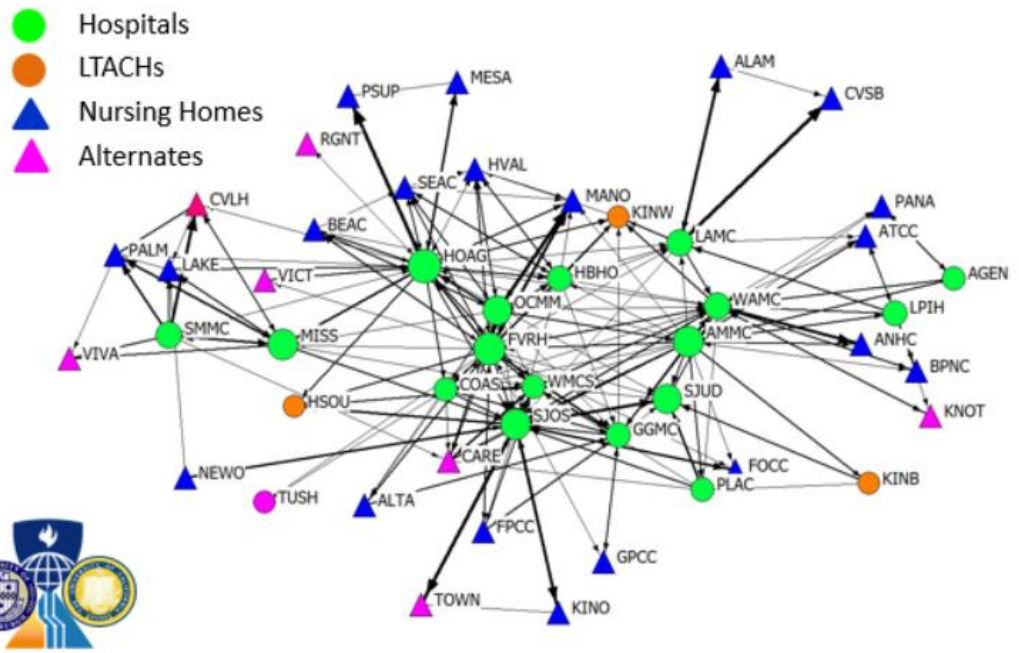


Shared Healthcare Intervention to Eliminate Life-threatening Dissemination of MDROs in Orange County, California

SHIELD Orange County Regional Intervention

- U.S. CDC funded regional project to reduce MDROs
- Part 1: Simulate impact of various regional interventions
- Part 2: Implement winning strategy in facilities with highest patient sharing





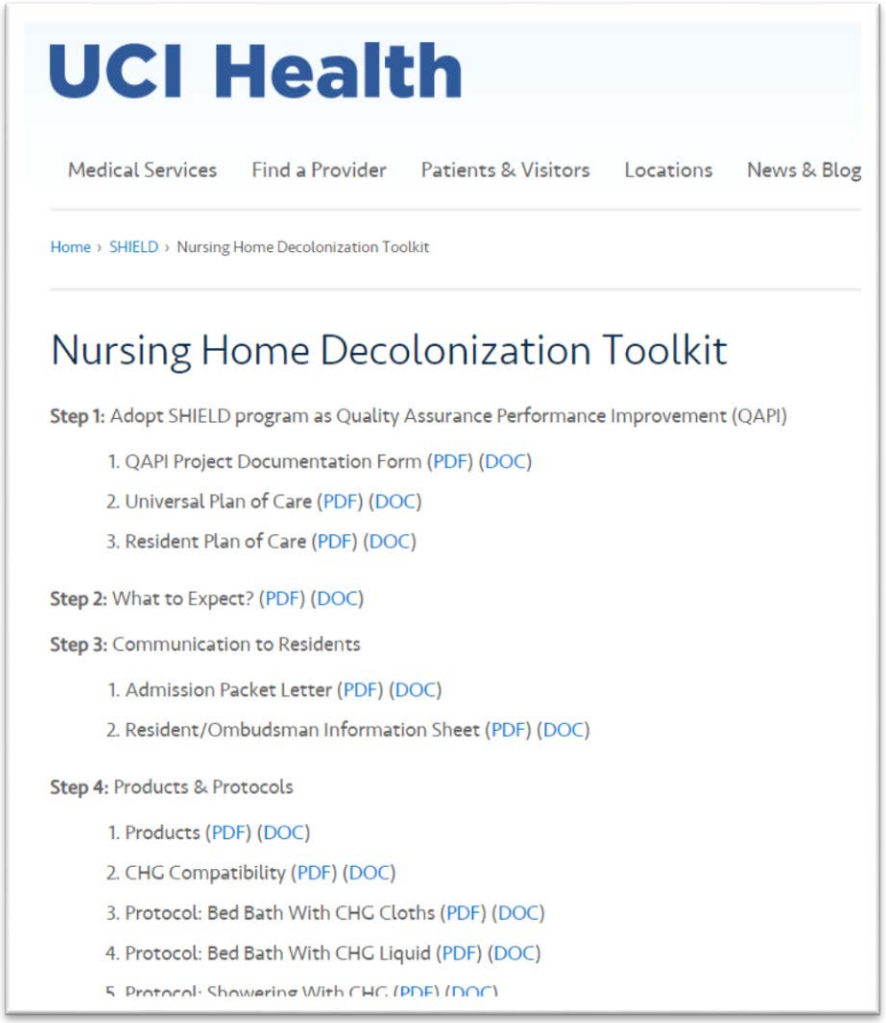
SHIELD OC: 37 Facility Decolonization Intervention

- **28-month intervention:** April 2017-July 2019
- **Participants:** 18 nursing homes (NHs), 3 long-term acute care hospitals (LTACHs), 16 hospitals
- **NHs and LTACHs:** universal decolonization
  - ✓ Chlorhexidine (CHG) antiseptic soap for routine bathing/showering
  - ✓ Nasal iodophor for 5d on admission and every other week
- **Hospitals:** decolonize patients on contact precautions
  - ✓ Daily CHG bathing/showering
  - ✓ Nasal iodophor decolonization for 5 days
  - ✓ Support ongoing ICU CHG daily bathing

https://www.cdc.gov/hai/research/cdc-mdro-project.html

Gussin G et al. SHEA/CDC Decennial 2020

SHIELD Online Decolonization Toolkit



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Home › SHIELD › Nursing Home Decolonization Toolkit

Nursing Home Decolonization Toolkit

Step 1: Adopt SHIELD program as Quality Assurance Performance Improvement (QAPI)

1. QAPI Project Documentation Form (PDF) (DOC)
2. Universal Plan of Care (PDF) (DOC)
3. Resident Plan of Care (PDF) (DOC)

Step 2: What to Expect? (PDF) (DOC)

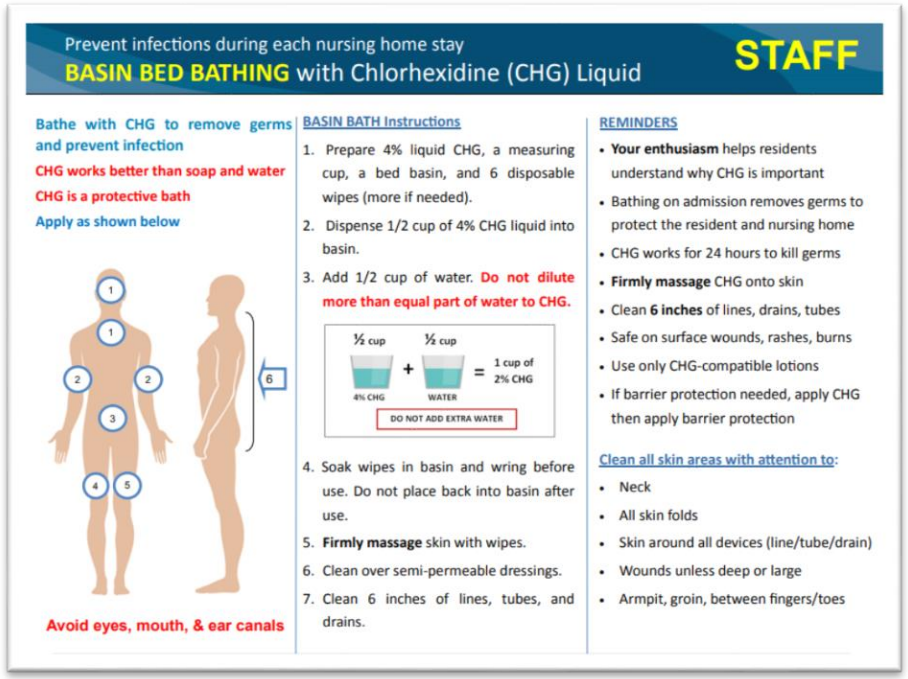
Step 3: Communication to Residents

1. Admission Packet Letter (PDF) (DOC)
2. Resident/Ombudsman Information Sheet (PDF) (DOC)

Step 4: Products & Protocols

1. Products (PDF) (DOC)
2. CHG Compatibility (PDF) (DOC)
3. Protocol: Bed Bath With CHG Cloths (PDF) (DOC)
4. Protocol: Bed Bath With CHG Liquid (PDF) (DOC)
5. Protocol: Showering With CHG (PDF) (DOC)

ucihealth.org/shield



Prevent infections during each nursing home stay

BASIN BED BATHING with Chlorhexidine (CHG) Liquid **STAFF**

Bathe with CHG to remove germs and prevent infection

CHG works better than soap and water

CHG is a protective bath

Apply as shown below

Avoid eyes, mouth, & ear canals

BASIN BATH Instructions

1. Prepare 4% liquid CHG, a measuring cup, a bed basin, and 6 disposable wipes (more if needed).
2. Dispense 1/2 cup of 4% CHG liquid into basin.
3. Add 1/2 cup of water. **Do not dilute more than equal part of water to CHG.**

4. Soak wipes in basin and wring before use. Do not place back into basin after use.
5. **Firmly massage** skin with wipes.
6. Clean over semi-permeable dressings.
7. Clean 6 inches of lines, tubes, and drains.

REMINDERS

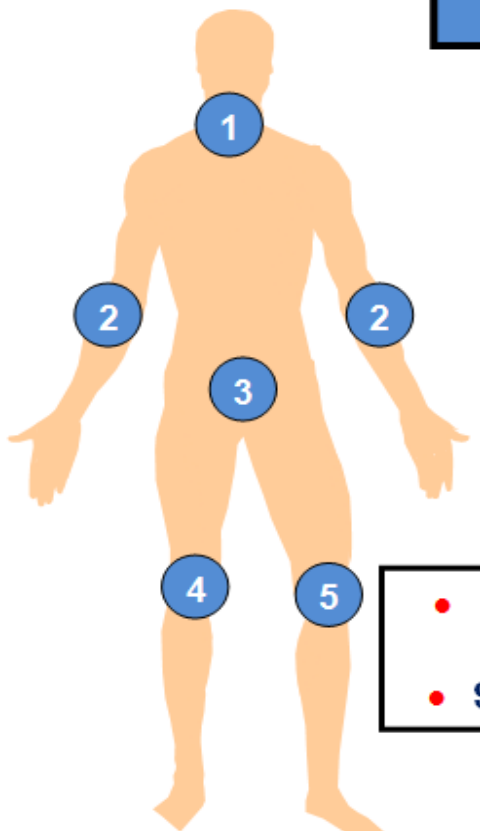
- **Your enthusiasm** helps residents understand why CHG is important
- Bathing on admission removes germs to protect the resident and nursing home
- CHG works for 24 hours to kill germs
- **Firmly massage** CHG onto skin
- Clean **6 inches** of lines, drains, tubes
- Safe on surface wounds, rashes, burns
- Use only CHG-compatible lotions
- If barrier protection needed, apply CHG then apply barrier protection

Clean all skin areas with attention to:

- Neck
- All skin folds
- Skin around all devices (line/tube/drain)
- Wounds unless deep or large
- Armpit, groin, between fingers/toes

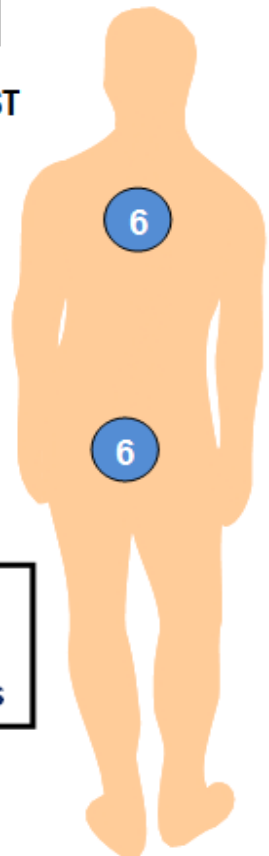
Apply Chlorhexidine WITH FIRM MASSAGE to remove bacteria

USE ALL 6 CHG CLOTHS
Avoid EYES & EAR CANAL



FRONT

1. FACE, NECK SHOULDERS & CHEST
2. BOTH ARMS & HANDS
3. ABDOMEN, GROIN & PERINEUM
4. RIGHT LEG & FOOT
5. LEFT LEG & FOOT
6. BACK, THEN BUTTOCKS

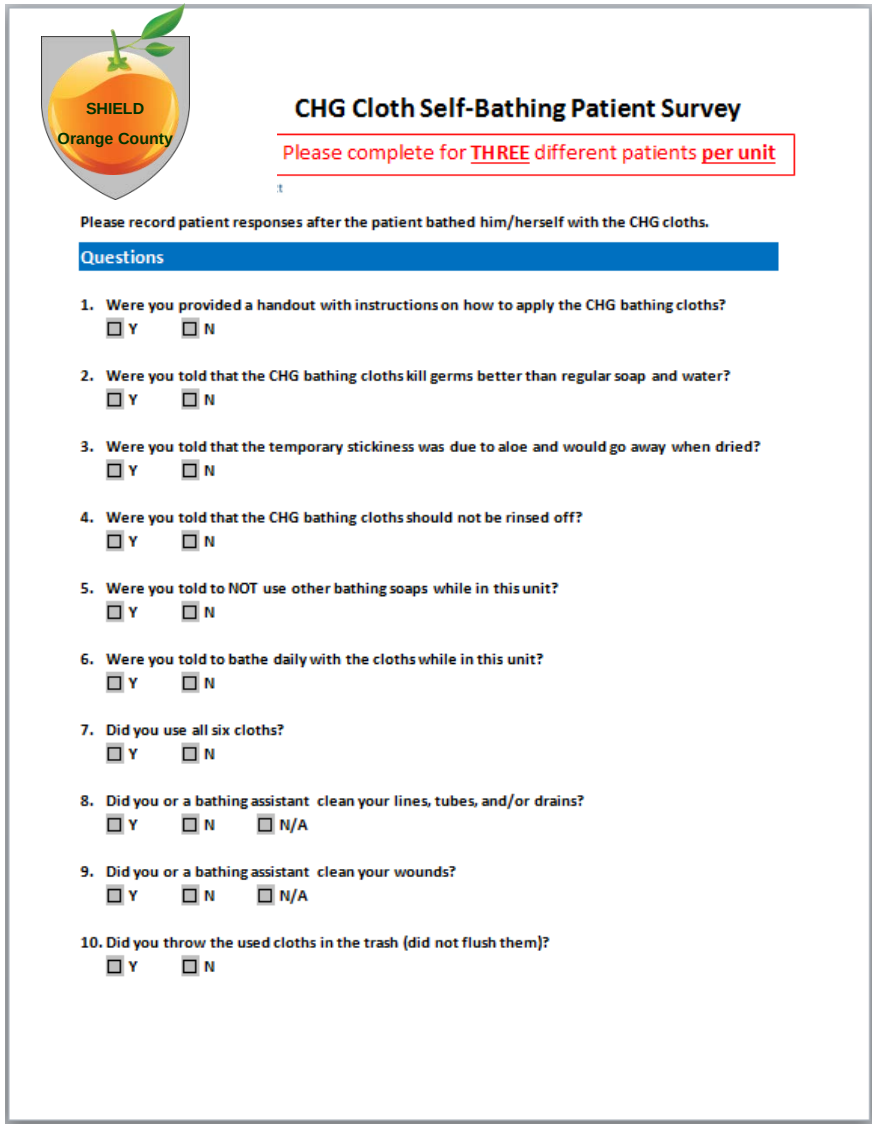


BACK

- Clean 6 inches of all tubes, lines, and drains closest to patient with CHG
- Safe on superficial wounds, rash, burns

Skin may feel sticky for a few minutes after CHG application.
Do NOT wipe off. Allow to air dry.

THIS IS a PROTECTIVE BATH
Do not use soap which can inactivate CHG



SHIELD
Orange County

CHG Cloth Self-Bathing Patient Survey

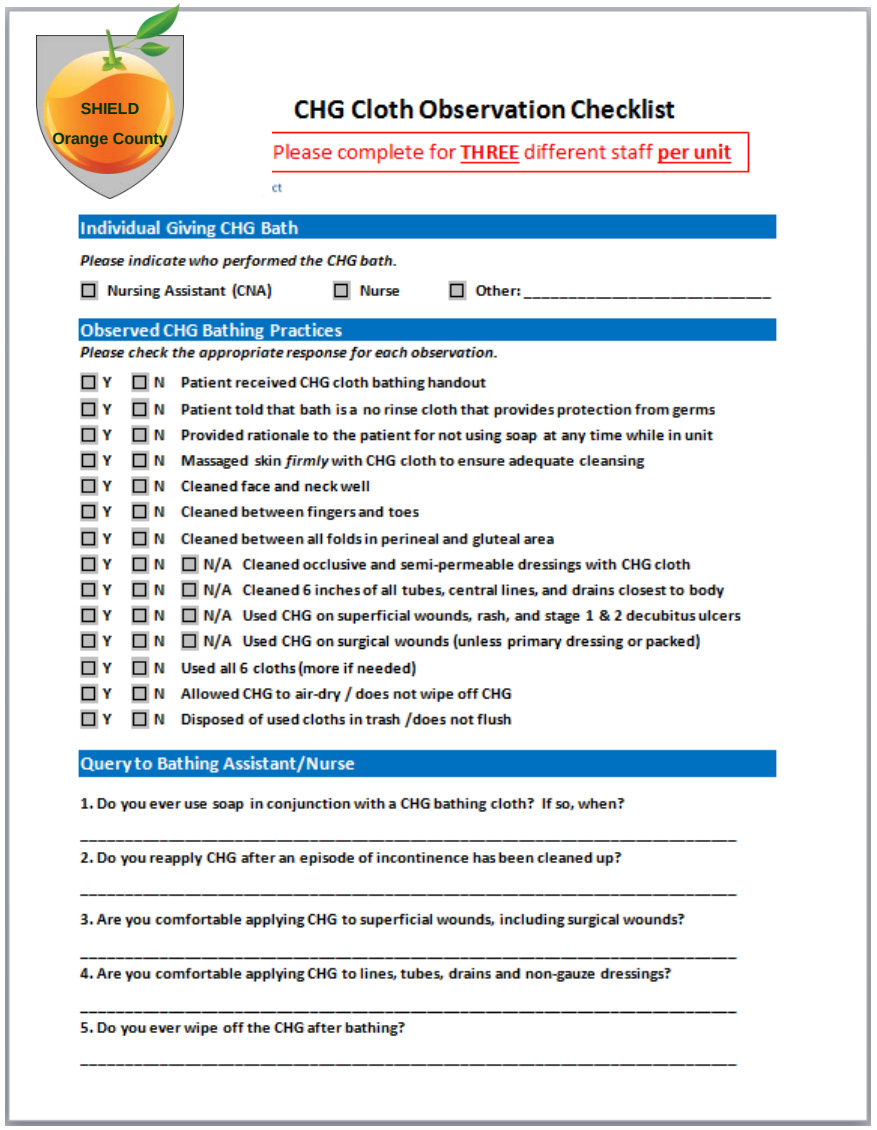
Please complete for **THREE** different patients **per unit**

Please record patient responses after the patient bathed him/herself with the CHG cloths.

Questions

1. Were you provided a handout with instructions on how to apply the CHG bathing cloths?
   ☐ Y ☐ N
2. Were you told that the CHG bathing cloths kill germs better than regular soap and water?
   ☐ Y ☐ N
3. Were you told that the temporary stickiness was due to aloe and would go away when dried?
   ☐ Y ☐ N
4. Were you told that the CHG bathing cloths should not be rinsed off?
   ☐ Y ☐ N
5. Were you told to NOT use other bathing soaps while in this unit?
   ☐ Y ☐ N
6. Were you told to bathe daily with the cloths while in this unit?
   ☐ Y ☐ N
7. Did you use all six cloths?
   ☐ Y ☐ N
8. Did you or a bathing assistant clean your lines, tubes, and/or drains?
   ☐ Y ☐ N ☐ N/A
9. Did you or a bathing assistant clean your wounds?
   ☐ Y ☐ N ☐ N/A
10. Did you throw the used cloths in the trash (did not flush them)?
    ☐ Y ☐ N

Patient CHG Cloth Self-Bathing Survey



SHIELD
Orange County

CHG Cloth Observation Checklist

Please complete for **THREE** different staff **per unit**

Individual Giving CHG Bath

Please indicate who performed the CHG bath.

☐ Nursing Assistant (CNA) ☐ Nurse ☐ Other: _____

Observed CHG Bathing Practices

Please check the appropriate response for each observation.

☐ Y ☐ N Patient received CHG cloth bathing handout
☐ Y ☐ N Patient told that bath is a no rinse cloth that provides protection from germs
☐ Y ☐ N Provided rationale to the patient for not using soap at any time while in unit
☐ Y ☐ N Massaged skin *firmly* with CHG cloth to ensure adequate cleansing
☐ Y ☐ N Cleaned face and neck well
☐ Y ☐ N Cleaned between fingers and toes
☐ Y ☐ N Cleaned between all folds in perineal and gluteal area
☐ Y ☐ N ☐ N/A Cleaned occlusive and semi-permeable dressings with CHG cloth
☐ Y ☐ N ☐ N/A Cleaned 6 inches of all tubes, central lines, and drains closest to body
☐ Y ☐ N ☐ N/A Used CHG on superficial wounds, rash, and stage 1 & 2 decubitus ulcers
☐ Y ☐ N ☐ N/A Used CHG on surgical wounds (unless primary dressing or packed)
☐ Y ☐ N Used all 6 cloths (more if needed)
☐ Y ☐ N Allowed CHG to air-dry / does not wipe off CHG
☐ Y ☐ N Disposed of used cloths in trash /does not flush

Query to Bathing Assistant/Nurse

1. Do you ever use soap in conjunction with a CHG bathing cloth? If so, when?
   _____
2. Do you reapply CHG after an episode of incontinence has been cleaned up?
   _____
3. Are you comfortable applying CHG to superficial wounds, including surgical wounds?
   _____
4. Are you comfortable applying CHG to lines, tubes, drains and non-gauze dressings?
   _____
5. Do you ever wipe off the CHG after bathing?
   _____

CHG Cloth Bathing Observation Form

Characteristics of SHIELD OC Facilities

	NH	LTACH	Hospital
Mean age	76	72	47
% Male	40%	53%	42%
Mean Licensed Beds	133	83	247
Average Daily Census	115	63	141
Mean LOS	69.3	30.6	4.1
Elixhauser Comorbidity Score	3.8	2.9	1.9
% Diabetes	36%	13%	12%
% Chronic Lung Disease	22%	21%	11%
% Chronic Kidney Disease	21%	23%	8%

Impact: MDRO Prevalence

- Point prevalence assessment for quality improvement
- Body swabs: nasal, skin, peri-rectal
  - Hospitals: 50 patients in contact precautions
  - LTACHs & NHs: 50 representative patients

18 Nursing Homes
Baseline MDRO Point Prevalence

	N	Any MDRO	MRSA	VRE	ESBL	CRE
Nares	900	28%	28%	-	-	-
Axilla/Groin	900	47%	30%	10%	22%	1%
Peri-Rectal	900	52%	25%	15%	31%	1%
All Body Sites	**900**	**64%**	**42%**	**16%**	**34%**	**2%**

64% MDRO carriers, facility range 44-88%

Among MDRO pathogens detected, only 14% known to facility

Among all residents, 59% harbored ≥1 MDRO unknown to facility

3 Long Term Acute Care Hospitals (LTACHs) Baseline MDRO Point Prevalence

	N	Any MDRO	MRSA	VRE	ESBL	CRE
Nares	150	23%	23%	-	-	-
Axilla/Groin	150	61%	17%	37%	27%	7%
Peri-Rectal	150	73%	19%	52%	35%	7%
All Body Sites	**150**	**80%**	**33%**	**55%**	**39%**	**9%**

80% MDRO carriers, facility range 72-86%

Among MDRO pathogens detected, only 29% known to facility

Among all patients, 69% harbored ≥1 MDRO unknown to facility

16 Hospitals
Patients on Contact Precautions

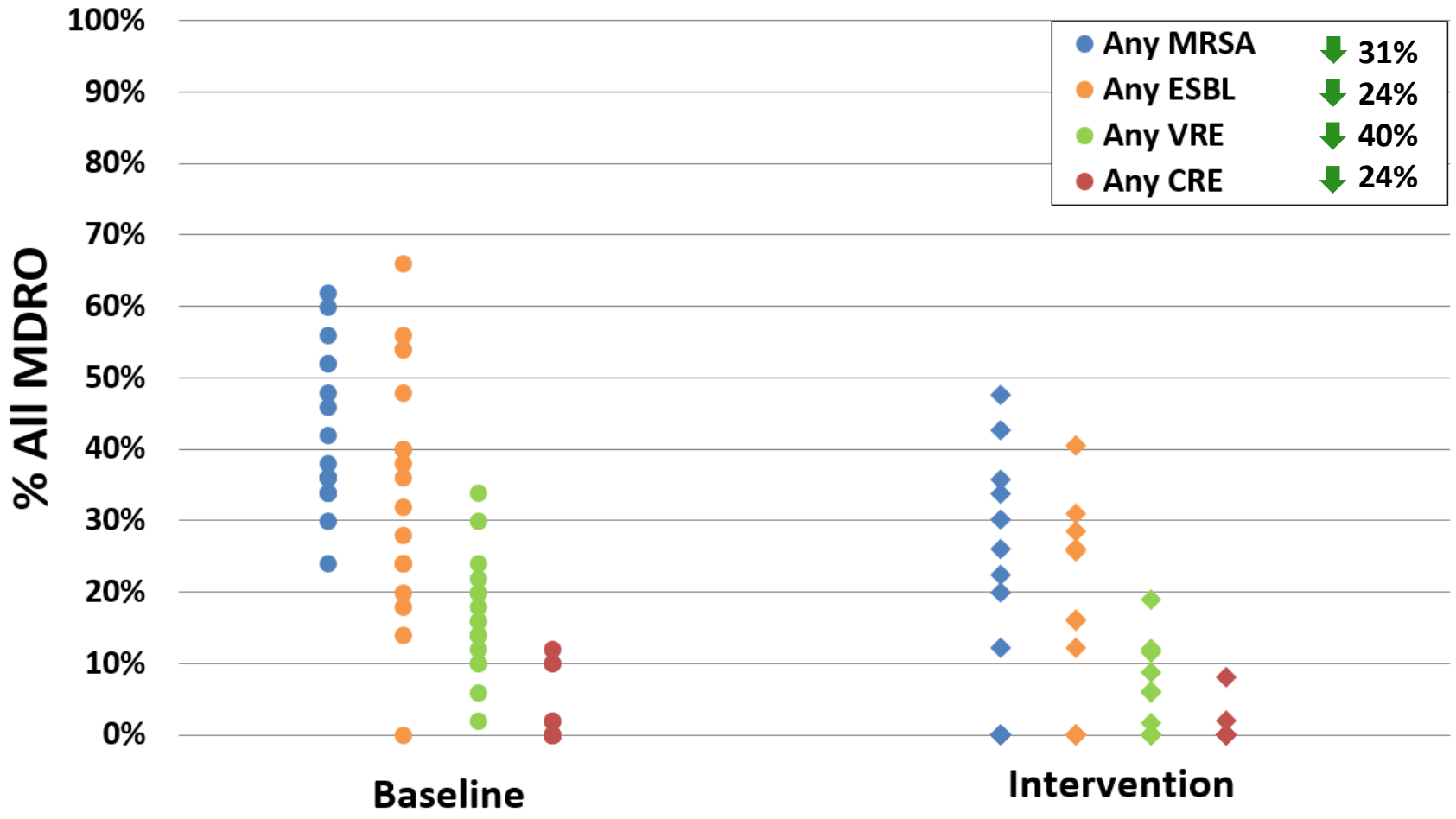
	N	Any MDRO	MRSA	VRE	ESBL	CRE
Nares	785	30%	30%	-	-	-
Axilla/Groin	785	33%	15%	14%	13%	1%
Peri-Rectal	785	49%	14%	23%	24%	2%
All Body Sites	**785**	**64%**	**36%**	**25%**	**27%**	**2%**

64% MDRO carriers, facility range 54-100%

Among MDRO pathogens detected, 53% known to facility

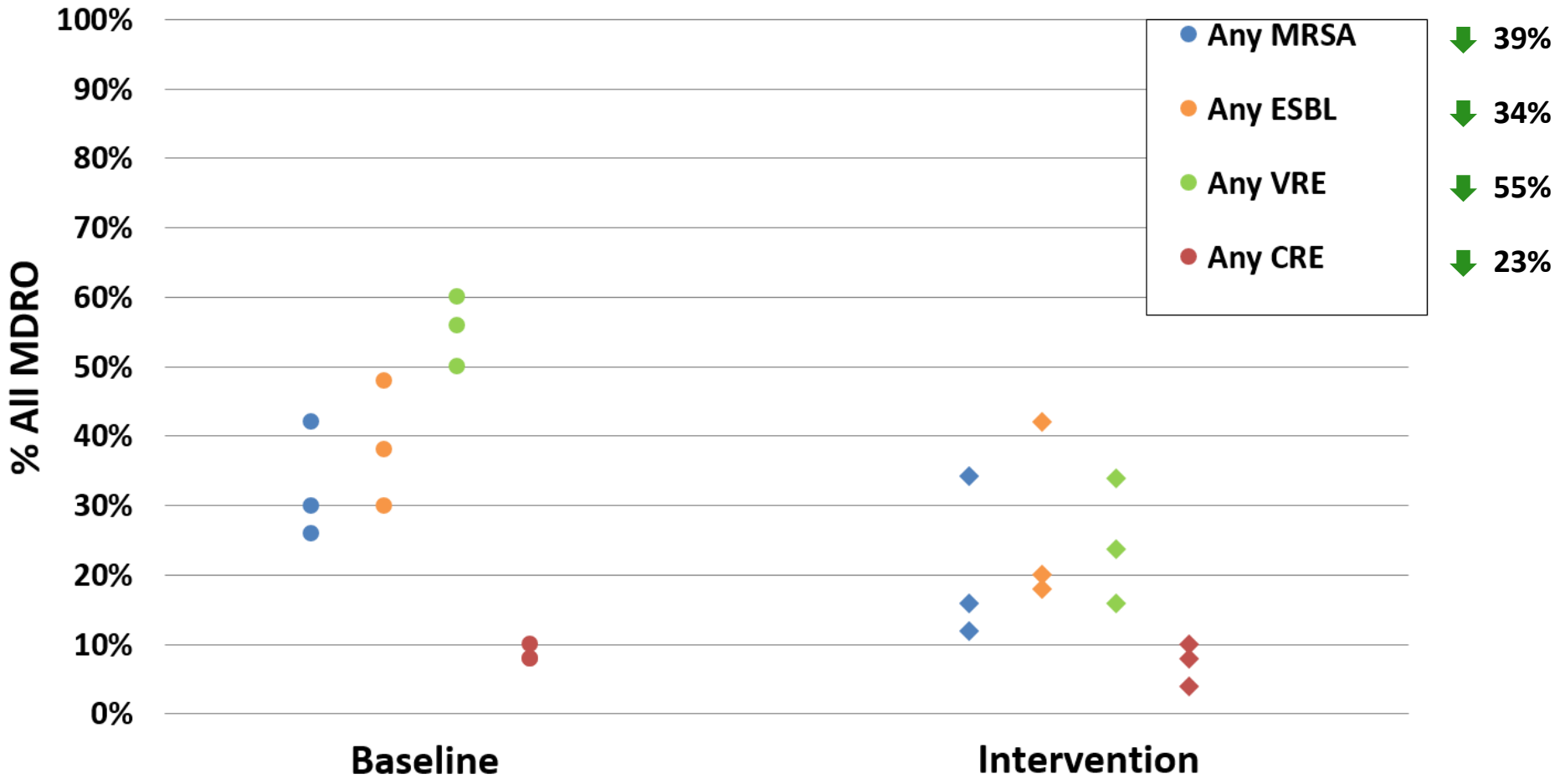
Among all in CP, 36% harbored ≥1 MDRO unknown to facility

SHIELD Nursing Home Impact: 22% MDRO Reduction



McKinnell IDWeek 2019

SHIELD LTACH Impact: 34% MDRO Reduction



McKinnell IDWeek 2019

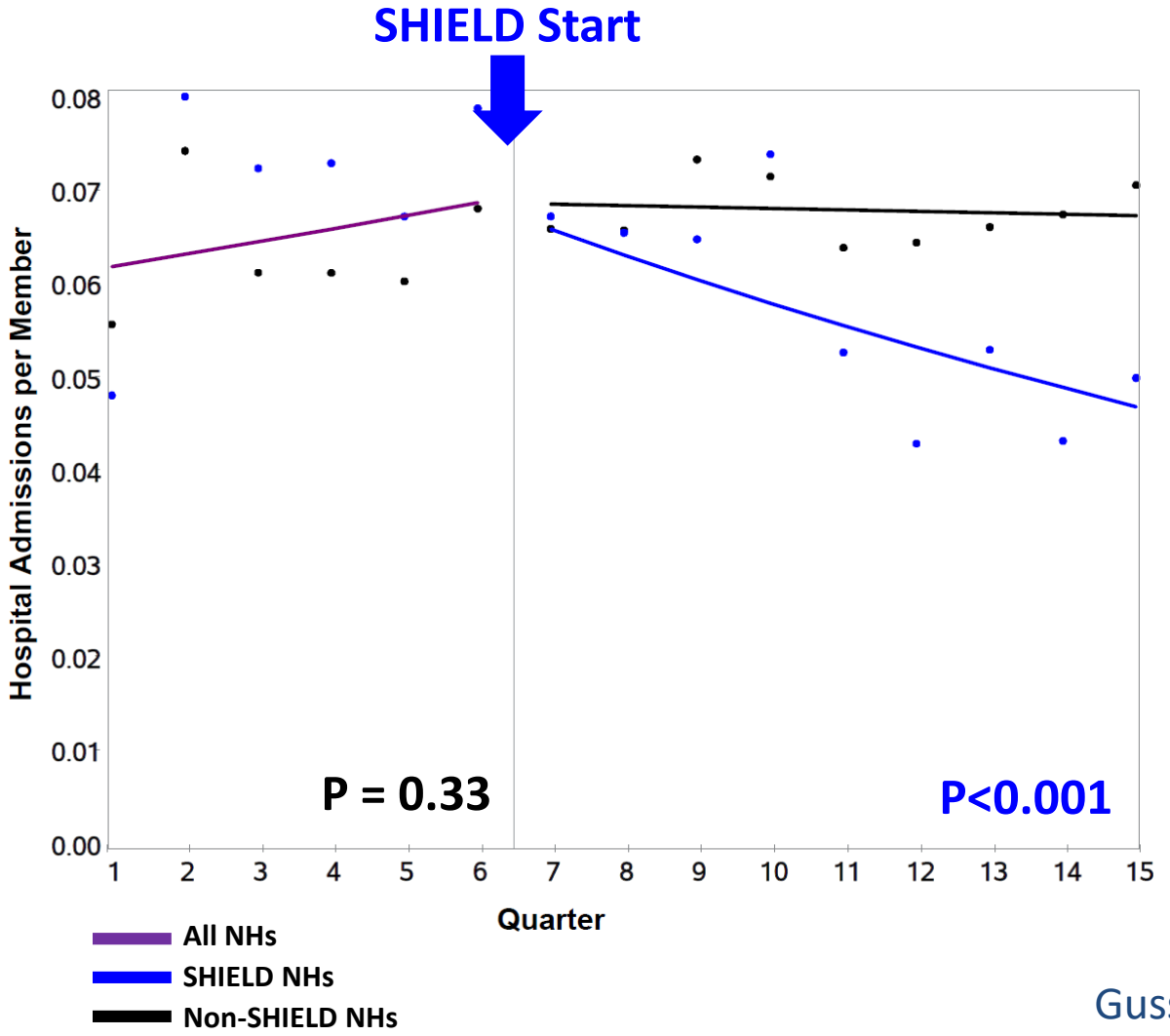
Impact on Hospitalization and Cost

- Partnership with CalOptima, OC Medicaid insurer
- **Goal**: understand if MDRO reductions in NHs resulted in reduced hospital admissions and costs due to infection among residents
- **Design:** retrospective cohort study of OC NHs that receive Medicaid funds
- **Study Population:**
  - ✓ 16 NHs participating in SHIELD OC
  - ✓ 43 NHs not participating in SHIELD OC (control)

SHIELD Nursing Home Characteristics

	SHIELD OC NHs	Non-SHIELD NHs (Control)
N	16	43
Median Age	80	77
% Female	58%	57%
Median Licensed Beds	118	99
Median Daily Census	107	91
Median Length of Stay (Days)	71	73
Median Acuity Index	13	14

SHIELD Impact: Hospitalizations Due to Infection



When comparing end-intervention rates to baseline rates:

SHIELD NHs ⬇ 29%

Non-SHIELD NHs ⬆ 11%

40% relative reduction in SHIELD compared to non-SHIELD NHs

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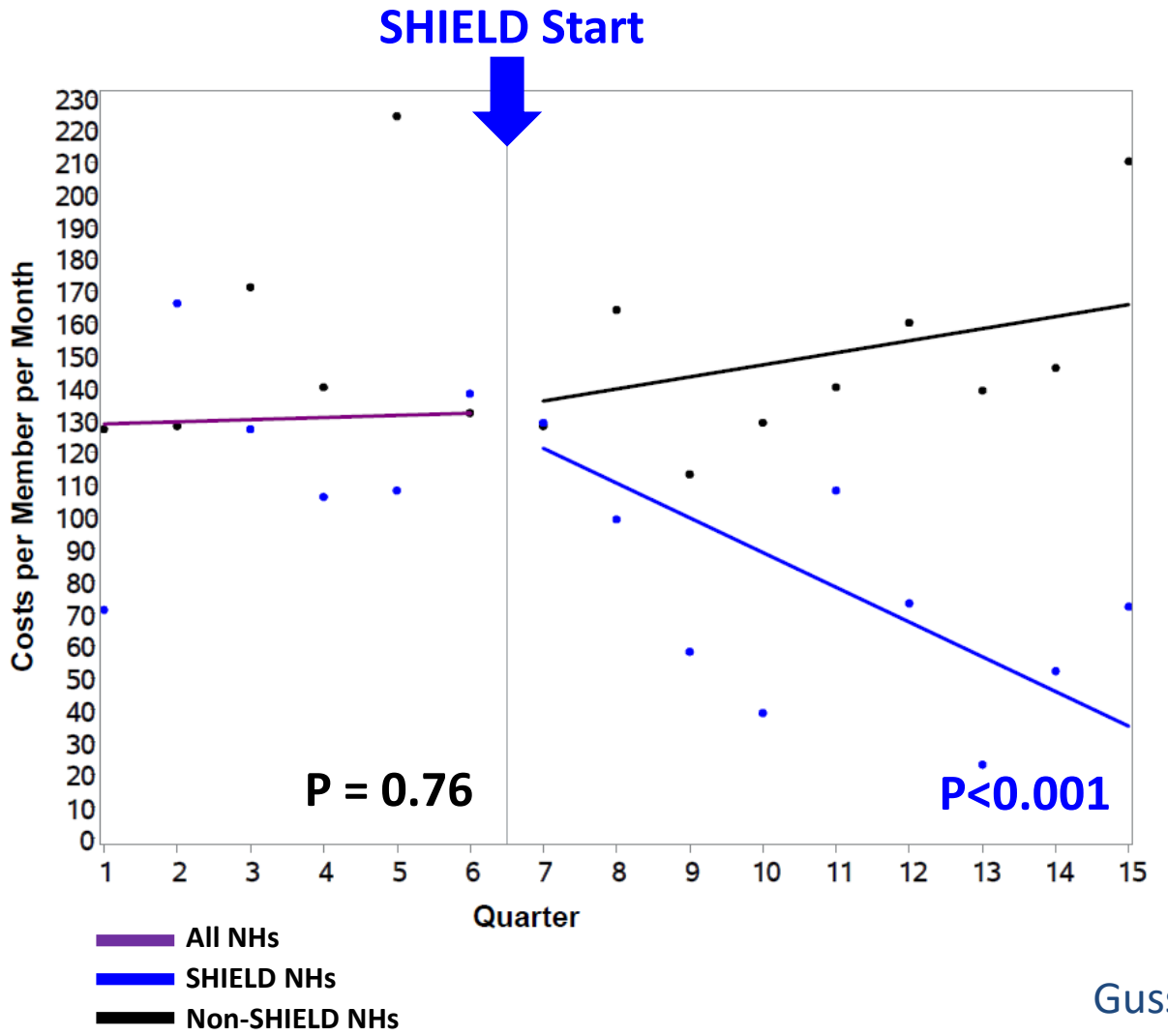
SHIELD Impact: Medicaid Expenditures



When comparing end-intervention rates to baseline rates:

SHIELD NHs ⬇ 40%

Non-SHIELD NHs ⬆ 37%

76% relative reduction in SHIELD compared to non-SHIELD NHs

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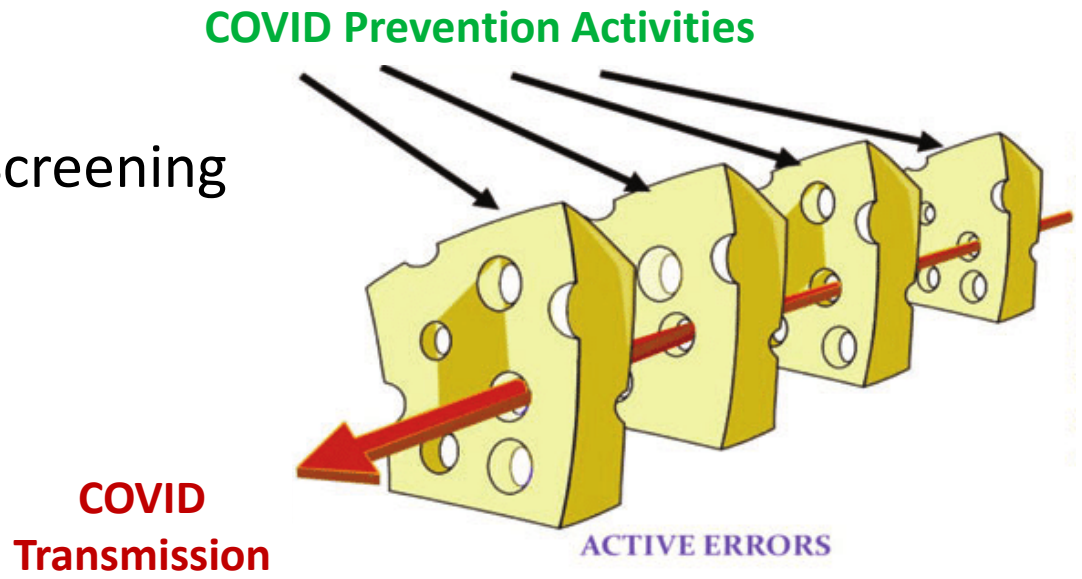
Post-SHIELD Adoption
Nursing Home Incentive Program

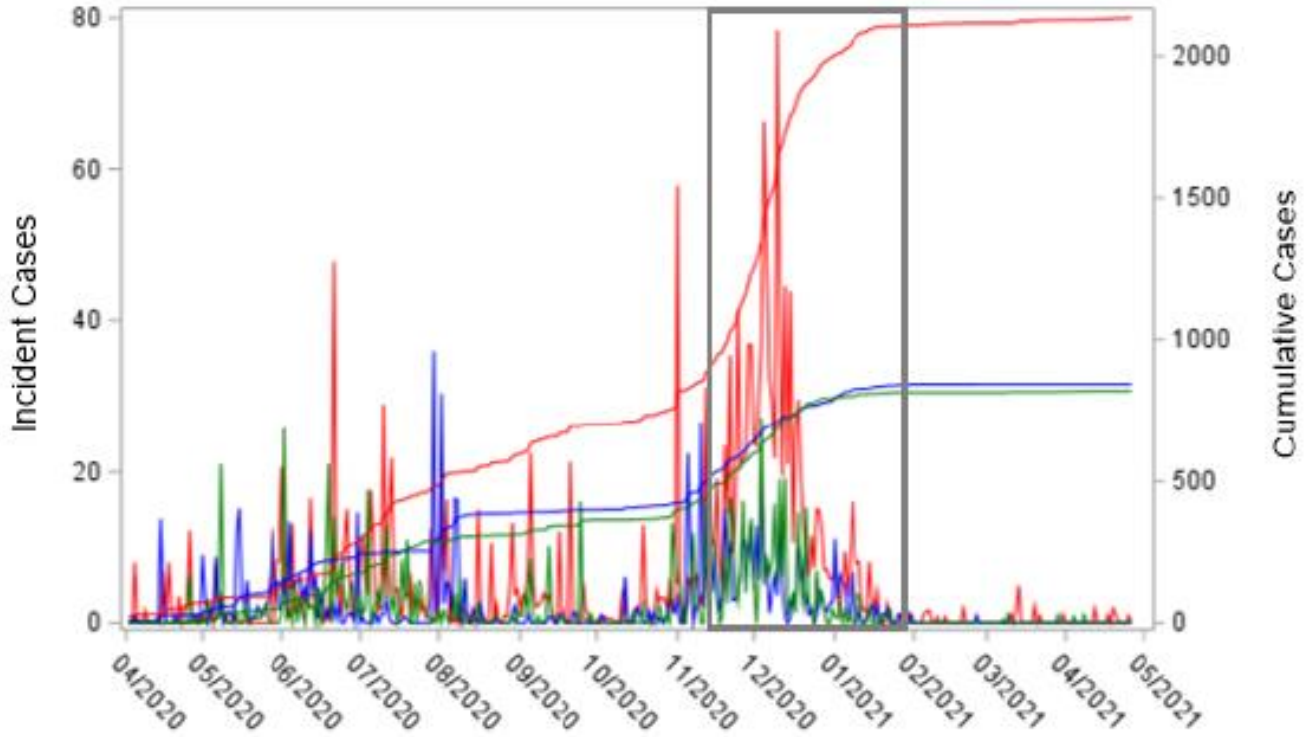
- OC Medicaid (CalOptima) funded a Post-Acute Infection Prevention Quality Initiative (PIPQI) to support adoption of SHIELD protocol in OC NHs
  - ✓ To date, 28 of 67 eligible NHs enrolled
- The CalOptima PIPQI program:
  - ✓ Training supported by CDC/NACCHO
  - ✓ Covers the cost of CHG soap and nasal decolonization for **all NH residents**, not just Medicaid-insured members, since protection against contagious pathogens requires a facility-wide effort
  - ✓ Provides incentive funds to NHs to support labor, training
  - ✓ Includes dedicated program nurses for on-site training and monitoring

Safety = Multiple Prevention Strategies

- Universal Masking
- Hand Hygiene
- Social Distancing
- Daily Symptom and Temperature Screening
- Routine COVID Testing
- Staying Home When Ill
- Some: universal decolonization



NH Staff COVID Cases
Decolonization with and w/o COVID Training vs Non-Participants



Legend.

- Non-Participants (N=38)
- COVID Training (N=12; 11 participated in decolonization)
- Universal Decolonization (N=24)

Staff COVID cases were reduced by 31% in Intervention NHs

OR=0.69 (0.52, 0.92)
P=0.01

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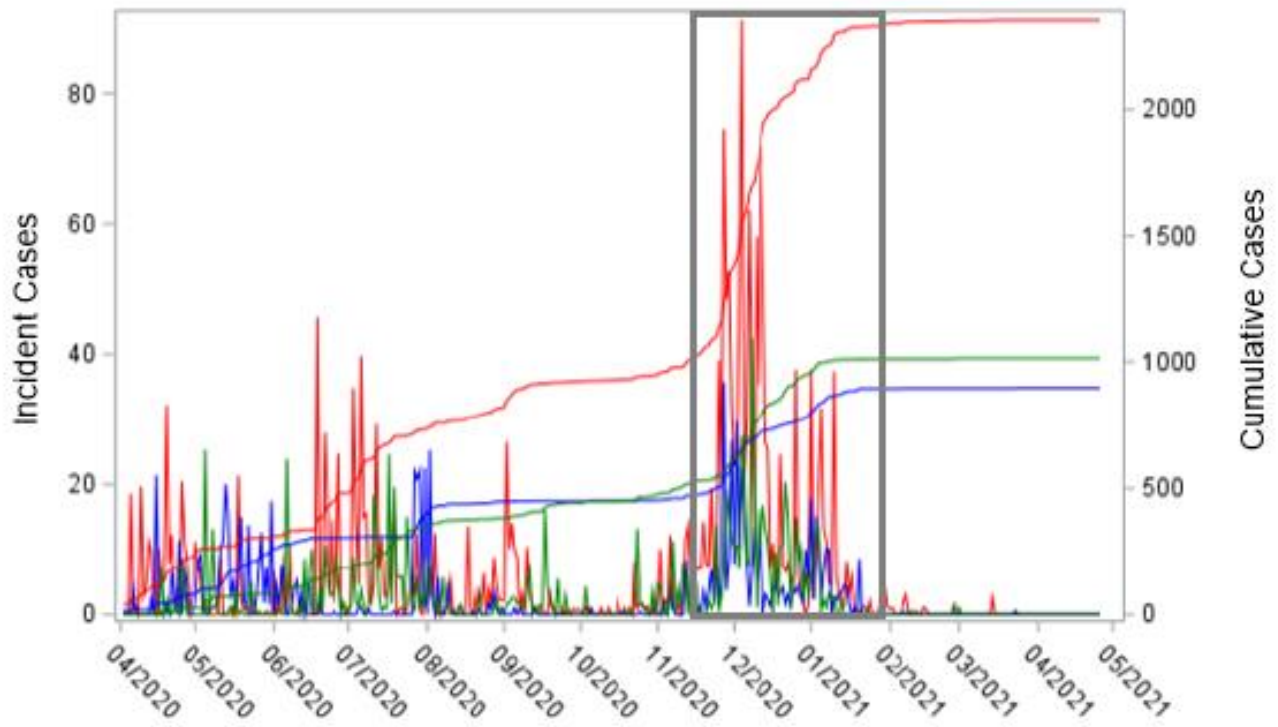
NH Resident COVID Cases
Decolonization with and w/o COVID Training vs Non-Participants



Legend.

- Non-Participants (N=38)
- COVID Training (N=12; 11 participated in decolonization)
- Universal Decolonization (N=24)

Resident COVID cases were reduced by 43% in Intervention NHs

OR=0.57 (0.39, 0.82)
P=0.003

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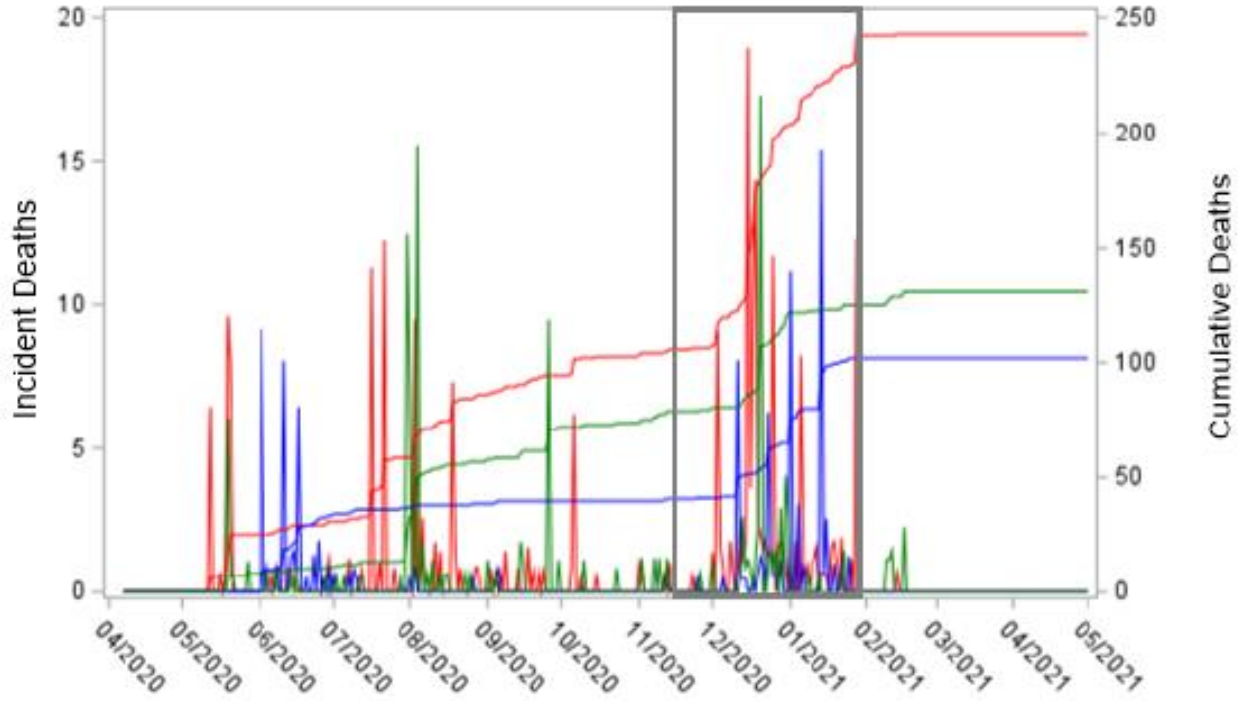
NH Resident COVID Deaths
Decolonization with and w/o COVID Training vs Non-Participants



Legend.

- Non-Participants (N=38)
- COVID Training (N=12; 11 participated in decolonization)
- Universal Decolonization (N=24)

Resident COVID cases were reduced by 26% in Intervention NHs

OR=0.74 (0.46, 1.21)
P=0.23

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Double Swab 5% vs Single Swab 10% Iodophor for Reducing MRSA with Routine Chlorhexidine Bathing

Comparison of 5% vs 10% Iodophor

- 3 nursing home decolonization study*
  - CHG for routine bathing and showering
  - 5% nasal iodophor on admit and M-F every other week**
  - 2 swabs per nostril twice daily x 5 days (8 swabs/day)
- Post-study, one nursing home adopted intervention, but changed to 10% iodophor nasal swabs
  - 1 swab per nostril twice daily x 5 days (4 swabs/day)
- We took the opportunity to compare our study results to the post-study QI results in that one nursing home

* Funded by CDC
** Contributed by 3M

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PROTECT Study: 3 Nursing Home Pilot

Design	**Before-after experimental study of universal decolonization**
Population	Residents of 3 California nursing homes
Study Period	**Baseline**: Jun-Aug 2015 **Phase-In**: Sept-Nov 2015 **Intervention**: Dec-Feb 2016
Intervention	**Body decolonization**: Daily CHG baths (2% no rinse) or showers (4% rinse off) **Nasal decolonization**: 5% iodophor, twice daily, on admit and M-F every other week 2 swabs/nostril, 30 seconds each swab (8 swabs/day)
Outcome	MDRO carriage in residents (MRSA, VRE, ESBLs, CRE)*
Results	Carriage of MDROs: 45% → 29% Carriage of MRSA: 29% → 19% Adjusted intervention effect: 59% reduction in MDROs

***Point prevalence nasal/axilla/groin swabs – 50 randomly selected residents, 6 rounds of swabbing**

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Post-Pilot Nursing Feedback on Iodophor Administration

- Nurses feedback on iodophor protocol
  - 2 swabs/nostril seen as redundant
  - 30 second application seen as impractical
  - Iodophor generally applied for 2-3 seconds each/nostril

- Post-pilot
  - Nursing home continued protocol as QI
  - Switched to 10% nasal iodophor (1 swab/nostril)

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QI Protocol: 10% Iodophor & CHG

Design	**Prospective cohort study of one nursing home's QI protocol**
Study Period	5 weeks (August 2016)
Population	Residents of 1 California nursing home
Intervention	**Body decolonization**: Daily CHG bathing/showering **Nasal decolonization**: 10% nasal iodophor, twice daily, M-F every other week 1 swab/nostril, 30 seconds (at least 3 revolutions)/nostril
Outcome	MDRO carriage in residents (MRSA, VRE, ESBLs, CRE)*

***Point prevalence nasal/axilla/groin swabs – 50 randomly selected residents, 2 rounds of swabbing**

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Resident Characteristics by Study Period

	Baseline % (N)	5% Iodophor (2 swabs/nostril) % (N)	10% Iodophor (1 swab/nostril) % (N)
N	300	300	100
History of MRSA	11%	10%	14%
Diabetes	48%	50%	48%
Hemodialysis	7%	9%	9%
Incontinence	58%	60%	60%
Urinary catheter	11%	11%	13%
Central line	6%	4%	8%
CHG in past 24h	0%	76%	80%
Iodophor past 24h	0%	83%	80%

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MRSA Carriage by Study Period

	Baseline % (N)	5% Iodophor (2 swabs/nostril) % (N)	10% Iodophor (1 swab/nostril) % (N)
N	300	300	100
MRSA			
Nares	27%	20%	20%
Skin	28%	7%	10%
Any	38%	21%	22%

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Comparative Impact on Nasal MRSA

	5% Iodophor (2 swabs/nostril) vs Baseline		10% Iodophor (1 swab/nostril) vs Baseline		10% vs 5% Iodophor	
	OR	P-value	OR	P-value	OR	P-value
Period	0.6	0.03	0.6	0.10	1.0	0.93

Adjusted for history of MRSA, diabetes, wounds, incontinence, devices

- ✓ 40% reduction in nasal MRSA with 5% iodophor vs baseline ($p<0.05$)
- ✓ 40% reduction in nasal MRSA with 10% iodophor vs baseline (p=NS)
- ✓ No difference in 5% vs 10% when compared to each other

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Comparative Impact on Any Site MRSA

	5% Iodophor (2 swabs/nostril) vs Baseline		10% Iodophor (1 swabs/nostril) vs Baseline		10% vs 5% Iodophor	
	OR	P-value	OR	P-value	OR	P-value
Period	0.4	<0.001	0.4	0.007	1.2	0.59

Adjusted for history of MRSA, diabetes, wounds, incontinence, devices

- ✓ 60% reduction in any MRSA with 5% iodophor vs baseline ($p<0.05$)
- ✓ 60% reduction in any MRSA with 10% iodophor vs baseline ($p<0.05$)
- ✓ No difference in 5% vs 10% when compared to each other

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Limitations

- Small study
- Evaluation occurred across different seasons
- Different sample size for pilot study vs post-pilot QI
  - ➢ Pilot sampling was 3x the post-pilot sampling

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Conclusions

- Both 5% iodophor (2 swabs/nares) and 10% iodophor (1 swab/nares) yielded a 40% reduction in MRSA nasal carriage and a 60% reduction in any MRSA carriage when used in combination with CHG bathing
- Nurses do not apply nasal iodophor for 30 seconds and feel 2 swabs per nostril is redundant
- Single swab per nares is effective and easier to implement

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Summary

- Universal decolonization with routine CHG bathing and nasal iodophor
  - reduces MDROs in nursing homes, including MRSA, VRE, and ESBLs
  - Reduces infection-related and all-cause hospitalizations in nursing home residents, with a large reduction in healthcare utilization costs
  - Convenient to swap out soap and use a nasal iodophor antiseptic
  - 10% nasal iodophor effect with single swab per nostril for 30 seconds twice daily appears similar to two swabs per nostril for 30 seconds
  - Mupirocin is more effective than iodophor, but may have logistical constraints (requires prescription)