



# Improving Care in Nursing Homes: A Mixed Methods Interdisciplinary Study

## A National Perspective

Patricia W. Stone, PhD, MPH, RN, FAAN

# Background

- Over 1.3 million elderly living in 15,700 nursing homes (NHs)
- 1.6-3.8 million infections annually in NHs (estimates old)
- 1 out of 3 NH residents are colonized with a Multiple Drug Resistant Organism (MDRO)
- 380,000 people die of infections in long term care facilities every year



Sources: CDC. Long Term Care Providers & Services Users, 2013-2014. 2016

Tsan et al. Prevalence of nursing home-associated infections in the Department of Veterans Affairs nursing home care units. American journal of infection control. 2008

# Background



- Antibiotics are overused in NHs and account for approximately 40% of all medications administered
- Between 47-79% of NH residents receive antibiotics at least once per year
- Over- and mis-use of antibiotics cause MDROs and *C. difficile* (which is a contagious diarrhea)
  - 20% patients with healthcare-associated *C. difficile* experience a recurrence
  - 9% patients aged 65+ with healthcare-associated *C. difficile* died within 30 days of diagnosis

Sources: CDC. Antibiotic Stewardship in Nursing Homes Infographic. Accessed 2018.

Daneman et al. Variability in antibiotic use across nursing homes and the risk of antibiotic-related adverse outcomes for individual residents. JAMA internal medicine. 2015

Hunter, et al. Burden of nursing home-onset Clostridium difficile infection in the United States: estimates of incidence and patient outcomes." Open forum infectious diseases. 2016

Lessa, et al.. Burden of Clostridium difficile infection in the United States. New England Journal of Medicine. 2015

# Prevention of Nosocomial Infections and Cost-effectiveness Analysis in Nursing Homes (PNICE-NH)

R01NR013687 (years 1-5: 2012-2016)

PI: Patricia Stone

# Aims

- Describe the incidence of HAI in NHs across the nation
  - Using Minimum Data Set (MDS) data
- Use a descriptive exploratory approach to describe the phenomenon of infection control in NHs
  - National survey
  - Qualitative interviews
- Determine the comparative effectiveness of current infection control structures and processes in preventing HAI in NHs



# Infection Trends in US Nursing Homes, 2006-2013

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Elaine L. Larson PhD, RN<sup>a,e</sup>, Patricia W. Stone PhD, RN<sup>a,\*</sup>

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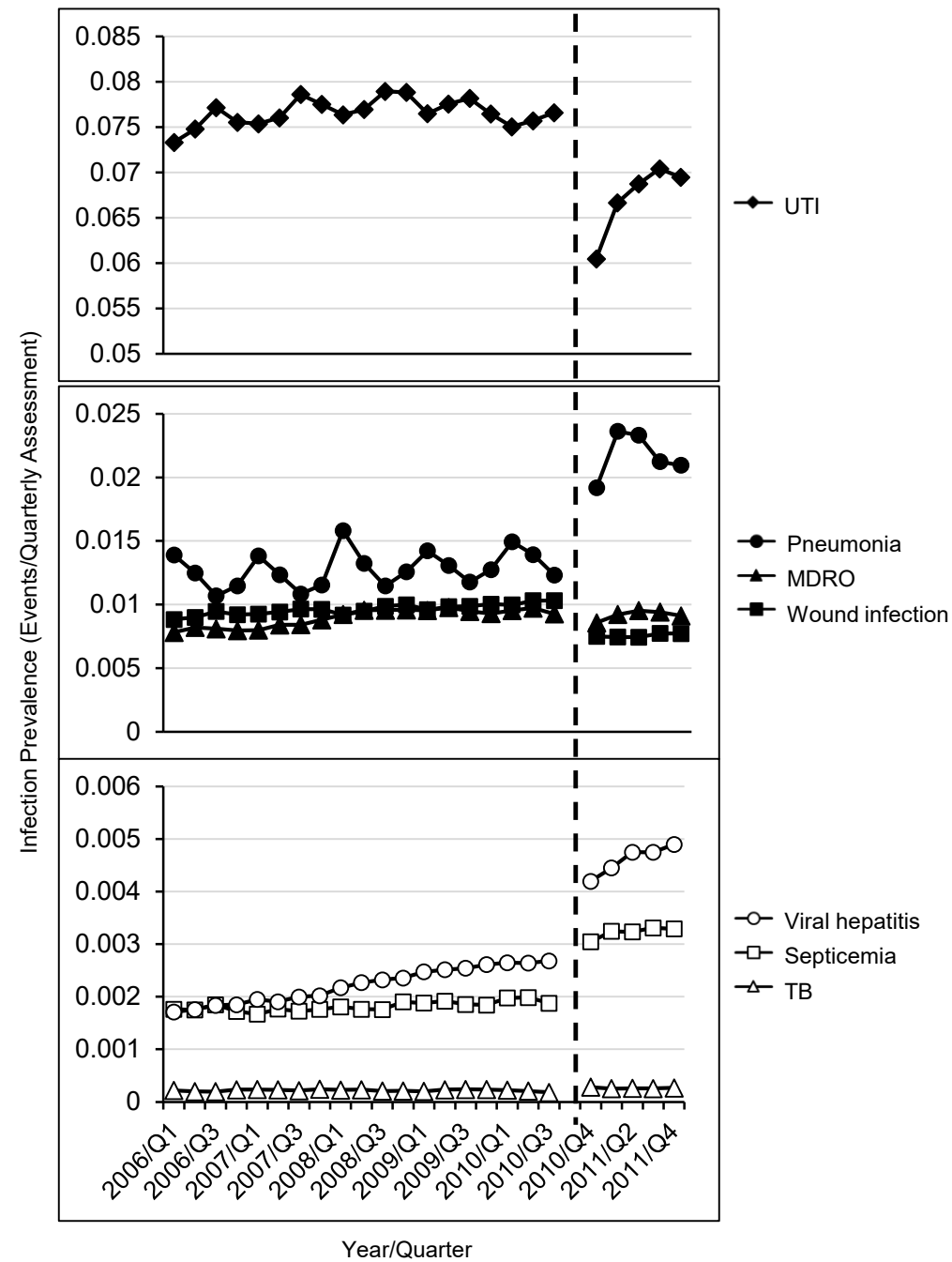
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We used longitudinal MDS 2.0 and 3.0 (2006-2013) to estimate infection trends over time and 2013 to estimate infection prevalence.





Infection Prevalence in Minimum Data Set Versions 2.0 and 3.0 in Quarter 4, 2006-2013

Year, Quarter	Number of NHs	Number of Residents	Number of Assessments	% of Assessments With Diagnosis*					
				UTI	Pneumonia	MDRO	Wound Infection	Septicemia	Viral Hepatitis
MDS 2.0									
2006 Q4	15,185	916,688	968,086	7.75	1.46	0.94	1.04	0.19	0.06
2007 Q4	15,169	903,980	957,141	7.94	1.48	1.03	1.07	0.19	0.06
2008 Q4	15,145	886,705	947,551	8.07	1.61	1.12	1.09	0.20	0.07
2009 Q4	15,149	875,927	940,696	7.86	1.62	1.10	1.09	0.19	0.08
MDS 3.0									
2010 Q4	15,168	930,111	987,659	6.21	1.92	0.79	0.64	0.28	0.14
2011 Q4	15,205	928,533	1,000,527	7.12	2.09	0.84	0.65	0.27	0.17
2012 Q4	15,202	919,951	996,952	6.31	2.07	0.78	0.57	0.27	0.21
2013 Q4	15,210	908,985	990,519	5.56	2.08	0.77	0.56	0.27	0.24

NH, nursing home; UTI, urinary tract infection; MDRO, multidrug-resistant organism infection; MDS, Minimum Data Set; Q, quarter.

\*Estimates are the 7-day prevalence for each infection type except for UTI, which are the 30-day prevalence.

- UTI and pneumonia were the most commonly reported infections.
- Based on the 2013 data, we estimated there 1.13 to 2.68 million infections.



# Infection Prevention and Control Programs in US Nursing Homes: Results of a National Survey

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Monika Pogorzelska-Maziarz PhD<sup>c</sup>, Elaine L. Larson PhD<sup>a</sup>, Andrew W. Dick PhD<sup>d</sup>

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*Nursing Home Performance*

## Nursing Home Infection Control Program Characteristics, CMS Citations, and Implementation of Antibiotic Stewardship Policies: A National Study

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DOI: 10.1177/0046958018778636  
[journals.sagepub.com/home/inq](http://journals.sagepub.com/home/inq)



- A random sample of NHs were selected
- Conducted 2013-2014
- 990 returned (39% response rate)
- Survey linked to Certified and Survey Enhanced Reporting CASPER (CASPER) data

# Main Results

- 36% of NHs had infection prevention deficiency citations
- 54% of people in charge of infection prevention (IP) had at least 2 or more additional roles
- Less than 3% of IPs were certified in infection control
- Antibiotic stewardship policies were lacking



# Additional Analysis

- Linked survey to NH compare quality measures
- Infection preventionist training was positively linked to quality measures



Influence of staff infection control training on infection-related quality measures in United States nursing homes (Kaur J. et al.)

# Understanding infection prevention and control in nursing homes: A qualitative study

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## Methods

10 NHs across the country

6-8 personnel per NH

Interview guides tailored by role

73 telephone interviews

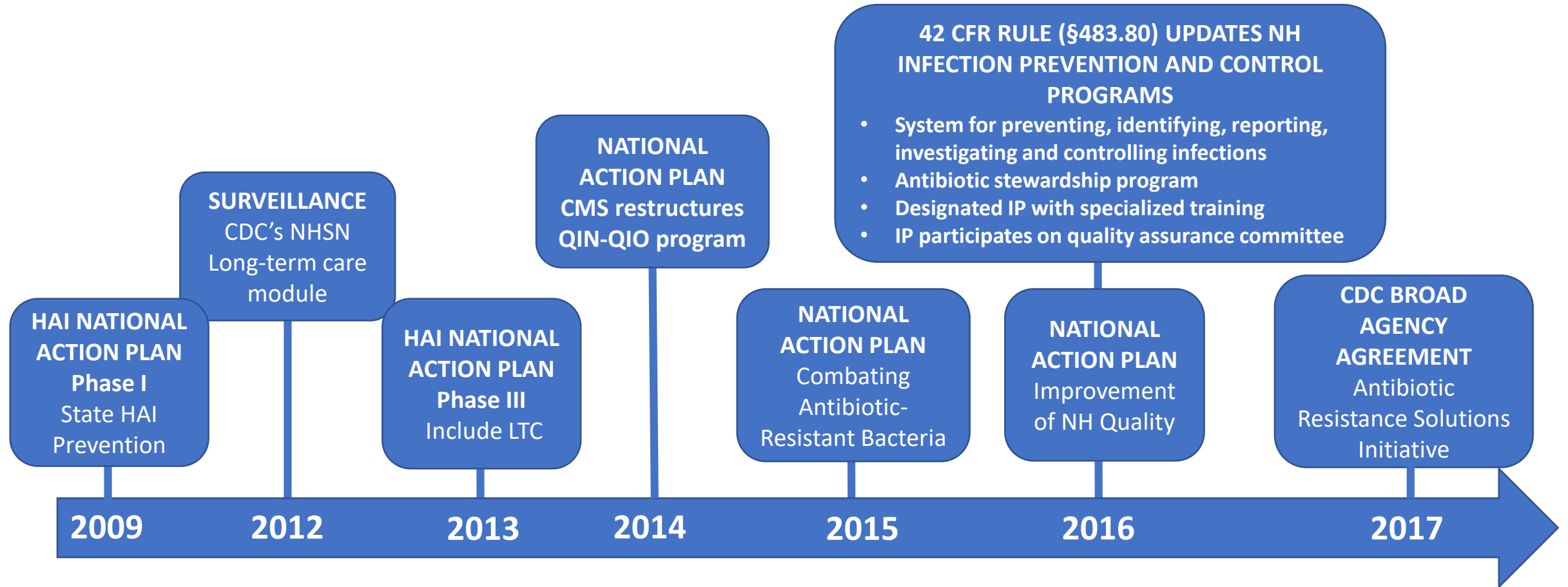
Content analysis



# Results

Theme	Explanation
Residents' Needs	Tension exists between the facility being the residents' home and the need for effective infection prevention and control procedures.
Roles and Training	Many employees involved in infection control program had multiple other responsibilities and frequently lacked formal training in infection prevention and control.
Using Infection Data	Infection data were used to improve care despite variations in surveillance methods/definitions.
External Resources	External resources were a source of information and support for some.
Focus on Hand Hygiene	All infection prevention programs focused on hand hygiene. Monitoring staff compliance with hand hygiene policies was often informal.

# National Efforts



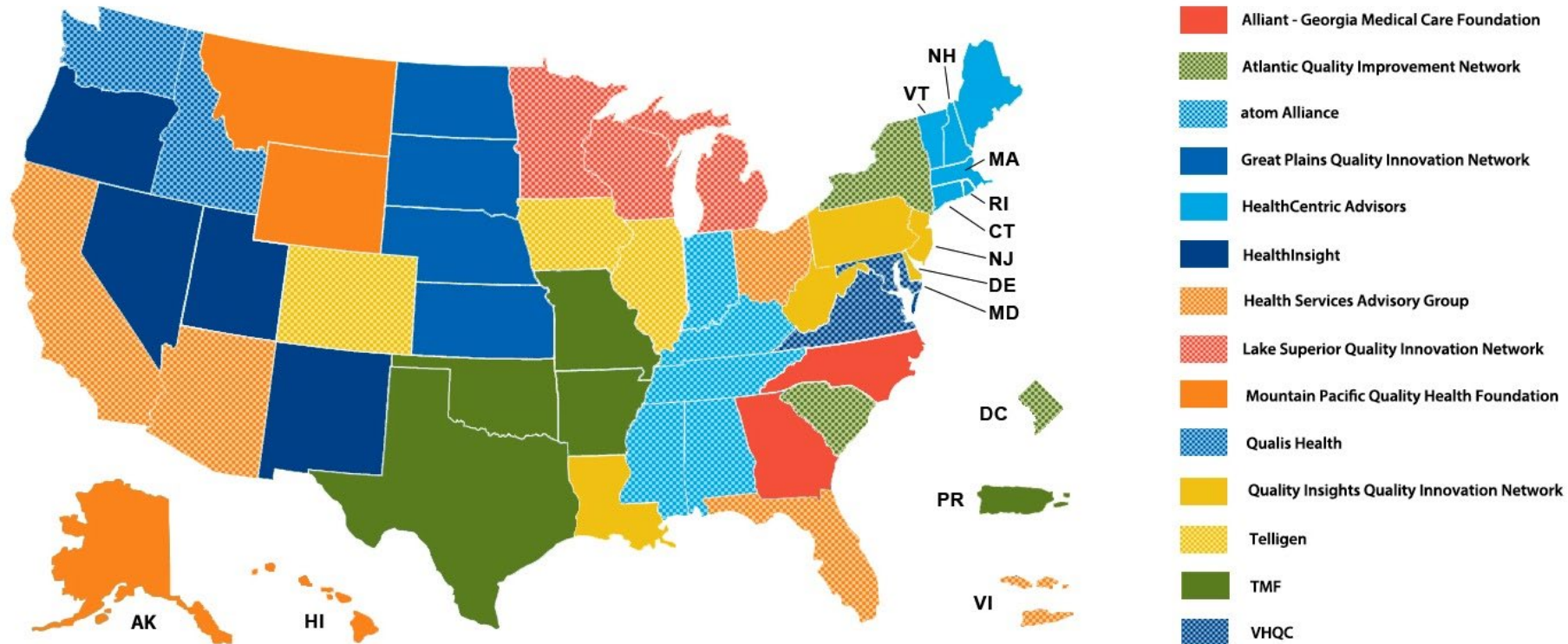


# CMS Final Rule Phases

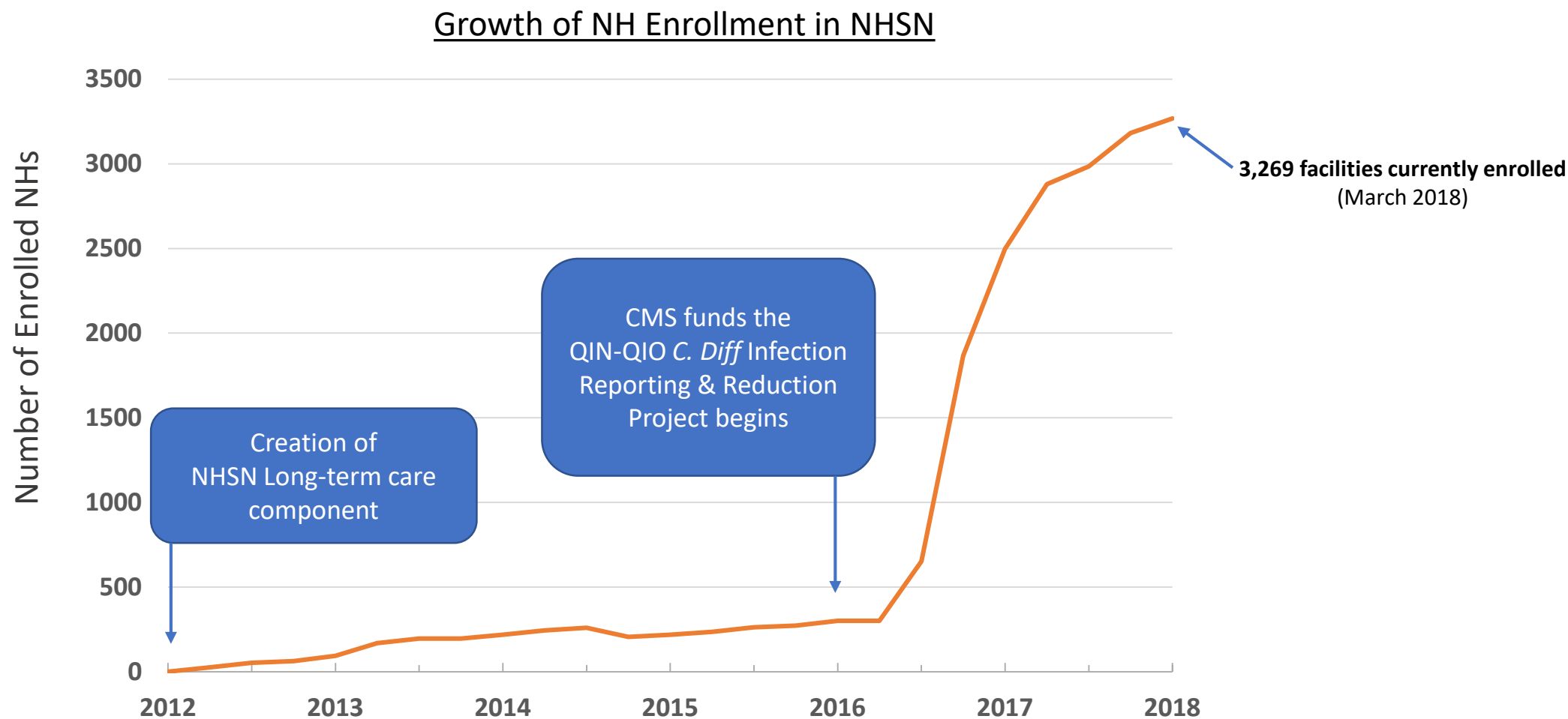
Phases	
Phase 1 (November 28, 2016)	<ul style="list-style-type: none"><li>• Implementation of existing requirements<ul style="list-style-type: none"><li>○ Participation in Quality Assurance and Performance Committees</li><li>○ Infection Control Program</li></ul></li></ul>
Phase 2 (November 28, 2017)	<ul style="list-style-type: none"><li>• Quality Assurance and Performance Improvements (QAPI Plan Only)</li><li>• Infection Control Program with Antibiotic Stewardship</li></ul>
Phase 3 (November 28, 2019)	<ul style="list-style-type: none"><li>• Full Implementation of QAPI plan</li><li>• Infection Preventionist with specialized training</li></ul>

# QIN-QIOs

- Required as part of the Social Security Act
- Each QIN-QIO serves a region of 2-6 states and territories



# Infection Surveillance in Nursing Homes



Source: Quarterly CDC NHSN Newsletters March 2012-March 2018

# BARRIERS AND FACILITATORS FOR NHSN ADOPTION IN NURSING HOMES

CDC (contract #200-2016-91952)

P. Stone-Columbia University  
A. Dick- RAND, Inc

# Aims

- Quantitatively explore characteristics of NHs adopting NHSN
- Qualitatively explore barriers and facilitators to NHSN adoption in NHs



# Nursing home adoption of the National Healthcare Safety Network Long-term Care Facility Component

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## **Methods**

Guided by Roger's Theory on Diffusion, we quantified characteristics of all US NHs by NHSN adoption status using CASPER data linked to NHSN data

- Early adopters (enrolled prior to 2016)
- Late adopters (enrolled in 2016)
- Non adopters (not enrolled)

Compared NH characteristics based on adoption status



NH characteristics: National Healthcare Safety Network, 2012–2016

	All NHs*	Not enrolled	Enrolled†		Early enrolled‡	Late enrolled§	
NHs (N)	16,081	14,125	1,956 (12.2%)		262 (13.4%)	1,694 (86.6%)	
	% of column total			P	% of column total		P
Facility characteristics							
Bed size							
<25	2.4	2.5	1.7	.034	5.7	1.1	<.001
25-49	10.1	10.4	8.1	.002	15.6	7.0	<.001
50-99	36.3	36.4	35.6	.483	22.1	37.7	<.001
100-199	44.9	44.8	45.4	.630	40.1	46.2	.063
200+	6.3	5.9	9.2	<.001	16.4	8.0	<.001
Ownership							
For profit	69.2	69.7	65.5	<.001	38.2%	69.8	<.001
Government	7.2	7.2	7.1	.8162	13.0	6.1	<.001
Not for profit	23.7	23.1	27.4	<.001	48.9	24.1	<.001
Membership in a chain	56.5	56.4	57.0	.641	38.5	59.9	<.001
Hospital based	5.7	5.3	8.6	<.001	27.9	5.6	<.001

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Early enrollees were not representative of NHs nationally.



Contents lists available at [ScienceDirect](#)

# American Journal of Infection Control

journal homepage: [www.ajicjournal.org](http://www.ajicjournal.org)



## Major Article

# The expansion of National Healthcare Safety Network enrollment and reporting in nursing homes: Lessons learned from a national qualitative study

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# Barriers and Facilitators to NHSN Adoption Study

## Participants

- 42 staff members from 14 nursing homes in 4 geographic regions
- Had varied roles and IPC experience
- Many had worked in LTC for a number of years (average = 18.4 years)

Example Interview Topics	
NHSN Awareness and Perceived Utility	Familiarity with NHSN, decision-making process to enroll
NHSN reporting	Reporting process, staff involvement
NHSN resources	Dissemination of NHSN information at facility, resources for NHSN reporting, outside partnerships
Outcomes and Impact	Accessing reports/data through NHSN, benefits/drawbacks to NHSN enrollment

# Barriers and Facilitators to NHSN Adoption Study

## Data Analysis

- Interviews were recorded and professionally transcribed
- Transcripts were coded and analyzed for similarities and differences between participants by facility enrollment status (themes)

Recurrent Themes	
Benefits of NHSN	External Support and Motivation
Need for a Champion	Risk Adjustment
Barriers	Data Integrity
No substantive differences in perceptions related to professional roles or enrollment category	



# Discussion

- The CMS funded QIN-QIO initiative was successful in enrolling NHs into NHSN
- Enrolled NHs became representative of all NHs
- Not clear if enrollment improved infection control processes and resident outcomes
- Not clear if funding for this initiative will continue
- Not clear if NHs will continue to participate

STUDY OF THE INTTEGRATION OF  
INFECTION MANAGEMENT AND  
PALLIATIVE CARE AT END-OF-LIFE IN  
NURSING HOMES: **SIMP-EL**

R01 NR013687 (years 5-10: 2017-2021)

Pat Stone RN MPH PhD FAAN, PI  
Andy Dick, PhD, PI, RAND subcontract  
Susan Mitchell, PhD, PI Harvard subcontract

# Background

Key findings from: *Prevention of Nosocomial Infections and Cost-Effectiveness in Nursing Homes (PNICE-NH, R01 NR013687 years 1-4)*

- 1.3 to 2.7 million infections occur in NHs annually
- Infection Prevention and Management is suboptimal in NHs
  - 40% Medicare-certified NHs received deficiency citations for inadequate infection control
    - NHs that received infection control deficiency citations had infection control professionals with less experience and training
    - Person in charge of infection prevention wore multiple hats
  - Less than half (46%) of NHs had written guidelines for antibiotic initiation
  - MDRO and *C-difficile* are problems

## Other Context

- National efforts to improve infection prevention and control in NHs underway
- Palliative care in NHs is suboptimal
- Antibiotics are over prescribed in NHs
- Infections are often terminal events

# SIMP-EL Specific Aims (R01 NR013687 years 5-8)

Aim 1. Describe the integration of infection management and palliative care in nursing homes and the associated facility, state and regional characteristics.

Aim 2. Examine factors associated with antibiotic use in elderly nursing home residents

Aim 3. Examine factors associated with hospital transfer due to infections among elderly nursing home residents.

# SIMP-EL Specific Aims

**Aim 1. Describe the integration of infection management and palliative care in nursing homes and the associated facility, state and regional characteristics.**

Aim 2. Examine factors associated with antibiotic use in elderly nursing home residents

Aim 3. Examine factors associated with hospital transfer due to infections among elderly nursing home residents.

# Methods

- Cross-sectional national facility level survey stratified on
  - QIN-QIO region (an equal number of NHs across each region),
  - NHSN enrollment (30% of all eligible NHs were enrolled in NHSN),
  - Participation in our previous study (988 NHs that were surveyed in 2013-2014)
- Random sample of NHs were identified from 2016 Certification and Survey Provider Enhanced Reporting (CASPER) data
  - Eligible if they were non-specialized, free-standing facilities with at least 30 beds and a CASPER assessment date of 2014 or later

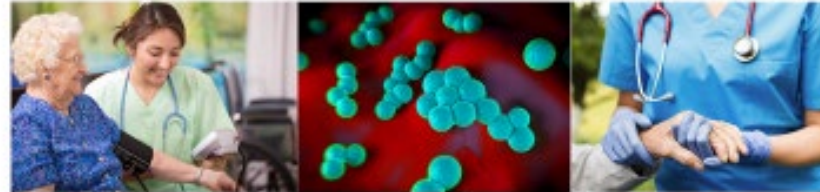


# Survey

- Characteristics of the infection control program in the facility
- Demographics and training of the person in charge of the program (i.e., the infection preventionist), workforce stability and staffing
- Palliative care processes
- Infection management processes
- Integration of palliative care and infection management

## Nursing Home Study

Exploring Infection Prevention & Management



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Conducted by:

Columbia University School of Nursing,

RAND Corporation

Hebrew Senior Life Institute of Aging Research

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# Analysis

- Responders and non-responders compared
- Developed 3 indices of indices integration using factor analysis
  - Prevalence of items and Cronbach alpha for internal consistency examined
- Pearson correlation of palliative care and infection management indices with integration indices
- Nursing home characteristics predicting integration
  - Star rating, size, % payer, staffing, ownership, setting, chain, citations, IP education, IP training, staff turnover

# Nursing Home Characteristics

	All n = 1807	Respondents n = 879	Non-Respondents n = 928	<i>p</i>
Ownership, n (%)				
For profit	1223 (67.68)	551 (62.68)	672 (72.41)	<0.01
Government	126 (6.97)	74 (8.42)	52 (5.60)	
Nonprofit	458 (25.35)	254 (28.90)	204 (21.98)	
Chain, n (%)	1047 (57.94)	487 (55.40)	560 (60.34)	0.03
Number of beds, mean (SD)	115.43 (65.12)	112.97 (67.46)	117.77 (62.77)	<0.01
Region, n (%)				
Midwest	549 (30.38)	288 (32.76)	261 (28.13)	<0.01
Northeast	364 (20.14)	192 (21.84)	172 (18.53)	
South	533 (29.50)	236 (26.85)	297 (32.00)	
West	361 (19.98)	163 (18.54)	198 (21.34)	
No differences in: 5-star ratings, case-mix, staffing, citations				

# Prevalence of Integration in US NHs

Unweighted n = 859  
Weighted n = 14,828

Questions coded  
so that a positive  
response was a  
higher value.

	Weighted %	Intensity Index		
		Cronbach's $\alpha$	Weighted $\mu$	SE
<b>1. Patient/Caregiver Involvement in Care Planning<sup>1</sup></b>		0.70	73.17	1.57
Consider residents' goals of care in managing suspected infections near the end-of-life.	70.81			
Include residents and resident proxies in treatment decisions for suspected infections near the end-of-life.	76.01			
<b>2. Formalized Advance Care Planning<sup>2</sup></b>		0.72	34.11	1.05
Ms. Davis would already have a "Do Not Resuscitate" order	57.35			
Ms. Davis would already have a "Do Not Hospitalize" order	23.98			
Ms. Davis would already have a "Do Not Administer Antibiotics" order	7.14			
Ms. Davis would already have a orders reflecting "Palliative/Comfort Measures" only	26.85			
A proxy for Ms. Davis would be asked how to manage the suspected infection	55.91			
<b>3. Routine Practices of Integration<sup>2</sup></b>		0.63	31.37	1.48
A straight catheter would be used to collect a urine sample*	30.77			
Ms. Davis would be treated with antibiotics*	32.39			

# Pearson correlations between palliative care and infection management with integration

	<i>Integration of Palliative Care and Infection Management</i>					
	<i>Patient Involvement</i>		<i>Advance Care Planning</i>		<i>Routine Practices</i>	
	r	p value	r	p value	r	p value
<b>Palliative Care</b>	0.23	<.01	0.18	<.01	0.12	<.01
<b>Antibiotic Stewardship</b>	0.25	<.01	0.17	<.01	0.12	<.01
<b>UTI Prevention Policies</b>	0.17	<.01	0.15	<.01	0.11	<.01

# Predicting Integration

- Relatively few NH characteristics predicted integration of infection management and palliative care
  - Exceptions:
    - Patient/Caregiver Involvement in Care Planning
      - Chain  $\beta = -9.57, p = 0.01$
    - Formalized Advanced Care Planning in Place
      - % Medicaid  $\beta = -0.12, p = 0.03$
      - South  $\beta = -9.61, p = 0.02$
    - Routine Practices
      - 5 Star Rating  $\beta = 2.74, p = 0.02$
      - High staffing of social workers  $\beta = 9.29, p = 0.01$
      - Northeast  $\beta = 12.87, p = 0.03$
      - IP turnover in past 3 years  $\beta = 2.23, p < 0.01$



# Discussion

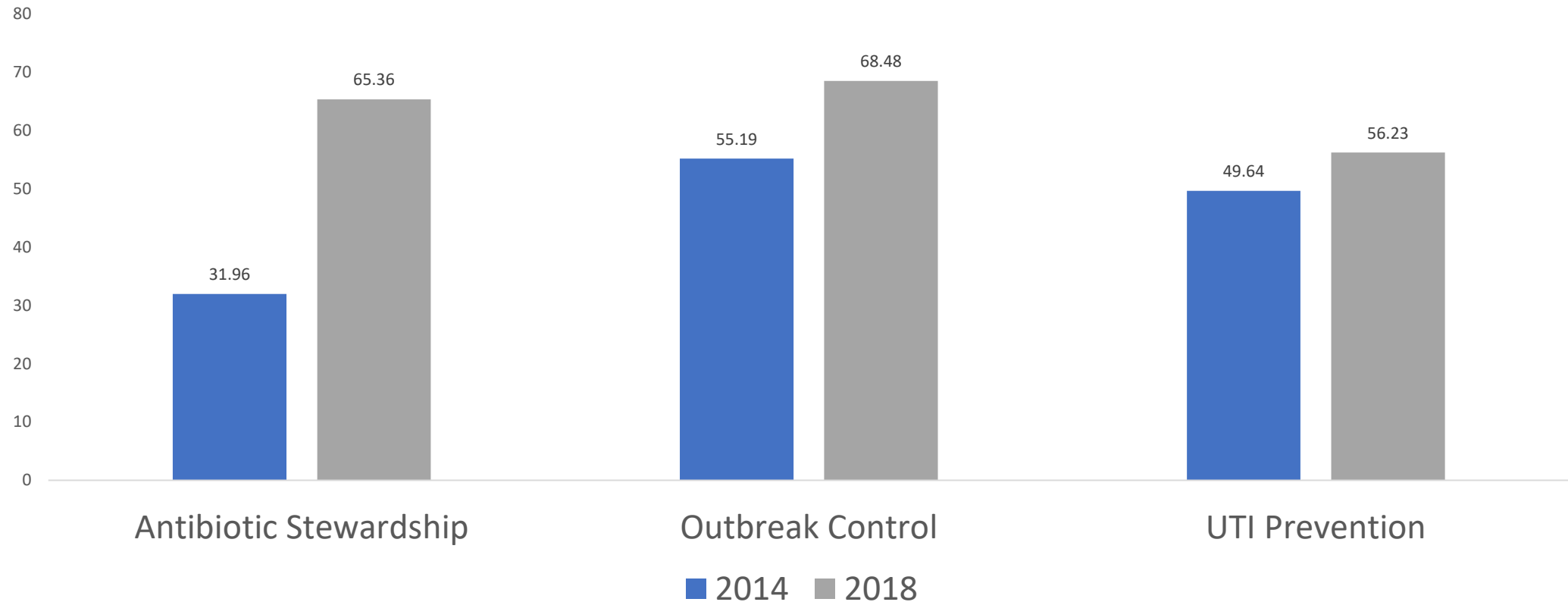
- Our integration measures seem valid
  - Measures of palliative care and infection prevention small positive correlations
- Variation in integration across the nation
- Need to understand if integration improves nursing home residents outcomes
  - Linking survey to Medicare data and MDS





# Change in Infection Programs Over Time

- Significant increase in policies in all categories ( $p < 0.001$ )



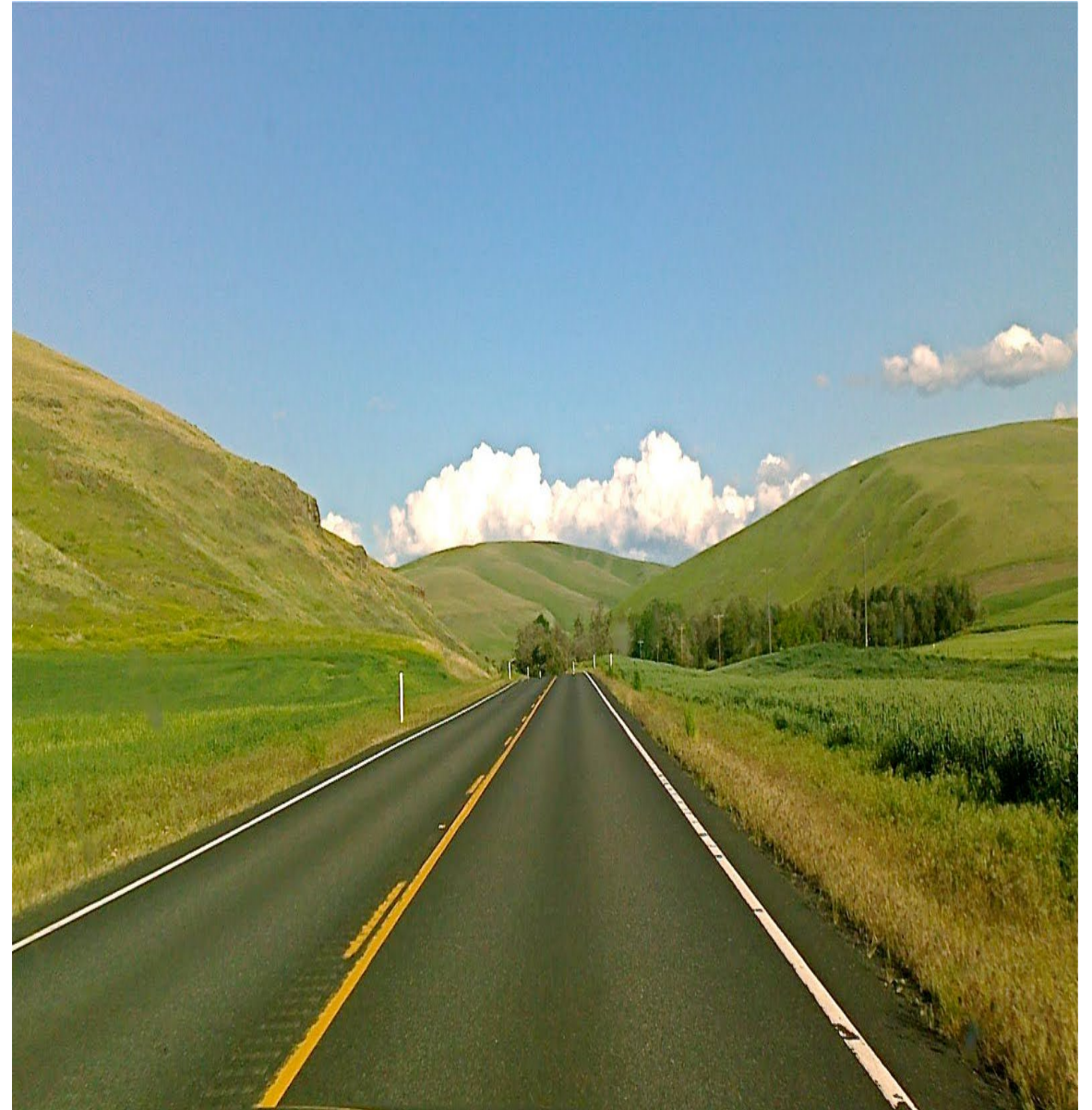
# Change in Infection Programs Over Time

- National initiatives to improve ICP are working
- Hiring & training dedicated infection preventionists are key for ICP
  - Having dedicated IP not part of the final rule



# Down the Road

- Linking MDS to MedPAR and Master Beneficiary Summary Files to determine burdensome transitions related to infections
- Alzheimer's supplement
- Evaluate if policy changes have improved infection rates and antibiotic usage



# Conclusion and Recommendations

- Nursing home personnel must be educated on antibiotic stewardship and infection prevention, especially for elderly residents at the end of life
- Much more work needs to be done

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Aluem Tark  
Richard Dorritie  
Ashley Chastain

## Our Advisory Board and other collaborators:

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Naushira Pandya	



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Denise Quigley  
Tadeja Gracner  
Melony Sorbero  
Katie Cohen



Nimalie Stone  
Jeneita Bell  
Elisabeth Mungai

Thanks to everyone who participated in our studies!

# Discussion & Questions