

APPENDIX

Supplemental Table 1. Implementation of antibiotic stewardship activities among nursing homes reporting to NHSN in 2016 and 2018.

Stewardship Activity	2016 (N = 2879)	2018 (N = 1866)
	N (%)	N (%)
Leadership	2491 (87)	1834 (98)
Written statement of support from leadership	1580 (55)	1612 (86)
Antibiotic use/resistance data reviewed by leadership	2385 (83)	1789 (96)
Accountability	2608 (91)	1827 (98)
<i>Individual responsible for impact of activities to improve antibiotic use</i>		
Medical Director	1656 (58)	1437 (77)
Director of Nursing	1934 (67)	1552 (83)
Pharmacist	1273 (44)	1321 (71)
Other	1319 (46)	1192 (64)
Drug Expertise	2218 (77)	1717 (92)
Access to individual with antibiotic stewardship expertise		
Action	2690 (93)	1832 (98)
Policy to document indication for antibiotic	2364 (82)	1699 (91)
Provide facility-specific treatment recommendations	1747 (61)	1436 (77)
Procedure for follow-up assessment 2-3 days after antibiotic start to determine whether still indicated/appropriate	1220 (42)	1162 (62)
Physician/nurse/pharmacist review courses of antibiotic therapy and communicates results with prescribers (audit with feedback)	1778 (62)	1490 (80)
Tracking	2722 (95)	1838 (99)

Pharmacy provides monthly report tracking antibiotic use	1987 (69)	1514 (81)
Laboratory provides report summarizing percent antibiotic resistance seen in common organisms from cultures sent from facility (antibiogram)	1489 (52)	1287 (69)
Monitor adherence to policy requiring documentation of indication (if policy present)	2107 (73)	1603 (86)
Monitor adherence to facility-specific treatment recommendations (if recommendations provided)	1557 (54)	1334 (71)
Reporting	1778 (62)	1490 (80)
Physician/nurse/pharmacist review courses of antibiotic therapy and communicates results with prescribers (audit with feedback)	1778 (62)	1490(80)
Feedback on route and/or dosing	1279 (44)	1145 (61)
Feedback on selection and/or duration of therapy	1425 (50)	1260 (68)
Other feedback	133 (5)	131 (7)
Education		
Education to clinicians and relevant staff on improving antibiotic use in past 12 months	2103 (73)	1726 (93)

Supplemental Table 2. Characteristics of nursing homes implementing all seven core elements compared to those implementing less than seven core elements in 2018.

Characteristic	All Nursing Homes (N=1866)	< 7 Core Elements (N=543, 29%)	7 Core Elements (N=1323, 71%)	P Value
Ownership, N (%)				<0.0001
For profit	1165 (62.4)	301 (55.4)	864 (65.3)	
Not for profit ¹	701 (37.6)	242 (44.6)	459 (34.7)	
Affiliation, N (%)				<0.0001
Multi-facility organization	1045 (56.0)	263 (48.4)	782 (59.1)	
Independent ²	599 (32.1)	220 (40.5)	379 (28.7)	
Hospital system ³	222 (11.9)	60 (11.1)	162 (12.2)	
Number of Beds, N (%)				0.09
< 50	208 (11.2)	64 (11.8)	144 (10.9)	
50 – 99	692 (37.1)	221 (40.7)	471 (35.6)	
100 – 199	838 (44.9)	228 (42)	610 (46.1)	
> 199	128 (6.9)	30 (5.5)	98 (7.4)	
US Census Region, N (%)				<0.0001
Northeast	274 (14.7)	73 (13.4)	201 (15.2)	
South	668 (35.8)	173 (31.9)	495 (37.4)	
Midwest	703 (37.7)	248 (45.7)	455 (34.4)	
West	221 (11.8)	49 (9.0)	172 (13.0)	
EHR utilization, N (%)	1741 (93.3)	501 (92.3)	1240 (93.7)	0.25
Onsite laboratory⁴, N (%)	185 (10)	47 (8.7)	138 (10.5)	0.24
Total staff hours per week dedicated to infection prevention activity in the facility, median (IQR⁵)	17 (10-25)	15 (8-20)	20 (10-30)	<0.0001

Percent occupancy⁶, median (IQR)	87 (76-93)	87 (76-93)	87 (76-93)	0.98
Percent short-stay residents⁷, median (IQR)	44 (22-70)	40 (21-67)	46 (22-72)	0.02

¹ Not for profit ownership includes church, government, and Veterans Affairs facilities.

² Independent includes free standing and continuing care retirement community.

³ Hospital system includes free standing and attached hospital-affiliated nursing homes.

⁴ Onsite laboratory information was missing for 8 surveys in 2018.

⁵ IQR, interquartile range.

⁶ Percent occupancy = (Average daily census/Number of beds) × 100.

⁷ Percent short-stay residents = (Number of unique short-stay residents in year/ Total unique residents in year) × 100.