

the distribution of HO incident rates and SIRs by those reporting NAAT vs EIA. (2) Among hospitals that switched their test type, we selected quarters with a stable switch pattern of 2 consecutive quarters of each of EIA and NAAT (categorized as pattern EIA-to-NAAT or NAAT-to-EIA). Pooled semiannual SIRs for EIA and NAAT were calculated, and a paired *t* test was used to evaluate the difference of SIRs by switch pattern. **Results:** Most hospitals did not switch test types (3,242, 89%), and 2,872 (89%) reported sufficient data to calculate SIRs, with 2,444 (85%) using NAAT. The crude pooled HO CDI incidence rates for hospitals using EIA clustered at the lower end of the histogram versus rates for NAAT (Fig. 1). The SIR distributions of both NAAT and EIA overlapped substantially and covered a similar range of SIR values (Fig. 1). Among hospitals with a switch pattern, hospitals were equally likely to have an increase or decrease in their SIR (Fig. 2). The mean SIR difference for the 42 hospitals switching from EIA to NAAT was 0.048 (95% CI, -0.189 to 0.284; *P* = .688). The mean SIR difference for the 26 hospitals switching from NAAT to EIA was 0.162 (95% CI, -0.048 to 0.371; *P* = .124). **Conclusions:** The pattern of SIR distributions of both NAAT and EIA substantiate the soundness of NHSN risk adjustment for CDI test types. Switching test type did not produce a consistent directional pattern in SIR that was statistically significant.

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Poster Presentation

Antibiotic Stewardship for Nursing: Can E-learning Be a First Step?

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Background: The CDC and The Joint Commission have called for an interdisciplinary approach to antibiotic stewardship implementation. The healthcare team should consist of infectious disease physicians, pharmacists, infectious disease pharmacists, infection preventionists, microbiologists, and nurses. The scant literature to date has looked at nurses' attitudes and beliefs toward participating in antibiotic stewardship and have identified several factors that contribute to the lack of uptake by nurses: lack of education around stewardship, poor communication among healthcare providers, and hospital or unit culture, among others. Additionally, nurses' lack of interest in what would be more work or not within their scope of work was put forth as an additional factor by infection preventionists and pharmacists as a barrier to implementation. **Method:** An investigator-developed online survey was used to assess the usefulness of 3 investigator-developed educational e-learning modules that encompassed the role of nurses in antibiotic stewardship, pharmacy and laboratory topics related to antimicrobial stewardship, as well as the nurses' attitudes toward their participation in such activities. **Results:** Participants took the survey after review of the 3 e-learning modules. The results indicate that, contrary to what pharmacists and infection preventionists thought, 82% of nurses felt they should contribute to and be part of the antimicrobial stewardship team. Additionally, after completing the modules, 73% felt more empowered to participate in stewardship discussions with an additional 23% wanting more education. 100% felt that they learned information that they could utilize in their everyday work. Barriers to implementation of stewardship activities on their unit included lack of education (41%), hospital or unit culture (27%), with only 4% citing they did not feel it was their job or that they had anything to contribute to

a discussion. Also, 24% felt that there were no obstacles to participation. **Conclusions:** Surprisingly, most nurses who took this educational series and survey felt that they should be part of the antibiotic stewardship team. As cited previously from the literature, education and culture need to be addressed to overcome the nurses' barriers to stewardship involvement. E-learning can provide an easy first step to educating nurses when time permits and can provide a good springboard for discussion on the units and with physicians and pharmacists. For a copy of the modules, please contact the author.

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Antibiotic Susceptibility of Common Organisms Isolated from Urine Cultures of Nursing Home Residents

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Background: With the emergence of antibiotic resistant threats and the need for appropriate antibiotic use, laboratory microbiology information is important to guide clinical decision making in nursing homes, where access to such data can be limited.

Figure 1. Isolates from Urine Cultures of Nursing Home Residents with Reported Susceptibility Data (N=215)

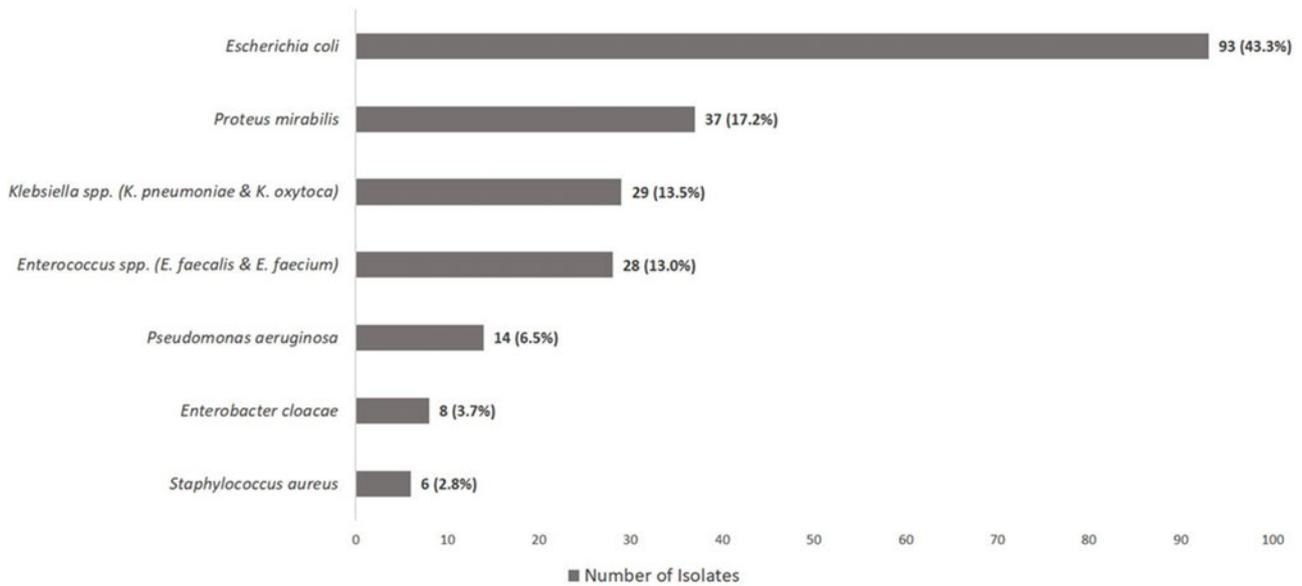


Fig. 1.

Susceptibility data are necessary to inform antibiotic selection and to monitor changes in resistance patterns over time. To contribute to existing data that describe antibiotic resistance among nursing home residents, we summarized antibiotic susceptibility data from organisms commonly isolated from urine cultures collected as part of the CDC multistate, Emerging Infections Program (EIP) nursing home prevalence survey. **Methods:** In 2017, urine culture and antibiotic susceptibility data for selected organisms were retrospectively collected from nursing home residents' medical records by trained EIP staff. Urine culture results reported as negative (no growth) or contaminated were excluded. Susceptibility results were recorded as susceptible, non-susceptible (resistant or

intermediate), or not tested. The pooled mean percentage tested and percentage non-susceptible were calculated for selected antibiotic agents and classes using available data. Susceptibility data were analyzed for organisms with ≥ 20 isolates. The definition for multidrug-resistance (MDR) was based on the CDC and European Centre for Disease Prevention and Control's interim standard definitions. Data were analyzed using SAS v 9.4 software. **Results:** Among 161 participating nursing homes and 15,276 residents, 300 residents (2.0%) had documentation of a urine culture at the time of the survey, and 229 (76.3%) were positive. *Escherichia coli*, *Proteus mirabilis*, *Klebsiella* spp, and *Enterococcus* spp represented 73.0% of all urine isolates (N = 278). There were 215

Figure 2. Antibiotic Susceptibility of Common Organisms Isolated from Urine Cultures of Nursing Home Residents (N=187)

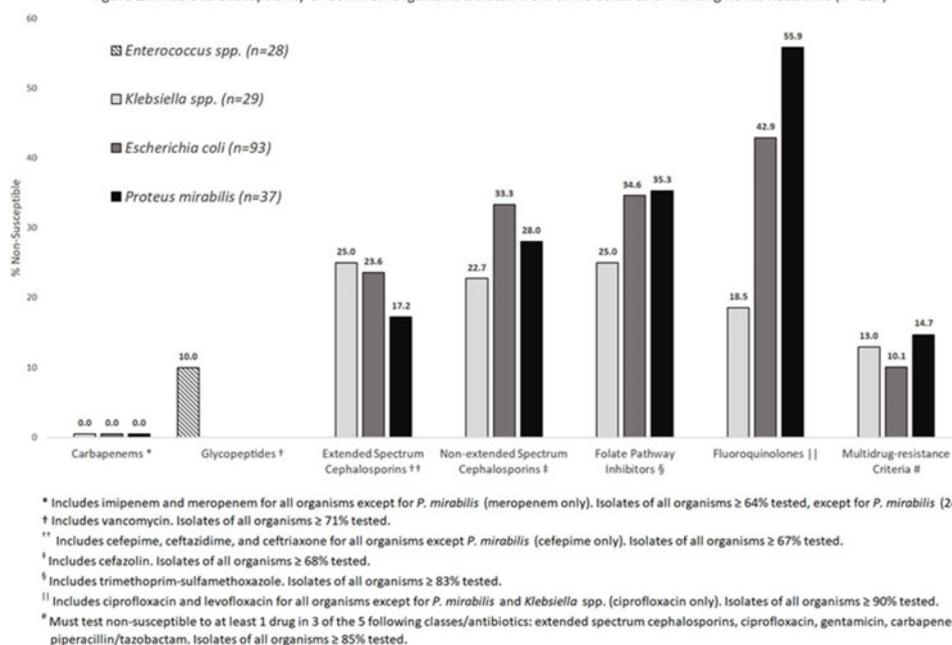


Fig. 2.

(77.3%) isolates with reported susceptibility data (Fig. 1). Of these, data were analyzed for 187 (87.0%) (Fig. 2). All isolates tested for carbapenems were susceptible. Fluoroquinolone non-susceptibility was most prevalent among *E. coli* (42.9%) and *P. mirabilis* (55.9%). Among *Klebsiella* spp, the highest percentages of non-susceptibility were observed for extended-spectrum cephalosporins and folate pathway inhibitors (25.0% each). Glycopeptide non-susceptibility was 10.0% for *Enterococcus* spp. The percentage of isolates classified as MDR ranged from 10.1% for *E. coli* to 14.7% for *P. mirabilis*. **Conclusions:** Substantial levels of non-susceptibility were observed for nursing home residents' urine isolates, with 10% to 56% reported as non-susceptible to the antibiotics assessed. Non-susceptibility was highest for fluoroquinolones, an antibiotic class commonly used in nursing homes, and $\geq 10\%$ of selected isolates were MDR. Our findings reinforce the importance of nursing homes using susceptibility data from laboratory service providers to guide antibiotic prescribing and to monitor levels of resistance. **Disclosures:** None **Funding:** None

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Antibiotic Use at the End-of-Life in Patients with Advanced Dementia: A Systematic Literature Review

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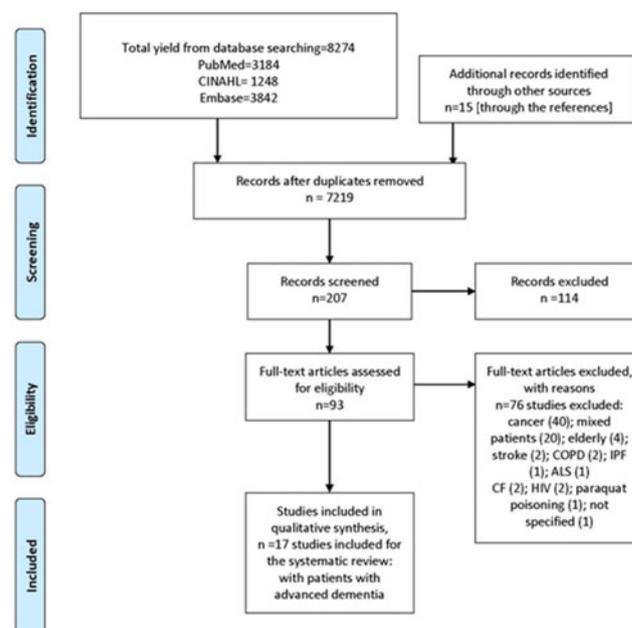
Background: Improving the use of antibiotics across the care continuum will be necessary as we strive to protect our patients from antimicrobial resistance. One potential target for antimicrobial stewardship is during end-of-life care of patients with advanced dementia. We aimed to perform a systematic literature review measuring the burden of antibiotic use during end-of-life care in patients with dementia. **Methods:** We searched PubMed, CINAHL, and Embase through July 2019 for studies with the following inclusion criteria in the initial analysis: (1) end-of-life patients (ie, dementia, cancer, organ failure, frailty or multi-morbidity); (2) antibiotic use in the end-of-life care; with the final analysis restricted to (3) patients with advanced dementia. Only randomized controlled trials (RCTs) and cohort studies were included. **Results:** Of the 93 full-text articles, 17 studies (18.3%) met the selection criteria for further analysis. Most of the included studies were retrospective ($n=8$) or prospective ($n=8$) cohort studies. These studies in combination included 2,501 patients with advanced dementia. Also, 5 studies (698 patients, [27.9%]) were restricted to patients with Alzheimer's disease. In 5 studies in which data were available, fewer than one-quarter of patients (19.9%, 498) with advanced dementia were referred to palliative care. In 12 studies $>50\%$ of patients received antibiotics during the end-of-life period. Also, 15 studies did not report the duration of antimicrobial therapy. Only 2 studies reported the antimicrobial consumption in days of therapy per 1,000 resident days. Only 6 studies studied whether the use of antibiotics was associated with beneficial outcomes (survival or comfort), and none of them evaluated potential adverse effects associated with antibiotic use. **Conclusions:** There are significant gaps in the literature surrounding antimicrobial use at the end of life in patients with advanced dementia. Future studies are needed to evaluate the benefits and harms of using antibiotics for patients during end-of-life care in this patient population.

Table 1.

Subgroups	No. of Studies	No. of Advanced Dementia Patients (%)
All studies	17	2,501
Alzheimer's disease	5	698 (27.9)
Any type of dementia	12	1,803 (72.1)
RCTs	1	99 (3.9)
Prospective cohort study	8	937 (37.5)
Retrospective cohort study	8	1,465 (58.6)
Palliative care	5	498 (19.9)
Not reported the duration of antimicrobial therapy	15	...
Not reported the outcome measured after antibiotic use (survival or comfort)	11	1,437 (57.5)



PRISMA Flow Diagram - Literature search for articles that evaluated antibiotic use at the end-of-life in patients with advanced dementia



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Med* 6(6): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit www.prisma-statement.org.

Fig. 1.

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Antimicrobial Nonsusceptibility Among Invasive MRSA USA300 Strains by Healthcare Exposure, Three Sites, 2005–2016

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