Identifying and Bridging the Gaps in Antimicrobial Stewardship in Post-Acute and Long-Term Care

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ABSTRACT

National organizations have developed guidelines and tools for antimicrobial stewardship (AMS) in post-acute and long-term care (PALTC), but there is a need to effectively translate these into actionable, measurable, and impactful programs. An electronic needs assessment survey was developed and distributed to health care providers and administrators involved with AMS activities in PALTC facilities in Maryland. The results of this survey were used to develop a statewide initiative to improve AMS in nursing facilities. The survey revealed that barriers to implementing AMS include limited access or poor utilization of experts in AMS and infectious disease, adverse event data collection tools, and locally developed protocols and guidelines. Strategies to improve AMS included the provision of free continuing education to a multidisciplinary audience and improved access to individuals with expertise in infectious disease and the development of an adverse drug event tool. Continuing to provide meaningful tools and resources that address the specific needs of nursing facilities should lead to improved compliance with regulations and ultimately improved resident outcomes. [*Journal of Gerontological Nursing, 46*(1), 8-13.]

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Over a 1-year period, up to 70% of residents in post-acute and long-term care (PALTC) facilities receive at least one course of systemic antibiotics, up to 75% of which may be unnecessary or inappropriate (Centers for Disease Control and Prevention [CDC], 2017). Urinary tract infections (UTIs) are the most common indication for which antibiotics in PALTC facilities are prescribed (Nicolle, Bentley, Garibaldi, Neuhaus, & Smith, 2000; Olsho et al., 2013). With the increasing emergence of multi-drug resistant organisms, particularly in the PALTC setting, appropriate use of antibiotics has become progressively more important.

The CDC (2017) sponsored focused approaches to improve the safe and effective use of antibiotics in a variety of health care settings, including PALTC. In recent regulatory changes known as the "Mega-Rule," the Centers for Medicare & Medicaid Services (CMS; 2017) requires skilled nursing facilities to have an antibiotic stewardship program as part of their Infection Prevention and Control Program. With these regulatory changes, an updated gap analysis was needed to evaluate the implementation of these requirements and inform their improvement. The Peter Lamy Center on Drug Therapy and Aging at the University School of Maryland School of Pharmacy partnered with the Maryland Department of Health to create the Maryland Antimicrobial Stewardship Collaborative.

The objectives of this Collaborative were to: (a) assess the current state of antimicrobial stewardship (AMS) in nursing facilities in Maryland; (b) characterize the barriers to implementing AMS, with a focus on the management of UTIs; (c) prioritize barriers experienced by facilities by highest potential impact to implementation; (d) develop recommendations and initiatives to improve current AMS practices; (e) develop and disseminate interprofessional continuing education designed to bridge the identified gaps; (f) develop a toolkit of AMS resources; and (g) describe the ongoing needs of PALTC providers.

METHOD

The interprofessional study team, comprised of health care providers with expertise in PALTC and AMS, decided on gap analysis focus areas and determined that survey questions would be divided among three core categories. Thirty-two questions were distributed among respondent and facility demographics, current AMS practices in general, and current practices related to diagnosis and treatment of UTIs (**Table A**, available in the online version of this article). UTIs were chosen as a survey focus secondary to their prevalence in PALTC and opportunities for antibiotic and diagnostic stewardship detailed in acute care literature (Claeys, Blanco, Morgan, Leekha, & Sullivan, 2019; Meddings et al., 2017; Osakwe, Larson, & Shang, 2019; Tsan et al., 2010). In addition, stewardship of UTIs in long-term care was determined to be a theme of the AMS Collaborative.

The survey tool was developed electronically in SurveyMonkey® and distributed to potential respondents through LifeSpan Network, with the goal of having the infection prevention and control officer (IPCO) and/or applicable staff involved with AMS activities in PALTC facilities participate. To expand the reach and encourage participation, champions of the Peter Lamy Center also e-mailed their respective medical and pharmacy organizations, long-term care pharmacies, and nursing and pharmacy schools in Maryland. The survey was e-mailed to potential respondents on three separate occasions (March 14, April 16, and June 22, 2018), with a cover letter describing the intent of the survey and the approximate time to complete (10 minutes). The letter also included instructions for returning the survey or editing responses if needed. Responses were voluntary and results recorded anonymously. Survey responses were evaluated to identify any potential barriers to implementing AMS. Descriptive statistics, including mean and standard deviation, median, and range, as appropriate, were performed using Microsoft® Excel®.

RESULTS

From March through August 2018, 91 individuals participated in the survey. Of these respondents, 51 individuals completed the survey in its entirety. Demographics of respondents and PALTC facilities are outlined in **Table 1**. Most respondents were either IPCOs (45%) or pharmacists (31%). Respondents estimated, on average, that 28% of individuals employed by each facility had any training in infection prevention and control. This estimation varied greatly, with respondent answers ranging from 0 to 100% (*SD* = 41%). **Figure A** (available in the online version of this article) shows the responses to the survey questions.

Seventy-one respondents continued the survey to answer questions regarding current stewardship practices. When asked if their facility uses infectious disease consults, 32% answered *no*, whereas 10% answered *unknown*. In response to questions of whether there are sufficient funds and time to cover AMS training, most respondents replied *yes* (56% and 75%, respectively). **Figure A** summarizes respondents answers to *yes/no* questions regarding implementation of AMS-related regulations, guidelines, and strategies and facilities' current practices. Prescribing clinicians and nurses were the target audience for AMS education for 65% and 75% of respondents, respectively. Approximately one third of respondents indicated that their facilities provide education to pharmacists, direct care staff, and residents and family members. When asked about antibiotic use data, 48 (87%) of 55 respondents

TABLE 1

DEMOGRAPHICS OF RESPONDENTS (*N* = 91), NURSING FACILITIES (*N* = 87), AND STAFF (*N* = 71)

Demographics	*n* (%)
Resident Demographics	
Position	
Infection prevention and control officer	41 (45)
Pharmacist	28 (31)
Nurse practitioner	5 (5)
Director/Assistant Director of Clinical Services	4 (4)
Director of Nursing	3 (3)
Nursing home administrator	3 (3)
Medical director	1 (1)
Other	6 (7)
Relevant training	
Continuing education in AMS	78 (86)
Continuing education in IPC	63 (69)
Certificate in IPC	33 (36)
Certificate in AMS	6 (7)
Residency/fellowship in IPC	3 (3)
Residency/fellowship in AMS	3 (3)
Other training in IPC	5 (5)
Other training in AMS	3 (3)
Nursing Facility Demographics	
Ownership type	
For profit	52 (60)
Non-profit	31 (36)
Government	4 (5)
Number of beds	
0 to 99	30 (34)
100 to 199	46 (53)
≥200	11 (13)

indicated that their facility collects this information, but there was no consensus as to the type of antibiotic use data collected (**Figure 1**). Eleven (20%) respondents indicated that they did not know how long their facility had been collecting these data, but 15 (27%) indicated that it was >3 years, two (4%) indicated it was 2 to 3 years, 15 (27%) indicated it was 1 to 2 years, and nine (16%) indicated it was <1 year. Many respondents did not know if their facility used an adverse event tool to help collect adverse event data, and among those who did, there was no consensus for the tool used (**Figure 2**).

All participants who completed the survey (n = 51) answered questions specific to AMS of UTIs. From 41 (80%) participants who indicated their facility had policies and protocols for the management of UTIs, the following was learned: these policies/protocols were updated weekly (4%), quarterly (6%), annually (47%), biannually (4%), and never/unknown/not applicable (40%). When asked to describe standardized antibiotic protocols, at least 10 respondents were unable to do so, due to lack of antibiotic knowledge, insufficient time or education, limited availability of resources, and lack of medical director support in creating protocols, helping further identify gaps in current implementation of AMS practices. When asked what their facility uses for ordering urine cultures, 22 (43%) completers responded *urinalysis to culture,* whereas 20 (39%) responded *culture with urinalysis criteria to culture*; two responded *neither* and two responded *unknown*. Of the 30 PALTC facilities that had the ability to contact a specialist for help in interpreting sensitivity results, 20% said that their facility *never* contacts a specialist, 34% said *rarely*, 30% said *sometimes*, and 16% said *often*.

DISCUSSION

The majority (76%) of respondents were IPCOs or pharmacists; therefore, these individuals should be used in AMS initiatives, serving as "champions" throughout implementation. Because most (73%) respondents did not have training in AMS beyond continuing education, access to more advanced training or trained individuals was likely a barrier to implementation of current AMS practices. This finding was supported by the average estimation that less than one third of individuals employed by PALTC facilities have any training in infection prevention and control. In addition, one third of PALTC facilities did not use infectious disease consults. The survey results are representative of a wide variety of PALTC facility types in Maryland. Respondents represented 51 unique PALTC facilities that served mostly long-stay (>100 days) residents. This survey (and the resulting initiatives) was created specifically for the PALTC setting, because AMS in this area has been a focus of regulations within the CMS Mega-Rule.

The survey reached the intended audience, with 22% (51/230) of Maryland PALTC facilities represented.

PALTC facility compliance with AMS-related federal regulations was modest. According to respondents, 46% of PALTC facilities in Maryland had a system for recording incidents identified under the facility's infection prevention and control program and the corrective actions taken by the facility. Seventy-six percent were compliant with the regulation requiring a system for preventing, identifying, reporting, investigating, and controlling infections and communicable diseases. Compliance with these regulations may have been >76% and respondents may have been unaware of the systems that are in place. Of each of the CDC core elements of AMS, PALTC facilities in Maryland appeared to be least compliant with the element of drug expertise. This finding provided further support that improving access to expertise could greatly impact any future implementation of AMS. Because approximately 20% of respondents did not know whether their facility had implemented the AMS guidelines and regulations, these survey questions illustrated the need for PALTC facilities to improve communication of AMS-related information. Of other common barriers to implementation of AMS, time was generally not perceived as a barrier, whereas having insufficient funds was perceived as a barrier by some.

In addition, there were no well-established measures for collecting antibiotic use data in this setting, as demonstrated by the varied responses to this survey question (**Figure 2**). Without statewide standardization, it will not be possible to compare antibiotic use between PALTC facilities as AMS improves over time. Also, according to respondents, adverse event data collection tools were not being used by several PALTC facilities, although this response may be due to lack of knowledge regarding their existence or limited use of existing tools. Regardless, this response demonstrates a need for a statewide adverse event data collection tool, preferably one that can be integrated into the electronic health record for ease of use.

TABLE 1 (CONTINUED)

DEMOGRAPHICS OF RESPONDENTS (*N* = 91), NURSING FACILITIES (*N* = 87), AND STAFF (*N* = 71)

Demographics	*n* (%)
Staff Demographics	
Number of staff	
0 to 50	19 (27)
51 to 99	13 (18)
100 to 199	21 (30)
200 to 499	13 (18)
≥500	5 (7)
Nurse staffing hours/resident/day	
0 to 3	28 (34)
4 to 7	19 (27)
≥8	24 (34)
Staff who have received training in IPC (%)	
0 to 0.99	12 (17)
1 to 4.99	27 (38)
5 to 9.99	7 (10)
10 to 49.99	5 (7)
50 to 99.99	6 (8)
100	14

Note. IPC = infection prevention and control; AMS = antimicrobial stewardship.

UTIs were a critical focus of the survey because of their prevalence in PALTC. A majority (80%) of survey completers reported having policies and protocols for the management of UTIs at their PALTC facilities. However, these were not used, never updated, or the frequency of updating was unknown per 40% of completers. There appears to be a gap between the development of policies/protocols and their actual implementation or adoption. From the survey, it could not be determined where or why this breakdown occurred, but it may have been due to poor dissemination of information. Fewer facilities (60%) had standardized antibiotic protocols at the point of prescribing, and this number was most likely higher than in reality, as several respondents were unable to describe these protocols. When asked to describe why facilities do not have protocols at the point of prescribing, respondents replied with recurring themes: lack of knowledge, insufficient time, and limited resources.

Regarding urine culture ordering, 43% of completers stated that their facilities cultured with every urinalysis, compared to 39% of completers stating that their facilities had urinalysis criteria to culture. Through interfacility collaboration via the study team's initiative, it may be possible to move toward the ideal: all facilities ordering urinalysis with criteria to cul-

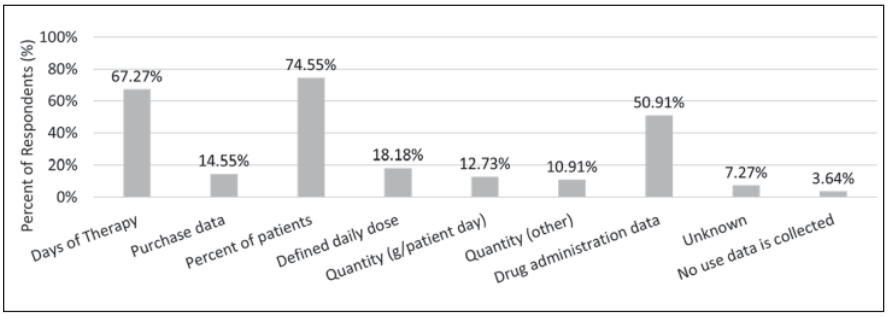

Figure 1. Types of antibiotic use data collected by post-acute/long-term care facilities in Maryland (*n* = 55).

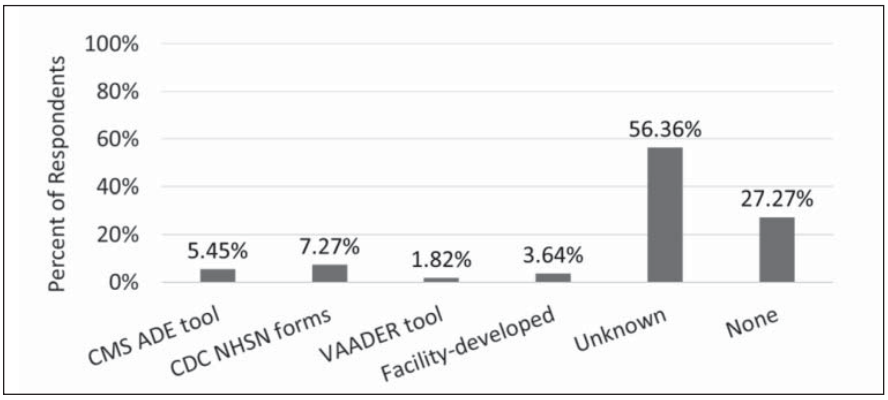

Figure 2. Types of adverse event data collection tools used by post-acute/long-term care facilities in Maryland (*n* = 55).
Note. CMS ADE = Centers for Medicare & Medicaid Services adverse drug event; CDC NHSN = Centers for Disease Control and Prevention Nursing Home Safety Network; VAADER = Veterans Affairs Adverse Drug Event Reporting.

ture. According to completers, urine cultures were processed 24 hours per day, 7 days per week at a majority of facilities (70%) and approximately all facilities (96%) received sensitivities. A specialist could be contacted to help interpret urine culture and sensitivity results in 59% of completers' PALTC facilities, but this was not performed often in most PALTC facilities (84%). This finding is concerning, because despite having access to individuals with expertise, they were not utilized.

Through consideration of all survey responses, the study team formed the following list of current needs of AMS in Maryland PALTC facilities, prioritized based on greatest probability of impact:

- access to and utilization of experts and specialists in infectious disease and AMS;
- access to and utilization of adverse event identification, data collection, and reporting tools;
- establishment of a statewide measure for antibiotic use data collection;
- protocols for restrictive prescribing;
- protocols for prescriber feedback;
- access to and utilization of locally developed guidelines and antibiograms;
- improved dissemination of AMS-related communication; and
- transparency in financial support for AMS.

Addressing these needs, especially with regard to UTIs, should continue to improve PALTC facility compliance with current guidelines and regulations, allow for future statewide studies that evaluate antibiotic use data and adverse event data, promote inter-facility relationships and sharing of data, and reduce inappropriate use of antibiotics.

EFFECT ON PRACTICE

The survey helped the study team and key stakeholders recognize the needs of PALTC facilities and the resources available. The survey also identified inconsistencies in practice that would benefit from standardization. The initiative was formed to address these key areas, with interprofessional collaboration driving the improvement of AMS. Shared solutions for the state of Maryland make each facility a part of a larger collaborative. Overall, the study team's efforts have provided a greater impact on the hands-on and practical application of AMS programs through education at multiple levels. The initiative has resulted in collaboration and application of the current guidelines and CMS regulations, thereby improving outcomes for patients and facilities. Future attention can be directed toward the next steps of AMS rather than the burden of implementing an AMS program.

LIMITATIONS

Because the survey was distributed electronically through multiple organizations, it was impossible to know exactly how many potential respondents were reached. From the information the survey provided, an estimated 11,387 individuals work in PALTC facilities in Maryland. The current sample size of 91 survey respondents is small in comparison and thereby may not be an accurate reflection of the impressions of all employees of PALTC facilities in Maryland. The team is confident that the completers of this survey were important stakeholders in AMS initiatives in PALTC, as this survey was voluntary. However, this fact, that survey respondents were key stakeholders in AMS, may bias survey results toward facilities that already have stronger AMS programs than other facilities in Maryland. Despite the anonymity of

the survey, there may also be respondent bias in attempting to make the state of AMS in their PALTC facilities appear better. However, this does not appear to be the case, given the reportedly modest compliance with federal regulations.

CONCLUSION AND IMPLICATIONS FOR NURSING

This interprofessional initiative represents a comprehensive approach toward identifying and bridging the gaps in AMS in PALTC. Through the distribution of a statewide survey and the delivery of an antibiotic summit, needs of AMS in Maryland PALTC facilities were identified and tools and ongoing support were provided to improve compliance with current regulations and guidelines, promote interfacility relationships and sharing of data, and reduce inappropriate use of antibiotics. Nurses are often championing infection prevention and control programs in the PALTC setting but need the support of the interprofessional team. It is imperative that ongoing work focus on antibiotic use and evaluating antibiotic-associated adverse events. This initiative represents an important step toward improving AMS in PALTC and ultimately improving meaningful person-centered and public health outcomes.

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Table A

Survey Questions

1. What is your position? (check all that apply)
2. Next to your profession, indicate the degree level and specialty area that best describes you (e.g., PharmD; Geriatrics).
3. Please select any additional training you have received in infection prevention and control. (check all that apply)
4. Please select any additional training you have received in antimicrobial stewardship. (check all that apply)
5. What is the ownership type of your facility?
6. How many beds are in your facility?
7. What percentage of your residents are considered short stay (<100 days)?
8. Approximately how many staff members work at your facility?
9. What are your facility's total nurse staffing hours per resident per day? (An estimate is acceptable.)
10. Approximately how many staff members, including yourself, have received training in infection prevention and control?
11. Does your facility utilize infectious disease consults and/or have an infectious disease specialist?
12. Are there sufficient funds to cover antimicrobial stewardship training and to make copies of materials for nurses, prescribing clinicians, residents, and family members?
13. Is there sufficient time to train nursing staff and prescribing physicians? Initial training may take up to 2 hours.
14. Has your facility implemented the CDC Core Elements for Antimicrobial Stewardship in Nursing Homes? (check all that apply)
15. Has your facility implemented the following elements of an infection prevention and control program (IPCP), consistent with the Code of Federal Regulations, section §483.80 Infection control? (check all that apply)
16. Which of the following strategies has your facility implemented to improve antimicrobial use? (check all that apply)
17. IF your facility provides stewardship education, who is the targeted audience? (check all that apply)
18. If your facility uses antibiograms, who provides these?
19. Does your facility collect data about antibiotic use?
20. What type of antibiotic use data does your facility or consultant pharmacist collect? (check all that apply)
21. How long has your facility been collecting this antibiotic use data?
22. Does your facility collect data about adverse events?
23. Does your facility utilize any of the following tools to collect data about adverse events? (check all that apply)
24. Does your facility have policies and protocols for the management of urinary tract infections (UTIs)?
25. How often does your facility update these policies and protocols?

26. Which of the following tools does your facility utilize when assessing UTIs?
27. At the point of prescribing, are there standardized antibiotic protocols at your facility? If so, please describe it. If not, please explain why not (i.e., what barriers are preventing you from developing these protocols).
28. For urine culture ordering, dose your facility use urinalysis to culture, culture with urinalysis criteria to culture, neither, or unknown?
29. Are urine cultures from your facility processed 24 hours a day, 7 days a week?
30. Does your facility receive sensitivities for urine cultures?
31. Can an infectious disease specialist or clinical microbiologist be contacted to help interpret urine culture and sensitivity results?
32. If you answered yes to the above, how frequently is this done?

Figure A
Overall Survey Results
(legend AMS = antimicrobial stewardship, CDC = Centers for Disease Control, IPCP = infection prevention and control program, UTIs = urinary tract infections)