CONCISE COMMUNICATION

Antimicrobial Stewardship Programs in Florida's Acute Care Facilities

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We surveyed acute care facilities in Florida to assess components of and barriers to sustained antimicrobial stewardship programs (ASPs). Most respondents with and without ASPs are doing some stewardship-related activities to improve antimicrobial use. Collaborative efforts between facilities and health departments are important to providing better resources for ASPs.

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Many organizations have recognized the importance of implementing antimicrobial stewardship programs (ASPs).[1,2] In California, Senate Bill 739 mandates that all general acute care hospitals monitor and evaluate the use of antibiotics and charge a quality improvement committee with the responsibility for overseeing the judicious use of these medications.[3] The impact of this law is thought to be substantial, but systematic information has not been published. In Florida and other states, it is not known how many institutions have developed ASPs or plan to do so. Statewide assessment of ASPs could inform states of both the status and needs of these programs.

METHODS

The Florida Department of Health (FDOH) Bureau of Epidemiology and the University of Miami Miller School of Medicine developed and distributed an electronic survey (using http://www.surveymonkey.com). A total of 213 acute care facilities were identified through the Florida Hospital Association's website, and surveys were distributed via email to professional organizations (Florida Infectious Diseases Society, Florida Society of Healthcare Pharmacists, and Florida Professionals in Infection Control) for dissemination to their members in acute care facilities. Questions focused on strategies, barriers, and educational opportunities to foster the implementation, sustainability, or improvement of ASPs. Facilities were deidentified, duplicates were removed, and results are presented in aggregate. Analyses were performed using SAS, version 9.2 (SAS). This study was exempt from institutional review board review by the FDOH.

RESULTS

Responses from 82 unique facilities (39% of those that received a survey) were analyzed. Respondents were distributed across Florida's 7 regions; their primary roles were as follows: 21 (26%) physician or medical director, 20 (24%) pharmacist, 14 (17%) pharmacy director, 16 (20%) infection control professional, and 11 (13%) other.

Of the 82 study facilities, 45 (55%) had an ASP in place, 17 (21%) planned to implement one within the next 12 months, and 20 (24%) did not plan to establish an ASP. There was no statistically significant difference in whether an ASP was present by type of facility (academic vs community), but facilities with more than 250 beds were significantly more likely to have an ASP established compared with facilities with 250 beds or less (33 [73%] vs 12 [27%]; $P = .0199$).

In the 45 facilities with an established program, 10 (22%) had implemented the program within the previous year, 24 (53%) within 1–3 years, and 11 (24%) over 4 years ago. Thirty-four (76%) of the established ASPs included an infectious disease physician, 71% included a clinical pharmacist, 64% included an infection control professional, and 42% included a microbiologist; 38% included pharmacists with specific training in infectious diseases, but only 9% had data analysts. In the 31 facilities whose programs included a physician, 65% had less than 50% of a full-time equivalent dedicated physician who was compensated for their program activities.

Seventy-three respondents reported the following perceptions as being important or very important reasons for why antimicrobials are misused in healthcare facilities: lack of awareness and knowledge about antimicrobials and infections (63 [86%] of respondents); lack of buy-in to problems associated with the overuse of antimicrobials (61 [84%]); clinicians' fear of being sued for untreated infection (61 [84%]); misconception that antibiotics should be used every time that a patient experiences a fever (52 [71%]); and patient satisfaction (47 [64%]). There were no significant differences among respondents according to ASP status, facility type, or number of beds. *Clostridium difficile*–associated diarrhea was perceived as the most challenging healthcare-associated infection in 14 (36%) of 39 facilities with an ASP.

Table 1 summarizes the extent to which respondents' have implemented core and supplemental strategies recommended by the Infectious Diseases Society of America/Society for Healthcare Epidemiology of America guideline.[4] The most commonly used strategies implemented by facilities with established ASPs were formulary restriction and education. Facilities with established ASPs, compared with those without programs, were significantly more likely to perform preauthorization ($P = .0092$), postprescription review with feedback ($P = .0017$), and deescalation of therapy ($P = .0008$).

Overall, 53 (72%) of the 74 facilities monitored consumption of antimicrobials, with no significant difference according to whether an ASP had been established. Among the 53 facilities that monitored consumption, 91% reviewed annual purchasing costs (US$), 53% measured defined daily doses, and 42% measured defined days of therapy. The most com-

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TABLE 1. Antimicrobial Stewardship Strategies Used in Florida's Acute Care Hospitals, by Presence of an Antimicrobial Stewardship Program (ASP)

Antimicrobial stewardship strategy	No. (%) of respondents		P
	Current ASP	No ASP planned	
Core strategy			
Formulary restriction	35 (78)	16 (80)	>.99
Preauthorization (approval required before antimicrobial can be used)	27 (60)	5 (25)	.0092
Postprescription review with feedback (use is reviewed after specified time period)	28 (62)	4 (20)	.0017
Supplemental strategy			
Education (eg, local antibiograms)	37 (82)	17 (85)	>.99
Dose optimization/automatic dose adjustments	32 (71)	11 (55)	.2052
Parenteral to oral conversion protocols	30 (67)	9 (45)	.0998
Guidelines and clinical pathways	29 (64)	10 (50)	.2726
Streamlining or deescalation of therapy	27 (60)	3 (15)	.0008
Time-sensitive automatic stop orders	17 (38)	5 (25)	.3150
Antimicrobial order forms	15 (33)	5 (25)	.5017
Computer systems that support clinical decision making for prescribing	10 (22)	2 (10)	.3152
Antimicrobial cycling	3 (7)	2 (10)	.6392
None at this time	0 (0)	1 (5)	.3077

NOTE. Stewardship strategies included selected strategies from the Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America 2007 Guideline.[4] Respondents selected all that applied.

mon outcomes measured by 56 facilities with established or planned ASPs were drug purchasing costs (70%), antimicrobial resistance (66%), rates of *C. difficile* infection (66%), patient outcomes (43%), length of stay (38%), and adverse drug reactions associated with antimicrobials (34%). The most commonly reviewed antimicrobials regardless of the presence of an ASP were linezolid, vancomycin, and daptomycin as well as broad-spectrum agents, such as carbapenems and piperacillin-tazobactam. Third-generation cephalosporins and fluoroquinolones were less likely to be monitored.

Perceived barriers and resources needed to start or sustain an ASP are shown in Table 2. The most common barriers were insufficient funds or personnel to dedicate time for ASP activities. There were no significant differences in the responses according to whether an ASP was present, facility type, or number of beds. Most respondents perceived that templates with forms successfully used by others, collaborative strategies, a regional listserv, and educational meetings with access to expert faculty would be the most useful resources. Online "webinars" were perceived as the least useful.

DISCUSSION

Our study describes the extent to which ASPs have been implemented in Florida's acute care facilities. Most established programs are relatively new. Interestingly, the majority of our respondents, even those with no established or planned ASP, are performing some stewardship-related activities. Respondents perceived that the most important reasons why antimicrobials are used inappropriately in healthcare facilities were a lack of awareness and knowledge about antimicrobials. These and other perceptions identified in our study should be explored further to help design strategies to alter behaviors on a large scale.

Most respondents were not monitoring third-generation cephalosporins and fluoroquinolones, although they have been associated with "collateral damage" from antimicrobial therapy.[5] ASPs should explore reviewing these antimicrobial classes as well; even though they may not have a large impact on the pharmacy budget, there is potential to improve patient outcomes.

Inadequate time for stewardship activities and inadequate funding for dedicated personnel were the most frequent reported barriers (Table 2), which is a finding that is consistent with previous studies.[6-8] These barriers are not unique to Florida, and leadership support at each individual facility[9] and regionally[3] are extremely important to successfully sustain ASPs.[10]

This study has several strengths. The unit of analysis was individual facilities within Florida. The survey was distributed to healthcare professionals with different roles across facilities limiting the selection bias of respondents within a single group. Limitations to our study include that our questionnaire was self-reported (no information is available from the nonrespondents), and we are unable to estimate the exact number of facilities contacted. It is also possible that nonrespondents are less likely to have ASPs and that our findings might overestimate the presence of ASPs in Florida.

The FDOH is using information resulting from this survey to help guide the development of regional collaborations and to promote ASPs. Our study provides a foundation for future efforts among acute care facilities and local and state health departments for developing statewide stewardship initiatives to address the worsening problem of antimicrobial resistance.

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TABLE 2. Perceived Barriers and Resources Needed to Establish or Sustain Antimicrobial Stewardship Programs (ASPs) in Florida's Acute Care Facilities, by Presence of an ASP

Barriers and resources needed	No. (%) of respondents			
	Current ASP	ASP planned within 12 months	No ASP planned	*P*
Barrier				
Inadequate time for ASP activities	27 (68)	10 (63)	12 (60)	.845
Personnel shortages	27 (68)	9 (56)	14 (70)	.351
Inadequate funding for activities or personnel	24 (60)	11 (69)	12 (60)	.374
Lower priority than other clinical initiatives	20 (50)	7 (44)	6 (30)	.243
Inadequate IT support	16 (40)	3 (19)	7 (35)	.115
Opposition from prescribers	16 (40)	5 (31)	6 (30)	.692
Paucity of data on improved outcomes with ASPs	10 (25)	3 (19)	3 (15)	.628
Multiple ID groups within the facility	8 (20)	3 (19)	3 (15)	.284
Financial support for ASP activities	25 (56)	9 (53)	15 (75)	.273
Resource needed				
Protected time for ASP activities	25 (56)	8 (47)	12 (60)	.726
Improved software	24 (53)	9 (53)	8 (40)	.589
Data analyst	23 (51)	8 (47)	8 (40)	.709
Dedicated ID physician	22 (49)	12 (71)	12 (60)	.283
Data (epidemiology)	19 (42)	8 (47)	8 (40)	.906
Education (starting and how to run an ASP)	18 (40)	12 (71)	17 (85)	.001
Data (antimicrobial use)	16 (36)	10 (53)	9 (45)	.248
Clinical pharmacist	15 (33)	11 (65)	11 (55)	.051
Administrative support	11 (24)	9 (53)	13 (65)	.004
Infection control personnel	9 (20)	5 (29)	5 (25)	.717

NOTE. Respondents selected all that apply. Two respondents reported no barriers. ID, infectious diseases; IT, information technology.

Suggested priority topics for such collaborations are the development of outcomes-based measures to monitor the impact of ASPs and support venues for sharing regional antimicrobial resistance data and successfully implemented interventions across facilities.

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