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Antimicrobial Stewardship in Pediatric Post-acute Care Facilities

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Abstract

Providers in pediatric post-acute care facilities (PACFs) were surveyed about knowledge of and resources for antimicrobial stewardship (AS). All agreed that antibiotics were overused in pediatric PACFs, but 60% had not implemented AS strategies. Lack of treatment guidelines (47%) was identified as the most common barrier to AS.

Keywords

Antimicrobial stewardship; Long-term care; Post-acute care; Pediatrics

INTRODUCTION

It is estimated that there are at least 100 pediatric long-term care facilities in the United States¹, as well as rehabilitation facilities and adult facilities with pediatric beds, providing comprehensive residential care for medically complex children. Collectively these facilities are often referred to as post-acute care facilities (PACFs). Children residing in PACFs are at increased risk of infection due to age-related susceptibility to infection, reliance on invasive devices, and underlying comorbidities². Healthcare-associated infections are a significant burden in pediatric PACFs³; colonization and infections with multidrug resistant organisms also occur in this population⁴. However, data are lacking on antibiotic use in pediatric PACFs. Within adult PACFs, it is estimated that as many as 70% of residents are prescribed an antibiotic annually; 40–75% of prescriptions may be inappropriate⁵. The difficulty of diagnosing infections in adult PACF residents—due to cognitive impairment, hearing or speech difficulties, atypical symptoms, lack of access to diagnostic tests, and difficulty

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obtaining specimens for testing—is believed to contribute to inappropriate antibiotic use⁶; pediatric PACFs face similar diagnostic challenges².

To date, the impact of antimicrobial stewardship (AS) to curtail inappropriate antibiotic use has largely been evaluated in acute care facilities and some adult PACFs. While the Centers for Medicare and Medicaid Services recently finalized a rule requiring stewardship programs as a condition for reimbursement for long-term care facilities⁷, AS implementation has not been evaluated in pediatric PACFs. This study seeks to address this knowledge gap by surveying PACFs caring for children to assess knowledge of and resources for stewardship.

METHODS

Study Setting

PACFs were identified with the aid of the Pediatric Complex Care Association, a group that promotes collaboration between organizations providing residential post-acute care for medically complex children (www.pediatriccomplexcare.org); facilities caring for residents

21 years of age were eligible for inclusion. A link to the survey was emailed to eligible facilities requesting that one staff member, preferably an antibiotic prescriber, complete the survey. The survey was available for completion from March 2016 through August 2016. A \$25 e-gift card was offered as an incentive to increase participation. The Columbia University Medical Center Institutional Review Board approved this study.

Survey Design

The survey was administered on an internet-based platform (Qualtrics, Provo, UT), allowing for anonymous responses. The 32-item survey included questions utilizing a 4-point Likert scale, dichotomous choices, and free text fields. Facility information—including geographic region⁸, number of pediatric beds, and diagnostic resources available—was collected.

Respondents were asked about their beliefs regarding antibiotic overuse and resistance. Knowledge of stewardship strategies, AS practices at each facility, and perceived barriers to implementing AS were also assessed.

Statistical Analysis

Descriptive analyses to determine response frequencies were performed.

RESULTS

Respondent and Facility Characteristics

Survey links were sent to 78 facilities; respondents from 34 facilities (44%) completed the survey. Nearly half of the respondents were nursing directors (Table 1); 35% of respondents were antibiotic prescribers.

Facility characteristics and resources are outlined in Table 1. Many facilities were free-standing pediatric PACFs and self-identified as long-term care facilities. Most had access to bacterial and viral diagnostic testing; fewer had access to point-of-care diagnostic testing including urinalysis (53%) or rapid tests for group A streptococcus (21%), influenza (27%),

or mononucleosis (9%). Of the 62% of facilities that used an electronic medical record, 29% utilized automatic stop orders for antibiotic prescriptions. Few facilities had guidelines for management of common infections.

Attitudes about Antibiotic Overuse and Resistance

Most respondents strongly agreed/agreed that antibiotics were overused in pediatric PACFs (88%) and that overuse can contribute to infections with resistant bacteria (88%). Many were very concerned about adverse outcomes associated with antibiotic overuse including alteration of the gut microbiome (74%), increased healthcare costs (65%), and *Clostridium difficile* infections (59%). Fewer respondents thought antibiotic resistance was a problem in their facility (65%) compared to other pediatric PACFs (82%) or acute care facilities (88%).

Antimicrobial Stewardship: Knowledge, Practices, and Barriers to Implementation

Most respondents (94%) were able to identify one or more recommended AS strategies⁹. However, 26% identified at least one strategy not recommended as a means to improve antibiotic use, e.g., antibiotic cycling (Table 2).

All respondents strongly agreed/agreed that stewardship is needed in pediatric PACFs; 41% implemented AS strategies in their facility. These strategies included audit and feedback (26%) or prior authorization for select antimicrobials (18%).

The most commonly identified barrier to improving antibiotic use was the lack of treatment guidelines (47%) (Table 2). Three respondents wrote that caretaker, nurse, and/or respiratory therapist discomfort with not starting empiric antibiotics when residents had a change in clinical status was also a barrier.

DISCUSSION

Most respondents were aware of recommended AS strategies and acknowledged that stewardship is needed in pediatric PACFs, but less than half of respondents' facilities implemented AS strategies. That the lack of treatment guidelines was the most common barrier to AS identified by respondents stands in contrast to findings in adult PACFs where prescriber attitude is cited as the greatest barrier¹⁰. Treatment guidelines have been published for adult PACFs^{5, 11}; guideline development is a potential stewardship target for pediatric PACFs. Respondents' also identified caretaker and non-physician provider discomfort with not starting antibiotics as a barrier, suggesting the need for expanded AS education targeting a wide range of stakeholders—including bedside nurses whose clinical assessments play a substantial role in antibiotic initiation for residents⁵.

Limitations of this study include the absence of a comprehensive listing of PACFs with pediatric residents which likely prohibited survey distribution to all eligible sites. This, along with the small sample size, may limit the generalizability of the findings to all pediatric PACFs. The lack of respondents who were antimicrobial prescribers may have influenced the perception of antibiotic overuse and resistance. However, nearly half of the respondents were nursing directors with knowledge of their facility's diagnostic, treatment, and AS resources.

In conclusion, there is a recognized need for AS in pediatric PACFs; developing treatment guidelines for this population is an important stewardship intervention. Future studies should assess strategies to expand AS implementation and measure the effectiveness of stewardship in pediatric PACFs.

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Highlights

- Antimicrobial stewardship is needed in pediatric post-acute care facilities.
- Less than half of surveyed facilities implemented stewardship practices.
- Lack of treatment guidelines was the most common barrier to stewardship.

Table 1

Characteristics of Pediatric Post-acute Care Facilities and Survey Respondents

Characteristics	Respondents, Number (%)
Respondents	
Role	
Nursing director	16 (47)
Medical director	5 (15)
Infection preventionist	5 (15)
Other *	8 (24)
Employed at facility > 5 years	18 (53)
Simultaneously work in acute care facility	12 (35)
Have received formal stewardship training	8 (24)
Facilities	
Region	
Northeast	13 (38)
Midwest	9 (26)
South	8 (24)
West	4 (12)
Care provided (<i>select all that apply</i>)	
Long-term care	28 (82)
Sub-acute	9 (26)
Rehabilitation	6 (18)
Type	
Free-standing pediatric facility	26 (76)
Combined adult and pediatric facility	7 (21)
Located within an acute care facility	1 (3)
Number of pediatric beds	
1–50	15 (44)
51–100	12 (35)
>100	7 (21)
Estimated average length of stay	
>1 year	30 (88)
Available Resources	
Access to Infectious Disease consult	27 (79)
Access to a clinical pharmacist	31 (91)
In-house pharmacy	6 (18)
Access to bacterial cultures	33 (97)
Access to viral diagnostic testing [†]	33 (97)
Local antibiogram	9 (26)

Characteristics	Respondents, Number (%)
Acute care facility antibiogram	9 (26)
Diagnostic guidelines for:	
Otitis media	8 (24)
Pneumonia	7 (21)
Urinary tract infections	9 (26)
Treatment guidelines for:	
Otitis media	7 (21)
Pneumonia	6 (18)
Urinary tract infections	7 (21)

* Other (n): staff physician (3), administrator (1), case manager (1), clinical pharmacist (1), nurse practitioner (1), quality control nurse (1).

[†] Viral diagnostic testing: Direct fluorescence antibody, PCR-based respiratory viral panel, viral culture.

Table 2

Knowledge of and Barriers to Antimicrobial Stewardship in Pediatric Post-acute Care Facilities (PACFs)

Domains and Survey Questions	
Knowledge	Number (%)
I have heard of the term “antimicrobial stewardship”	25 (74)
Which of the following strategies can improve antibiotic use (<i>select all that apply</i>):	
Treatment guidelines *	28 (82)
Antibiotic timeout *	24 (71)
Infectious Disease consult	21 (62)
Using narrow spectrum antibiotics *	21 (62)
Prescribing shorter course of antibiotics *	15 (44)
Having a restricted formulary *	7 (21)
Using the least expensive antibiotic	6 (18)
Antibiotic cycling	4 (12)
Barriers to improving antibiotic use at my facilities include lack of (<i>select all that apply</i>):	
Treatment guidelines for infections in pediatric PACFs	16 (47)
Expert consultation (infectious disease or clinical pharmacist)	10 (29)
Facility-specific antibiogram	8 (24)
Diagnostic resources	8 (24)
Provider buy-in to change antibiotic prescribing practices	8 (24)
Financial support for stewardship resources	7 (21)
No barriers	6 (18)

* AS strategies endorsed by the Infectious Diseases Society of America and the Society for Healthcare Epidemiology⁹.