Antibiotic Use for Upper Respiratory Tract Infections
How Well Do Pediatric Residents Do?
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Background: Antibiotics are often used inappropriately for the treatment of upper respiratory tract infections in children, and the emergence of resistant bacteria is a growing public health concern.

Objective: To assess awareness and compliance with the Centers for Disease Control and Prevention (Atlanta, Ga) and American Academy of Pediatrics (Elk Grove Village, Ill) principles for judicious antibiotic use for upper respiratory tract infections among residents from a sample of pediatric residency programs in the mid-Atlantic region of the United States.

Participants and Methods: Residents at the participating programs were requested to complete a survey questionnaire.

Results: Of the 524 pediatric residents surveyed, 74% (388 participants) completed the questionnaire. Familiarity with the principles increased with a year of training; 16%, 36%, and 50% of first-year (PL1), second-year (PL2), and third- or fourth-year (PL3/PL4) residents, respectively, had heard or read about the principles ($\chi^2_{\text{trend}}; P < .001$). In response to a direct question about the use of antibiotics for an otherwise well, afebrile 18-month-old child with purulent rhinorrhea, 29%, 25%, and 15% of PL1, PL2, and PL3/PL4 residents, respectively, would prescribe antibiotics within 10 days of onset of illness ($\chi^2_{\text{trend}}; P = .008$). A significant difference was found between PL1 vs PL3/PL4 participants (difference = 20%; 95% CI = 3%-26%). If the same infant had a temperature of 38.8°C, then 63%, 45%, and 47% of PL1, PL2, and PL3/PL4 residents, respectively, would prescribe antibiotics ($\chi^2_{\text{trend}}; P = .008$).

Conclusions: Awareness among pediatric residents about the judicious use of antibiotics for upper respiratory tract infections is often lacking, and inappropriate use of antibiotics for this condition continues to be prevalent. This was especially noted among PL1 residents, with an improving trend noted with increasing years of training.

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PARTICIPANTS AND METHODS

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The study, which involved survey responses to CDC/AAP principles and to clinical vignettes by which residency programs, but not individual respondents, could be identified, was ruled exempt from review by the institutional review board at the Inova Fairfax Hospital ( Falls Church, Va). We contacted large residency programs in the mid-Atlantic region, and 12 programs responded. These included 2 programs each in Maryland and the District of Columbia, and 4 each in Virginia and North Carolina. The median number of residents per level of training per year in these programs was 13, and the range was between 9 and 22 residents. Pediatric residents at all levels of training were surveyed. The chief residents of each program coordinated the distribution and collection of completed questionnaires. Our predeterm ined goal was a response rate of at least 70%. Follow-up letters and telephone calls were used to improve response rates.

SURVEY INSTRUMENT

The survey questionnaire contained 17 questions, including information about year of training, awareness of CDC/AAP principles, and 6 vignettes, each requiring forced-choice answers (yes, no, or uncertain). These vignettes were on (1) short-duration, purulent rhinorrhea; (2) acute otitis media; (3) otitis media with effusion; (4) acute whooping cough; (5) pneumonia; and (6) pharyngitis. The first 5 case scenarios pertained to an 18-month-old child, and the sixth scenario, to a 4-year-old child. In addition, direct questions regarding management of a febrile and a febrile 18-month-old child with purulent rhinorrhea were included. Attendance at a childcare center was introduced as a variable to see whether it had any effect on the decision to use antibiotics. The study was conducted from October 1998 to April 1999.

STATISTICAL ANALYSIS

All survey responses were categorical in nature. For comparisons between residency groups, percentage differences with 95% confidence intervals (CIs) are reported. For comparisons among residency groups, χ² analysis for trend is reported. All calculations were performed using SAS software version 6.12 (SAS Institute, Cary, NC).

RESULTS

Of the 524 residents in the participating residency programs, 74% (388 residents) returned completed questionnaires. Distribution of residents across the different years of training was comparable with 130, 121, and 137 residents in the first (PL1), second (PL2), or the third or fourth (PL3/PL4) year of training, respectively. As only 14 (3.5%) of the respondents were PL4, PL3 and PL4 residents were combined as a single group. Overall, only 34% (133/388) of the respondents had read or heard about the principles of CDC/AAP. Awareness of American Academy of Pediatrics principles for treating upper respiratory tract infections with antibiotics. PL1 indicates first-year residents; PL2, second-year residents; and PL3/PL4, third- or fourth-year residents.

to assess their awareness. Illustrative case vignettes were included in the survey to determine antibiotic prescribing patterns, with the assumption that responses to vignettes reflected their knowledge and application of the principles, or lack thereof. We hope our data will highlight the need for improving awareness among this group of healthcare providers, who represent practicing physicians of the future.
Inappropriate use of antibiotics for upper respiratory tract illnesses in children continues to be commonly reported among pediatric residents. This was especially noted among PL1 residents. It was encouraging to see an improving trend with increasing years of training both in awareness of the principles and reported antibiotic use. This could represent experience accrued during training or possibly greater familiarity with current literature.

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Knowledge gaps will have to be identified so that appropriate interventions can be designed. Seminars, noon conferences, and other teaching sessions can be used as platforms to disseminate this information. Introducing this topic at the beginning of each academic year may be valuable, as it will provide PL1 residents the opportunity to learn correct concepts from the very beginning and also reinforce them among senior residents. Online physician education is becoming a popular teaching tool. Web-based tutorial systems may be more efficacious than print-based guidelines.

In a survey of family practice residents regarding use of clinical practice guidelines, 78% of residents felt that such guidelines improved their residency education, and 75% thought it improved patient care. In a study from Israel, more senior residents and certified family practitioners felt that clinical practice guidelines did not constrain clinical freedom as compared with uncertified general practitioners and junior residents.

Our study included 12 different institutions in the mid-Atlantic region and may not be representative of overall attitudes and practices of residents in this region. Before these results can be generalized, studies spread across different geographic regions will be needed to provide a more comprehensive representation. As in any study based on a survey, there is a concern around whether respondents differed from nonrespondents, and it is not possible for us to ascertain differences based on this study. As the responses were based on self-report, they do not clearly reflect what residents would do when faced with similar situations in actual practice. It is possible that the respondents overstated their compliance with the principles, as they were aware of our intentions. If so, our data may be an underrepresentation of the magnitude of the problem.

In collaboration with the CDC, AAP, or other professional organizations, educational modules can be developed that specifically target the needs of residents. Knowledge gaps will have to be identified so that appropriate interventions can be designed. Seminars, noon conferences, and other teaching sessions can be used as platforms to disseminate this information. Introducing this topic at the beginning of each academic year may be valuable, as it will provide PL1 residents the opportunity to learn correct concepts from the very beginning and also reinforce them among senior residents. Online physician education is becoming a popular teaching tool. Web-based tutorial systems may be more efficacious than print-based guidelines.
Upper respiratory tract infections are a leading rationale for outpatient antibiotic prescription. In 1998, the CDC and the AAP published principles for the judicious use of antibiotics for common pediatric respiratory tract infections. Our study was done to assess awareness and compliance with these principles among residents from a sample of pediatric residency programs.

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