

2004

Child care center policies and practices for management of ill children

Jennifer F. Friedman

Grace M. Lee

Ken P. Kleinman

Jonathan A. Finkelstein

Follow this and additional works at: https://scholarworks.umass.edu/public_health_faculty_pubs



Part of the [Biostatistics Commons](#), and the [Epidemiology Commons](#)

Recommended Citation

Friedman, Jennifer F.; Lee, Grace M.; Kleinman, Ken P.; and Finkelstein, Jonathan A., "Child care center policies and practices for management of ill children" (2004). *Ambulatory Pediatrics*. 20.
<https://doi.org/10.1367/A04-005R.1>

This Article is brought to you for free and open access by the Public Health at ScholarWorks@UMass Amherst. It has been accepted for inclusion in Public Health Department Faculty Publication Series by an authorized administrator of ScholarWorks@UMass Amherst. For more information, please contact scholarworks@library.umass.edu.

Child Care Center Policies and Practices for Management of Ill Children

Jennifer F. Friedman, Grace M. Lee, Ken P. Kleinman, Jonathan A. Finkelstein

Objectives.—The objectives of this study were to 1) describe child care staff knowledge and beliefs regarding upper respiratory tract infections and antibiotic indications and 2) evaluate child care staff reported reasons for a) exclusion from child care, b) referral to a health care provider, and c) recommending antibiotics for an ill child.

Methods.—A longitudinal study based in randomly selected child care centers in Massachusetts. Staff completed a survey to assess knowledge regarding common infections. For six weeks, staff completed a record of absences each day, describing the reason for an absence, and advice given to the parents regarding exclusion, referral to a health care provider, and obtaining antibiotics. Exclusions for the specific illness/symptom were defined as appropriate or inappropriate based on national guidelines.

Results.—A large proportion of child care staff incorrectly believed that antibiotics are indicated for bronchitis (80.5%) and green rhinorrhea (80.5%) in children. For 82.2% of absences, the circumstances or reasons for the absence were discussed with a child care staff member. Of 538 absences due to illness that child care staff discussed with parents, there were 45 inappropriate exclusions (8.4% of illnesses discussed), 91 appropriate exclusions (16.9% of illnesses discussed), and 402 cases (74.7%) in which no recommendation for exclusion was made.

Conclusions.—Misconceptions regarding the need for antibiotics for URIs are common among child care staff. However, day care staff do not pressure parents to seek medical attention or antibiotics.

KEY WORDS: antibiotics; child care; day care; exclusion; pediatric; policies

A substantial fraction (41%) of preschool children are cared for by a nonrelative in organized child care settings at least part of the time.¹ Child care attendance is frequently disrupted by illness partly because of the increased incidence of infectious illness among those who attend.²⁻⁷ These absences incur significant direct and indirect costs due to physician visits, medications, alternative child care arrangements, and/or missed work for employed parents.⁸ Keeping an ill child home is often in the interest of both the ill child and others who attend a center. However, previous work has suggested that exclusion decisions made by child care staff may be overly conservative.⁹ This may promote, directly or indirectly, additional medical care costs and even unnecessary use of antibiotics.

In 1992, the American Academy of Pediatrics (AAP) and The American Public Health Association (APHA) created the *Guidelines for Out-of-Home Child Care Programs*,¹⁰ which was updated and revised in 2002.¹¹ These guidelines specify indications for exclusion of ill children as well as specific illnesses and symptoms that do not require exclusion. Most states (including Massachusetts) also have their own health and safety guidelines for child care centers, which require licensed centers to have a written policy for exclusion of children who are ill. The Massachusetts Department of Public Health (DPH) publishes guidelines,¹² which include a brief summary of illnesses/symptoms for which exclusion is recommended. These are less detailed than the AAP/APHA Guidelines and centers are not required to follow either national or state-specific recommendations in formulating their own policies.

Despite such guidance, little is known about how exclusion policies are applied in practice and whether they conform to recommendations by public-health authorities. Even less is known about advice given by child care staff to parents with respect to health care seeking and antibiotics for an ill child. Several studies have shown that children who attend child care receive more antibiotics than children cared for at home.^{5,13-17} Further, physicians cite parental desire to expedite return to work and child care as a source of pressure for unnecessary antibiotic use.^{18,19} Given this perception and that antibiotic overuse likely contributes to increasing rates of bacterial resistance to antibiotics,²⁰⁻²⁵ it is important to understand whether child care providers inappropriately exclude children or encourage unnecessary physician visits and antibiotic use.

The objectives of this study were to 1) describe child care staff knowledge and beliefs regarding upper respiratory tract infections and antibiotic indications and 2) prospectively evaluate the appropriateness of child care staff reported exclusions, referrals for medical care, and recommendations that antibiotics be sought. Specifically, child care staff-reported exclusion requirements for a specific ill child were evaluated using APHA/AAP Guidelines for appropriateness, and recommendations to obtain an antibiotic were evaluated using Centers for Disease Control (CDC) and AAP Guidelines.²⁶

METHODS

Study Design

We conducted a prospective observational study in randomly selected child care centers in Massachusetts. At the beginning of the study, child care center directors and lead teachers completed a survey addressing knowledge about upper respiratory tract infections (URIs) and antibiotic indications. Then, for 6 weeks, child care staff completed a daily record of absences and, for each absence, documented the reason, if known, and any advice given to the parents of the absent child regarding exclusions, seeking medical care, or obtaining antibiotics.

Study Sample

Child care centers were randomly selected for participation from a list of all licensed centers in Massachusetts with a capacity of between 5 and 75 children provided by the Department of Public Health. Median household income level of the community in which each center was located was taken from 1990 census data. Using a random number generator, 40 centers were chosen from communities with median household incomes above and below the statewide median. In January of 2001, these 80 centers received a recruitment letter, a consent form, and a director's survey regarding attributes of the center and director. To be eligible, centers had 1) a director who was reached by telephone and able to consent on behalf of the center, 2) a capacity of 5–75 children, and 3) children enrolled who were less than 48 months of age. No incentives were offered for participation. Centers that were not eligible or refused to participate were asked to complete and return the brief form describing their center and personnel.

This study was reviewed and approved by the Institutional Review Board of Children's Hospital Boston.

METHODS

Data Collection and Sources

Child Care Center Characteristics

The directors' survey was used to assess specific characteristics about the child care center, including 1) information regarding the center's health care consultant, 2) source and clarity of the center's guidelines for exclusion of ill children, 3) adequacy of available staff to care for mildly ill children, and 4) information on the center itself (including size and director's years of experience).

Child Care Staff Knowledge and Beliefs

Participating centers were mailed surveys for the director and lead teachers that were returned directly to project staff in a self-addressed postage-paid envelope. A second set of surveys with a reminder was mailed 6 weeks later

to the director and/or any lead teacher who had not responded. The child care staff survey contained 11 questions assessing knowledge and beliefs regarding etiology of URIs and antibiotic indications for specific URIs. These questions were based on items used in previous community-based studies of antibiotic knowledge.²⁷ The Cronbach alpha score was .76, indicating very good internal consistency and reliability.²⁸ Responses for antibiotic indications were judged correct or incorrect based on the current AAP and CDC "Principles of Judicious Use of Antimicrobial Agents for Pediatric URIs."²⁶

Staff Management of Absences

One predated absence record was provided for each day of the 6-week study period on which staff recorded the number of 1) children expected to attend, 2) absent children, and 3) absent children about whom child care staff spoke with a parent. Most centers began record keeping on February 12, 2002, and all began by February 26, 2001. If a staff member spoke to the parent about an absence, they completed an absences record form detailing the reason for the absence, specific symptoms, important factors determining whether the child would be allowed to attend (these included symptoms or illnesses not permitted in center, the judgment that the child would be more comfortable cared for at home, concern about spread of illness in the center, and available staffing to care for an ill child), and specific recommendations made by child care staff regarding exclusion, seeking medical care, and obtaining antibiotics. If child care staff recommended exclusion, a visit to a health care professional, or obtaining an antibiotic, they were asked to indicate which symptom(s) prompted the recommendation.

An inappropriate exclusion was defined as a child care staff recommendation to exclude a child for an illness or symptom for which APHA/AAP Guidelines¹⁰ at the time of the study did not require exclusion. Of note, the updated (2002) Guidelines favor exclusion for diarrhea in diapered children, whereas the 1992 Guidelines recommended exclusion only for diarrhea that could not be contained by a diaper. An inappropriate recommendation to obtain an antibiotic was defined as a child care staff recommendation to obtain an antibiotic for an illness or symptom for which current CDC²⁶ do not recommend antibiotic therapy.

Statistical Analyses

We report the percentage of times that child care staff recommended or required exclusion, health care provider evaluation, or antibiotics, among the number of illness/absences discussed with parents (N = 538). The same denominator was used to calculate the percent of inappropriate exclusions and recommendations to obtain an antibiotic. All statistical analyses were performed using SAS version 8.2 (SAS Institute, Cary, NC).

RESULTS

Of the original 80 centers selected, 43 (68%) agreed to participate, 17 were not eligible, and 20 refused. Of 37

centers that were ineligible or refused, 29 (78%) provided basic information about their center. There were no significant differences between centers that did and did not participate with respect to community income level below the statewide average (53.5% vs 46.5%), the number of children enrolled in the center (median 21–40 children for both groups), or the director's years of experience in child care (median >10 years for both groups). Eighty-eight directors and lead teachers out of 129 (68%) in the 43 centers completed surveys. Eight hundred forty-two daily absences records and 1110 accompanying absence diary forms (one for each absent child) were completed during the 6-week period of follow-up in 29 of 43 (67%) centers. The remaining 14 centers found the daily record keeping too time consuming and did not complete this part of the study. There were no significant differences among centers that completed the absences forms and those that did not with respect to median community household income level below the median (53.3% vs 53.9%), number of children enrolled in the center (median 21–40 children both groups), or the director's years of experience in child care (median >10 years both groups).

Characteristics of the 43 centers and their staff are presented in Table 1. Most (71%) reported that the Massachusetts DPH *Health and Safety in Childcare* served as the basis for their guidelines; only 5% reported that their policies were based on APHA/AAP guidelines. The center's health care consultant was a nurse in 61% of centers, a physician in 34%, and another health care professional in 5%.

Child care staff knowledge of infectious illnesses and indications for antibiotics is presented in Table 2. Eighty percent believed that antibiotics are indicated for bronchitis and green rhinorrhea in children. In addition, 27% believed that colds and flu illnesses get better faster with antibiotics and 25% believed antibiotics are helpful for treating viral infections. Almost all (95%) felt that the center's health care consultant and the state's help line were helpful.

On average, 17% of children were absent from child care each day. For 538 (82.2%) absences due to illness, the reasons were discussed with a staff member. For children for whom exclusion was recommended, child care staff cited the following as either very important or important: 1) child would be more comfortable cared for at home (97%), 2) concern about spread of illness in the center (85%), 3) insufficient staff to care for an ill child (65%), and 4) symptom or illness was not permitted in center (81%). The percentage of times that child care staff required exclusion, health care provider evaluation, or antibiotics before returning, is presented in the Figure.

The symptoms or illnesses that prompted staff to require exclusion, recommend health care provider evaluation, or recommend obtaining an antibiotic are presented in Table 3. The top portion of the table reports the 45 cases, representing 9 symptoms/illnesses, for which staff required exclusion but the APHA/AAP Guidelines¹⁰ at the time of data collection did not require exclusion. Of 538 absences due to illness that child care staff discussed with

Table 1. Characteristics of 43 Participating Massachusetts Child Care Centers

Characteristic	Number Responding/ Total Number Respondents (%)*
Type of center	
Family child care center (residential)†	3/38 (7.9)
Nonresidential	35/38 (92.1)
Center receives federal or state funding	24/41 (58.5)
Average number of children in attendance per day	
6–12	2/37 (5.4)
13–20	10/37 (27.0)
21–40	18/37 (48.6)
41–60	4/37 (10.8)
61–80	3/37 (8.1)
Lead teachers' average years of experience in child care	
<3	4/44 (9.1)
3–5	8/44 (18.2)
6–10	9/44 (20.5)
>10	23/44 (52.3)
Director's average years as a child care director	
<3	9/29 (31.0)
3–5	7/29 (24.1)
5–10	3/29 (10.3)
>10	10/29 (34.5)
Center's health care provider is	
Physician	13/38 (34.2)
Nurse	23/38 (60.5)
Other	2/38 (5.3)
Center has written rules for exclusion of ill children	38/38 (100)
Rules for exclusion of ill children based on Massachusetts Department of Public Health's <i>Health and Safety in Childcare</i>	27/38 (71.1)
Developed de novo to meet needs of the center	3/38 (7.9)
Not sure	3/38 (7.9)
Guidelines from another child care center	2/38 (5.3)
The APHA and AAP <i>Guidelines for Out-of-Home Child Care Programs</i>	2/38 (5.3)
Guidelines used for all centers in a national or state chain of centers	1/38 (2.6)

*Denominator for staff experience based on lead teachers that responded (more than 1 per center in some cases), denominator for director experience based only on directors that responded, other variables based on director's response and if unavailable, response of lead teacher(s).

† Located in an individual's home.

parents, there were 45 inappropriate exclusions (8.4% of illnesses discussed), 91 appropriate exclusions (16.9% of illnesses discussed), and 402 cases (74.7%) in which no recommendation for exclusion was made. Of the 136 required exclusions, 45, or 33.1%, were inappropriate. The majority (28/45) of inappropriate exclusions were for vomiting or diarrhea. In only 1 case did a staff member inappropriately recommend obtaining an antibiotic before returning to child care.

DISCUSSION

This is the first study to prospectively examine the appropriateness of child care staff actions and recommen-

Table 2. Staff Knowledge Regarding Infections and Antibiotic Indications in 43 Massachusetts Child Care Centers

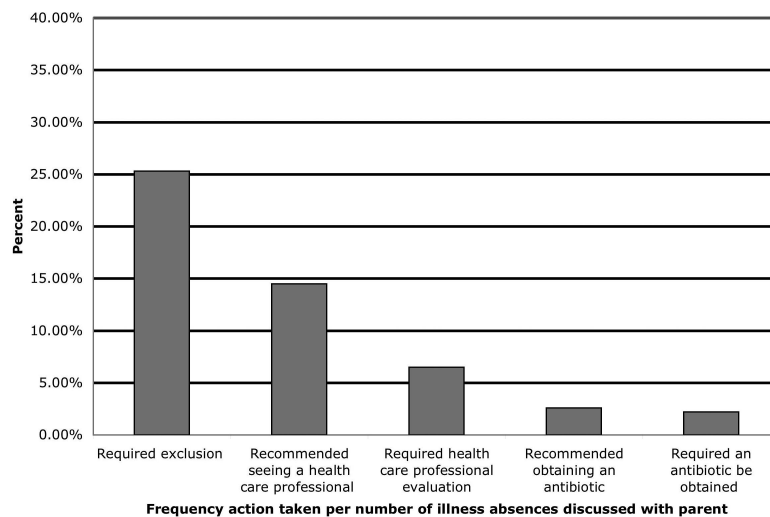
Question	Correct Response	% Correct/Total (% Correct)
1. Are most cold, cough, and flu illnesses caused by bacteria or viruses?	Viruses	66/88 (75.0)
2. Do most cold, cough, and flu illnesses get better faster with antibiotics?	No	62/85 (72.9)
3. Are antibiotics helpful for treating bacterial infections, viral infections, or both?	Bacterial	65/87 (74.7)
How often are antibiotics useful for		
4. Sore throat	Sometimes/never/almost never	71/85 (83.5)
5. Clear, runny nose	Never/almost never	85/87 (97.7)
6. Green, runny nose	Never/almost never	17/87 (19.5)
7. Ear infections	Always/almost always/sometimes	87/87 (100)
8. Fluid in middle ear without infection	Never/almost never	70/85 (82.4)
9. Strep throat	Always/almost always	84/86 (97.7)
10. Wet or loose cough	Never/almost never	77/86 (89.5)
11. Bronchitis	Never/almost never	17/87 (19.5)

dations for children with specific illnesses and symptoms. Child care staff had significant knowledge gaps with respect to etiology of infectious diseases and antibiotic indications, similar to those found among parents.^{9,27,29,30} In particular, the misconception that antibiotics are useful for bronchitis may reflect staff's experience with antibiotic prescribing for adults. Despite this lack of knowledge, the number of recommendations to obtain an antibiotic was low (14 of 538), and only 1 of these was for a clearly inappropriate indication.

Although the overall number of inappropriate exclusions was low, among the 136 instances in which child care staff required exclusion, 45, or 33%, were inappropriate, according to guidelines available during the study period. The most common inappropriate exclusions were for diarrhea contained by a diaper/toilet and vomiting less than twice in 24 hours, which each represented approximately 10% of all required exclusions. Of note, the revised APHA/AAP Guidelines¹¹ recommend exclusion for diarrhea in children who do not use the toilet. Thus, the

number of inappropriate exclusions based on revised APHA/AAP Guidelines would be lower. Furthermore, though child care staff reported requiring exclusion for these symptoms specifically, it is possible that the exclusion related to the belief that a child with these symptoms would be more comfortably cared for at home. Both the original and revised APHA/AAP guidelines include under recommended exclusion an illness that "prevents the child from participating comfortably in facility activities or results in greater care need than the child care staff can provide. . . ." In fact, in 97% of exclusions, staff judgments that the child would be more comfortable cared for at home was reported as a very important factor in their decision to exclude.

It can be argued that any recommendation by child care staff without medical training is inappropriate and might lead to pressure from parents during a clinical encounter. However, the overall number of recommendations to obtain an antibiotic was extremely low. This suggests that physician-reported pressure to prescribe antibiotics for



Frequency of child care staff required/recommended exclusion, health care provider evaluation, and antibiotics per number of absences due to illness discussed with parent (N = 538).

Table 3. Exclusions, Referrals, and Antibiotic Recommendations for Specific Symptom/Illnesses in 29 Participating Massachusetts Child Care Centers

Specific Symptom or Illness	Number of Required Exclusions for Illness/Symptom (%*)	Number Times Recommended Seeing Health Professional for Illness/Symptom (%†)	Number Times Recommended Obtaining an Antibiotic for Illness/Symptom (%‡)
All symptoms/illnesses	136 (100)	78 (100)	14 (100)
Inappropriate			
Clear, runny nose	0 (0)	0 (0)	
Green, runny nose	1 (0.7)	1 (1.3)	0 (0)
Sore throat (not strep)	1 (0.7)	4 (5.1)	0 (0)
Fever < 101	7 (5.0)		1 (7.1)
Cough	1 (0.7)	3 (3.9)	0 (0)
Diarrhea contained by diaper/toilet	14 (10.3)	6 (7.7)	0 (0)
Vomiting <2× in 24 hours	14 (10.3)	1 (1.3)	0 (0)
Ear pain	1 (0.7)	5 (6.4)	0 (0)
Rash, nonspecific	6 (4.4)	5 (6.4)	0 (0)
Appropriate			
Fever ≥ 101	47 (34.6)	17 (21.8)	
Strep throat	1 (0.7)	8 (10.3)	2 (14.2)
Vomiting ≥2× in 24 hours	18 (13.2)	1 (1.3)	0 (0)
Diarrhea not contained by diaper/toilet	9 (6.6)	0 (0)	0 (0)
Conjunctivitis (pink eye)	7 (5.0)	4 (5.1)	4 (28.6)
Impetigo	1 (0.7)	1 (1.3)	0 (0)
Difficulty breathing	2 (1.4)	1 (1.3)	0 (0)
Croup	1 (0.7)	1 (1.3)	0 (0)
Asthma	1 (0.7)	2 (2.6)	
Other§	4 (2.9)	18 (23.0)	7 (50.0)

*Total times exclusion required for specific illness/symptom divided by total times exclusion required for any illness/symptom.

†Total times recommended seeing a health professional for specific illness/symptom divided by total times recommended seeing a health professional for any illness/symptom.

‡Total times recommended obtaining an antibiotic for specific illness/symptom divided by total times recommended obtaining an antibiotic for any illness/symptom.

§More than one symptom was listed and, of these, the symptom that prompted the action was not listed. These are listed under “appropriate” because at least 1 of the symptoms listed was an appropriate exclusion, health care professional referral, or recommendation to obtain an antibiotic.

children in child care^{18,19} may be more related to parental misconceptions about antibiotic indications and a desire to expedite return to child care and work than to specific requirements imposed by child care center staff. It should also be noted that the most common reasons for inappropriate exclusions were for gastrointestinal illnesses rather than respiratory tract infections. It is unlikely that inappropriate exclusions for gastrointestinal illnesses would contribute significantly to antibiotic overuse.

There are several limitations to this study. First, we analyzed staff self reports of interactions with parents. It is possible that child care staff reported what they believed to be correct responses, rather than what they told parents, or that they gave parents more subtle cues to suggest a child should remain at home. In addition, these data only represent absences that were discussed with child care staff. Thus, in centers with a culture of overexcluding children, parents may expect exclusion and not even call to discuss what should be done. Second, these Massachusetts centers may not be representative of those in other states. Third, child care directors who participated may differ from those who refused or who did not follow through with data collection. Based on the demographic data we collected, however, there were no significant dif-

ferences between centers that agreed and those that did not agree to participate. In addition, 13 centers did not complete the daily absences and diary forms after agreeing to do so and receiving study materials. Again, there were no differences between centers that completed this part of the study and those that did not. If present, these two biases would likely have caused underestimation of the number of inappropriate exclusions and recommendations for antibiotics.

It is not surprising that most centers reported that their own policies were based on the guidelines distributed by the state, which licenses them, rather than national guidelines. Although centers do not need to strictly follow these recommended guidelines for licensure, they may feel safer modeling their policies on local sources. However, we suggest that centers base such policies on the APHA/AAP guidelines, as these provide evidence-based illness and symptom-specific recommendations regarding the need for exclusion. Use of the APHA/AAP Guidelines would also provide more uniform policies in centers nationwide. The recent posting of the revised APHA/AAP guidelines on the Internet¹¹ may make them much more accessible.

In conclusion, this study reinforces the need to continue to improve knowledge regarding infectious illness and ap-

appropriate exclusion policies among child care professionals. It also highlights that the exclusion of children from child care is based not only on the physical health of the child and communicability to others, but is strongly influenced by whether child care staff feel a child can participate in the program without additional staff. These data also suggest, however, that parents make the vast majority of the decisions surrounding exclusion of children from child care independently. In short, the commonly held beliefs that inappropriate exclusions and recommendations to obtain antibiotics by child care staff are substantial contributors to work days lost and unnecessary antibiotics consumed,^{18,19} respectively, are not supported by these data. Rather than viewing child care staff as major contributors to inappropriate parental demand for antibiotics, we should view these professionals as potential partners in educating families about the treatment of common infections and the need for judicious antibiotic use.

REFERENCES

1. United States Census Bureau. *Who's minding the kids? Child care arrangements: spring 1999*. Available at: <http://www.census.gov/population/www/socdemo/child/ppl-168.html>. Accessed April 25, 2004.
2. Wald ER, Dashefsky B, Byers C, et al. Frequency and severity of infections in day care. *J Pediatr*. 1988;112:540–546.
3. Fleming DW, Cochi SL, Hightower AW, Broome CV. Childhood upper respiratory tract infections: to what degree is incidence affected by day-care attendance? *Pediatrics*. 1987;79:55–60.
4. Hurwitz ES, Gunn WJ, Pinsky PF, Schonberger LB. Risk of respiratory illness associated with day-care attendance: a nationwide study. *Pediatrics*. 1991;87:62–69.
5. Strangert K. Respiratory illness in preschool children with different forms of day care. *Pediatrics*. 1976;57:191–196.
6. Louhiala PJ, Jaakkola N, Ruotsalainen R, Jaakkola JJ. Form of day care and respiratory infections among Finnish children. *Am J Public Health*. 1995;85(8 pt 1):1109–1112.
7. Gardner G, Frank AL, Taber LH. Effects of social and family factors on viral respiratory infection and illness in the first year of life. *J Epidemiol Commun Health*. 1984;38:42–48.
8. Carabin H, Gyorkos TW, Soto JC, et al. Estimation of direct and indirect costs because of common infections in toddlers attending day care centers. *Pediatrics*. 1999;103:556–564.
9. Friedman JF, Lee GM, Kleinman KP, Finkelstein JA. Acute care and antibiotic seeking for URIs for children in day care: parental knowledge and day care center policies. *Arch Pediatr Adolesc Med*. 2003;157:369–374.
10. American Public Health Association and American Academy of Pediatrics. *Caring for our Children—National Health and Safety Performance Standards: Guidelines for Out-of-Home Child Care Programs*. Elk Grove Village, Ill: 1992.
11. American Public Health Association and American Academy of Pediatrics. *Caring for our children-national health and safety performance standards: guidelines for out-of-home child care, 2nd Edition*. Elk Grove Village, IL: 2002. Available at: <http://nrc.uchsc.edu/CFOC/index.html>. Accessed April 25, 2004.
12. Massachusetts Department of Public Health. *Health and Safety in Child Care*. Massachusetts Department of Public Health; 1995.
13. Jones J, Reves R, Pickering L. Incidence of illnesses prompting physician visits among children in day care. *Am J Dis Child*. 1990;144:431.
14. Presser HB. Place of child care and medicated respiratory illness among young children. *J Marriage Fam*. 1988;50:995–1005.
15. Stahlberg MR. The influence of form of day care on occurrence of acute respiratory tract infections among young children. *Acta Paedr Scand*. 1980;282(suppl 1):1–87.
16. Reves R, Jones J. Antibiotic use and resistance patterns in day care centers. *Semin Pediatr Infect Dis*. 1990;1:212–221.
17. Hjern A, Haglund B, Rasmussen F, Rosen M. Socio-economic differences in daycare arrangements and use of medical care and antibiotics in Swedish preschool children. *Acta Paediatr*. 2000;89:1250–1256.
18. Barden L, Dowell S, Schwartz B, Lackey C. Current attitudes regarding use of antimicrobial agents: results from physicians' and parents' focus group discussions. *Clin Pediatr*. 1998;37:665–672.
19. Schwartz R, Freij B, Ziai M, Sheridan M. Antimicrobial prescribing for acute purulent rhinitis in children: a survey of pediatricians and family practitioners. *Pediatr Infect Dis J*. 1997;16:185–190.
20. Tenover F, Hughes J. The challenges of emerging infectious diseases. Development and spread of multiply-resistant bacterial pathogens. *JAMA*. 1996;275:300–304.
21. ASM. Report of the ASM Task Force on Antibiotic Resistance. Washington, DC: American Society for Microbiology; 1995.
22. Centers for Disease Control. *Addressing Emerging Infectious Disease Threats: A Prevention Strategy for the United States*. Atlanta, Ga: Centers for Disease Control; 1994.
23. Stephenson J. Icelandic researchers are showing the way to bring down rates of antibiotic-resistant bacteria. *JAMA*. 1996;275:175.
24. Seppala H, Klaukka T, Vuopio-Varkila J, et al. The effect of changes in the consumption of macrolide antibiotics on erythromycin resistance in Group A streptococci in Finland. *N Engl J Med*. 1997;337:441–446.
25. Fujita K, Muroto K, Yoshikawa M, Murai T. Decline of erythromycin resistance of Group A streptococci in Japan. *Pediatr Infect Dis J*. 1994;13:1075–1078.
26. Dowell S. Principles of judicious use of antimicrobial agents for pediatric upper respiratory tract infections. *Pediatrics*. 1998;101(suppl 1):163–184.
27. Belongia EA, Naimi TS, Gale CM, Besser RE. Antibiotic use and upper respiratory infections: a survey of knowledge, attitudes, and experience in Wisconsin and Minnesota. *Prev Med*. 2002;34:346–352.
28. Nunnally J. *Psychometric Theory*. New York: McGraw-Hill; 1967.
29. Bauchner H, Osganian S, Smith K, Triant R. Improving parent knowledge about antibiotics: a video intervention. *Pediatrics*. 2001;108:845–850.
30. Trepka MJ, Belongia EA, Chyou PH, et al. The effect of a community intervention trial on parental knowledge and awareness of antibiotic resistance and appropriate antibiotic use in children. *Pediatrics*. 2001;107:E6.