PERGAMON

Social Science & Medicine 54 (2002) 1153–1165

SOCIAL SCIENCE & MEDICINE

www.elsevier.com/locate/socscimed

Beliefs about and responses to childhood ear infections: a study of parents in Eastern North Carolina

Matthew D. Curry[a,*], Holly F. Mathews[b], Hal J. Daniel III[c], Jeffrey C. Johnson[d], Christopher J. Mansfield[e]

[a] *Center for Health Services Research and Development, Physicians Quadrangle, Building "N", East Carolina University, Greenville, NC 27858, USA*

[b] *Department of Anthropology, East Carolina University, USA*

[c] *Department of Biology and Department of Anthropology, East Carolina University, USA*

[d] *Department of Sociology and Institute for Coastal and Marine Resources, East Carolina University, USA*

[e] *Center for Health Services Research and Department of Family Medicine, East Carolina University, USA*

Abstract

Middle ear infection, also known as otitis media (OM), is a major public health problem among American children. Although clinical and epidemiological aspects of OM have been intensely studied, cultural factors that may be contributing to the problem of OM have received less attention. This article presents findings from an ethnographic study exploring beliefs about OM and responses to the illness among parents from eastern North Carolina. In-depth interviews were conducted with a convenience sample of nine mothers in order to learn more about parents' explanatory models of OM, the source of their beliefs, and how they respond to the illness. A survey instrument based on their statements was then constructed and administered to a convenience sample of 79 parents. The survey consisted of belief statements about OM, as well as questions pertaining to sources of beliefs, the home management of the disease, and the effects of the illness on families. A cultural consensus analysis of responses to belief statements indicates that parents shared a common model of OM. Beliefs about risks, symptoms, and causes of OM were similar to the current biomedical model of the illness, but their divergent beliefs about the diagnosis, prognosis and treatment of OM could lead to unnecessary use of health care services. Clinicians, family, and friends were reported to be important sources of information about OM. Parents also reported using similar home management strategies and care seeking behaviors to minimize the impact of the illness on their children and families. While these findings need to be replicated in studies with larger, more representative samples, this study suggest that ethnographic approaches may provide new insights into the cultural dimension of the problem of OM.

Keywords: Cultural beliefs; Cultural consensus analysis; Explanatory models; Medical anthropology; Otitis media; USA

Middle ear infection, known in medical terms as otitis media (OM), is a major public health problem among American children. Over the last three decades, office visits for OM increased almost 225% for children under the age of 2 (Schappert, 1992). By age three, more than 83% of children have suffered from OM at least once, and 46% have endured three or more episodes (Teele, Klein, Rosner & the Greater Boston Otitis Media Study Group, 1989). The rising prevalence of the disease has resulted in a dramatic increase in antibiotic consumption among children. Between 1980 and 1992, the annual antibiotic prescribing rate for children less than 15 rose from 627 to 928 per 1000. (McCaig & Hughes, 1995). Trends in surgery for OM have not been well documented, but an estimated 800,000 children underwent general anesthesia for the placement of

*Corresponding author. Tel.: 252-816-2953; fax: 252-816-3259.

E-mail address: currym@mail.ecu.edu (M.D. Curry).

0277-9536/02/$ - see front matter
PII: S0277-9536(01)00086-7

typanostomy tubes in 1988 (Bright et al., 1993). Health care costs associated with OM are in excess of $5 billion a year (Gates, 1996).

The causes of the current epidemic of childhood ear infections are not completely understood. Epidemiological factors, such as increased use of day care, and clinical factors, such as better screening, have been considered as explanations for the rising prevalence (see Bluestone & Klein, 1995), but cultural factors have likely played a role as well. Studies have found parents to be uninformed or misinformed about certain aspects of OM prevention and control. For example, Daly, Selvius, and Lindgren (1997) reported that mothers from Minnesota were unaware of important risk factors for OM, such as day care attendance. Other studies have found that parents often seek medical care for self-limiting childhood illnesses because they believe these conditions warrant antibiotic therapy (Barden, Dowell, Schwartz, & Lackey, 1998; Belongia & Schwartz, 1998; Palmer & Bauchner, 1997). The broader social context in which childhood illnesses occur may also influence care-seeking behaviors of parents. One qualitative investigation found that parents often seek medical attention for OM in order to avoid problems such as losing sleep, altering childcare arrangements, and missing work (Wuest & Stern, 1990). As Vuckovic (1999) points out, the time demands facing contemporary American families encourage parents to "buy time" by substituting medicines for personal attention when their children are ill. These studies point to a need for ethnographic research on cultural factors that may be contributing to the problem of otitis media.

This article presents findings from an ethnographic study that used explanatory model interviews, a survey, and cultural consensus analysis to explore beliefs about OM and responses to the illness among parents residing in eastern North Carolina. The paper begins with a brief overview of the current biomedical model of OM. We then report on parents' beliefs about the signs and symptoms, risk factors, causes, complications, and treatment of OM, as well on the sources for those beliefs. Next, we describe problems that parents face when their children have OM and the home management strategies and care-seeking patterns they use to minimize these problems. Finally, we present and discuss two schematic models that demonstrate how cultural beliefs and social factors may interact to influence parental responses to the illness.

Biomedical perspectives on otitis media

Otitis media is a general term referring to inflammation of the middle ear and covering a spectrum of diseases that usually occur in a continuum. Acute otitis media (AOM) is characterized by a sudden appearance of fluid in the middle ear with a rapid onset of signs and symptoms of infection. Viral upper respiratory tract infections (URI) often lead to bouts of AOM by producing inflammation of the eustachian tube, negative middle ear pressure, and accumulation of middle ear secretions (Buchman et al., 1995). These pathological changes predispose the middle ear to bacterial infection, the most common cause of AOM (Ruuskanen & Heikkinen, 1994).

OM is primarily a disease of infancy and early childhood, with the peak incidence occurring during the first 2 years of life (Teele et al., 1989; Paradise et al., 1997). Infants are particularly predisposed to OM because their eustachian tubes do not ventilate, drain, or protect the middle ear as effectively as the adult tube. However, most children outgrow the predisposition to OM as their cranio-facial structures mature (Daniel, 1999).

The clinical manifestations of AOM may include fever, runny nose, cough, earache, ear discharge, headache, ear pulling, irritability, and restless sleep (Kontiokari, Koivunen, Niemelä, Pokka, & Uhari, 1998). Otitis media with effusion (OME), the presence of fluid in the middle ear cavity, is usually asymptomatic. OME is often a sequealae of AOM, but allergic reactions to inhalants and food have also been implicated in the pathogenesis of OME (Hurst, 1990; Nsouli et al., 1994). Both types of OM may recur or persist for long periods of time. A transient conductive hearing loss is a common sequelae of all types of OM. In rare cases, AOM may lead to serious complications such as mastoiditis and meningitis (Neely, 1979). However, when left untreated, between 69% and 94% of children with AOM recover without complications (Rosenfeld, 1995).

Several environmental risk factors for OM have been identified. The seasonal incidence of OM is highest in the winter and lowest in the summer months, paralleling seasonal rates of URI (Henderson et al., 1982). Broad exposure to other children, whether in day care or the home (Paradise et al., 1997), is a major risk factor for OM (Hardy & Fowler, 1993; Marx, Osguthorpe, & Parsons, 1995). Breast-feeding protects children from OM, whereas formula feeding, especially in the prone position (Beauregard, 1971), increases the risk of OM (Aniansson et al., 1994; Duncan et al., 1993; Sassen, Brand, & Grote, 1994). Pacifier usage decreases the duration of breastfeeding (Barros et al., 1995) and increases the chances of OM (Niemelä, Uhari, & Möttönen, 1995) Finally, exposure to second hand smoke increases the risk of OME (Adair-Bischoff & Sauve, 1998; Etzel, Pattishall, Haley, Fletcher, & Henderson, 1992; Ey et al., 1995), as does contact with allergens (Hurst, 1990; Nsouli et al., 1994).

Although certain medical histories and physical examination findings are associated with OM, there is considerable variation in the diagnostic criteria used in

clinical practice and research (Hayden, 1981). Ear pain accompanied by rhinitis and coughing are the only symptoms that have been consistently associated with AOM (Heikkinen & Ruuskanen, 1995; Kontiokari et al., 1998; Niemelä et al., 1994; Uhari, Niemelä, & Hietala, 1995). Based on these symptoms alone, a correct diagnosis of OM can be expected in 55% of children younger than 2 and in 78% of older children (Uhari et al., 1995). Otoscopic exams provide additional information about the status of the middle ear. Normally, the tympanic membrane (TM) is gray, translucent, and slightly convex. In AOM, the TM may be red, opaque, bulging, while in OME the TM is usually cloudy, opaque, retracted (Bluestone & Klein, 1995). Redness of the eardrum, though often considered to be a reliable sign of AOM, may be caused by crying, a viral infection confined to the eardrum, and efforts to remove ear wax (Berman, 1995). Diagnostic certainty with otoscopy ranges from 58% in children younger than one to 73% in children less than 3 (Froom et al., 1990). When otoscopic exam findings are vague, physicians are more likely to prescribe antibiotics (González-Vallejo, Sorum, Stewart, Chessare, & Mumpower, 1997). For these reasons and others, OM is frequently over-diagnosed.

OM is also over-treated. The majority of children with AOM and OME are treated with antibiotics. Analgesics may also be prescribed for AOM, and children with OME are sometimes given decongestants–antihistamine combinations. Prophylactic antibiotics, tympanostomy tubes, and other surgical procedures are reserved for children with chronic and recurrent forms of the disease. However, evidence to support these practices is scant.

Justifications for treating OM aggressively include the desire to relieve the child's symptoms, concerns about the impact of OM on speech and language development, and fear of complications such as mastoiditis and meningitis. However, numerous randomized, placebo-controlled clinical trials and meta-analyses have failed to provide convincing evidence to support the use of most medical and surgical treatments for OM (Bodner, Browning, Chalmers, & Chalmers, 1991; Cantekin et al., 1983; Cantekin, McGuire, & Griffith, 1991; Damoiseaux, van Balen, Hoes, Verhiej, & de Melker, 2000; Del Mar, Glasziou, & Hayem, 1997; Diamant & Diamant, 1974; Froom et al., 1997; Kaleida et al., 1990; Paradise et al., 1999; Roger, van Balen, Hoes, Verheij, & de Melker, 2000; Rosenfeld & Post, 1992; Rosenfeld et al., 1994; Rovers et al., 2000; Stool et al., 1994; van Buchem, Dunk, & van't Hof, 1981; van Buchem, Peeters, & van't Hof, 1985; Williams, Chalmers, Stange, Chalmers, & Bowlin, 1993). It is also important to note that serious complications were rare or non-existent among children who were assigned to the placebo groups in clinical trials of antibiotics. Furthermore, there is no sound evidence supporting the claim that transient, conductive hearing losses associated with OM causes long-term delays in speech, language, or intellectual development (Gravel & Wallace, 1998; Paradise et al., 2000; Roberts et al., 1998; Teele, 1994; Teele et al., 1990). Recognizing the favorable natural history of the disease, physicians in the Netherlands prescribe local decongestants and analgesics for routine cases of AOM (van Buchem et al., 1981, 1985), an approach that provides symptomatic relief for the child and limits unnecessary antibiotic use.

Setting, participants, and methodologies

The research setting

This study was conducted between July 1998 and April of 1999 with parents residing in Pitt County, North Carolina. Located in the coastal plain of eastern North Carolina, the county is home to approximately 117,000 people, with 40% of the population living in rural areas. As compared to the rest of the nation, Pitt County residents have higher rates of poverty, lower levels of educational attainment, and a greater proportion of female-headed households. Fifteen percent of families in the county live below the federal poverty level, as compared to 10% nationwide. About 90% of Americans have at least a ninth grade education, but only 87% of Pitt County residents have received this level of education. Twenty-two percent of households in the region are headed by females, as compared to 16% of households nationwide (Center for Health Services Research and Development, 1997).

Pitt County is home to a regional tertiary care center that is affiliated with a local medical school. The county also has 40 practicing pediatricians and four pediatric clinics, as well as a county health department and numerous family practitioners who provide care to children (Center for Health Services Research and Development, 2000). The percentage of children in the county who lack health insurance or financial means to pay for care is unknown, but even those without insurance coverage often receive episodic care for acute illnesses at the medical school's pediatric clinic or the hospital emergency department. Thus, despite local social problems, most families are able to find a source of health care for their children.

Interview and survey methods

This study was conducted in two phases. In phase 1, the first author conducted in-depth, open-ended, explanatory model interviews (Kleinman, Eisenberg, & Good, 1978) with a convenience sample of nine mothers who came from different ethnic and socioeconomic groups and whose children had experienced either occasional or recurrent ear infections (Johnson, 1990).

The purpose of the interviews was to gain an understanding of local cultural beliefs about childhood ear infections and to learn more about how parents respond to illness. During the interview, mothers were asked general questions about their experiences with childhood ear infections and specific questions about predisposing and precipitating factors, causes, symptoms, complications, and treatment. Parents were also asked whom they turned to for information about ear infections, what types of problems ear infections caused for their families, and how they managed the disease in the home.

In phase 2, we conducted a survey with a larger sample of parents in order to determine whether the beliefs, behaviors, and experiences of key informants were more widely shared. The survey included 37 agree/disagree statements and one multiple-response question that were drawn from the interviews and designed for use in a cultural consensus analysis. We randomly ordered the belief statements and worded half in the positive (e.g. does) and half in the negative (e.g. does not) in order to minimize response bias (Johnson & Weller, 2001). The survey also included multiple-response items that asked parents how they learned about ear infections, what types of problems ear infections caused for their family, and how they managed the disease in the home. A letter accompanying each survey explained the purpose of the study and provided directions for those who wished to participate.

We reasoned that if the beliefs of our key informants were truly part of a larger cultural model of ear infections, then their beliefs should be shared by a larger sample of parents who were heterogeneous with respect to ethnicity, educational background, occupation, and socioeconomic status. Therefore, we purposely selected five sites for survey distribution in order to reach different segments of the population (Johnson, 1990). Survey sites included: a daycare center serving White and African-American working class parents, an ethnically diverse community college child-care class with many young, single mothers; the maternal/child health clinic of the county health department which serves a large low-income, minority population; a support group for stay-at-home mothers who were mostly white, married, and middle-to-upper class; and another day care center that served middle-to-upper-income parents with professional and advanced degrees.

Permission to distribute surveys was obtained from the director of each group. Staff at each of the survey sites worked with the investigators to develop a method of survey distribution that was appropriate for their setting. At the day-care centers, staff members distributed surveys to parents at the end of the day and asked that they be returned the following morning. Mothers in the community college class and support group were asked to complete and return the surveys at the end of one meeting period. Surveys were returned to the leader of each group and collected by the investigators at a later date. The first author and an assistant approached parents at the health department and asked them to fill out the survey while they waited for their clinic appointment. Surveys were collected upon completion. A total of 87 surveys were collected, and 79 completed surveys were analyzed. Eight were excluded because they were incomplete, filled out by someone other than a parent, or the respondent's youngest child was a teenager.

Data analysis

A standard statistical software package (SPSS, 1998) was used to analyze responses to survey items pertaining to family demographics, sources of information about OM, the effects of the disease on the family, and home management strategies. A cultural consensus analysis (Romney, Weller, & Batchelder, 1986) of responses to agree–disagree statements from the survey was used to determine if parents shared common beliefs about ear infections and if so, to further ascertain what beliefs made up the model. We used the software package ANTHROPAC (Borgotti, 1992) to perform the consensus analysis.

The basic assumption behind consensus analysis is that agreement among respondent indicates shared knowledge. In consensus analysis, respondents are asked whether they agree or disagree with statements pertaining to a particular cultural domain or topic. A matrix of agreement is then calculated based on the proportion of matching responses between each informant. Next, a factor analysis of minimum residuals is performed on the matrix in order to determine whether there is an underlying pattern of agreement among respondents that would indicate shared beliefs. A ratio of at least 3 to 1 between the eigenvalues for the first and second factors in the solution is generally accepted as evidence of shared beliefs (Chavez, Hubbell, McMullin, Martinez, & Mishra, 1995; Garro, 1988, 1996; Romney et al., 1986). Higher ratios indicate greater agreement among respondents across survey items. Two or more large factor solutions suggest that there are systematic differences in agreement among sub-groups of respondents or no consensus.

If an overall pattern of agreement among respondents exists, then the next step in the analysis is to examine individual loadings on the first factor. The individual loadings on the first factor reflect the fit between an informant's responses and the group consensus, with higher loadings reflecting greater similarity between an individual's beliefs and the group consensus. In order for the assumption of shared cultural knowledge to be met, all factor loadings should be positive and relatively large (Chavez et al., 1995; Garro, 1988, 1996; Romney et al., 1986; Weller et al., 1999).

Once loadings on the first factor are calculated, the "culturally correct" answer for each belief statement is derived from a Bayesian weighing of respondents' responses, with the greatest weight being given to the respondents with the highest loadings on the first factor. The proportion of parents who agree and disagree with each statement is also calculated. This measure indicates whether agreement about each statement is high (>90%), moderate (89–76%), or low (74–50%) (Johnson & Griffith, 1996).

Although consensus analysis was specifically designed for use in ethnographic studies with small numbers of respondents, the number of respondents needed for consensus analysis to produce valid results increases as the overall level of agreement among respondents decreases (Romney et al., 1986). In other words, the lower the level of agreement within the group, the greater the number of respondents required for the analysis to produce valid results. For a group of 29 respondents with modest level of agreement (average of factor loading = 0.5), consensus analysis can identify the culturally correct response to 99% of survey items with 95% confidence (Romney et al., 1986). With higher levels of agreement (average factor loading = 0.8), only 8 respondents would be needed to achieve the same results. The problem is that respondents must be selected before levels of agreement can be measured. Therefore, to ensure that valid results can be obtained if the level of agreement for a group is low, researchers who use this technique typically select samples of 25–40 respondents. (Chavez et al., 1995; Garro, 1988, 1996; Weller et al., 1999). In our analysis of responses from 79 parents, we were able to identify the culturally correct answer to all but one of our survey items with 99.9% confidence.

Findings

Description of survey respondents

The average survey respondent was 29 years old. The majority of respondents were married (62.0%); either white (51.9%) or African American (40.5%); had between 12 and 16 years of education (63.3%); and reported their average annual family income to be less than $49,000 a year (72.6%). Respondents had an average of two children, and 84.4% of all children were less than 4 years of age. The majority of parents reported having some form of medical insurance for their children (87.4%), and most children were cared for by pediatricians (79.7%). Home care (31.6%) and part-time day care (31.6%) were used more often than full-time day care outside the home (13.9%). When asked about the medical history of their children, 53.2% of parents reported having at least one child with frequent ear infections, but only 21.5% reported having a child who received tympanostomy tubes. Though not statistically representative of the county population, our diverse sample does include parents from different segments of the population.

Overall level of agreement

As Table 1 demonstrates, the consensus analysis indicates that parents shared a common set of beliefs about ear infections. The eigenvalue for the first factor solution was 4.78 times as large as the second solution and accounted for 75% of the variation in responses. All of the individual loadings for the first factor were positive and ranged from 0.03 to 0.77. The mean of individual loadings was 0.55, which means the average informant knew the culturally correct answer to 55% of the statements. These findings indicate that respondents shared a common set of beliefs about ear infections.

Parents' beliefs about ear infections

Responses to belief statements are summarized in Table 2. The "culturally correct" answer to each statement appears in bold. Survey respondents understood OM to be an infectious disease, and their beliefs about risk corresponded to current biomedical concepts. Parents agreed that bacteria cause most ear infections, although viruses were mentioned as another possible

Table 1
Results of the consensus analysis

Factor solution	Eigenvalue	Explained variation (%)	Ratios
1	25.17	75.0	4.78
2	5.27	15.7	1.70
3	3.10	9.2	
Summary measures of loadings on the first factor			
Mean	Standard Deviation	Range	
0.55	0.14	0.03–0.77	

Table 2
Parental responses to belief statements about ear infections, *n* (%)[a]

	Disagree	Agree
Most ear infections are caused by bacteria	21 (26.8)	**58 (73.4)**
Viruses can cause ear infections	11 (13.9)	**68 (86.1)**
Children who have colds rarely develop ear infections	**59 (74.4)**	20 (25.3)
Allergies do not cause fluid to build up in a child's ear	**60 (75.9)**	19 (24.1)
Children do not have more ear infections if their parents smoke cigarettes	**62 (78.5)**	17 (21.5)
Babies who go to day care have fewer ear infections than babies cared for at home	**75 (94.9)**	4 (5.1)
Breast fed babies have fewer ear infections than babies who are fed formula	24 (30.4)	**55 (69.6)**
Sucking a pacifier increases the chances of developing ear infections	**52 (65.8)**	27 (34.2)
Babies who nurse lying down have more ear infections than babies who nurse in an upright position	23 (29.1)	**56 (70.8)**
Ear infections do not run in families	28 (35.4)	**51 (64.6)**
Children tend to have fewer ear infections after the age of 7	10 (12.7)	**69 (87.3)**
Children are more likely to have ear infections after the age of 2	**68 (86.1)**	11 (13.9)
Babies are prone to ear infections because the tubes that drain their ears are short, wide, and flat	36 (45.6)	**43 (54.4)**
Children have less ear infections than babies because they have stronger immune systems	**44 (55.7)**	35 (44.3)
Boys do not have more ear infections than girls	**47 (59.5)**	32 (40.5)
Babies do not get ear infections when their teeth start coming in	**53 (67.1)**	26 (32.9)
If children go outside with wet hair, they may get an ear infection	**61 (77.2)**	18 (22.8)
Swimming in a pool does not cause ear infections[b]	40 (50.6)	39 (49.4)
Taking a baby outside during cold weather can cause an ear infection	**51 (64.6)**	28 (35.4)
Ear infections are more common in the summer than the winter	**72 (91.1)**	7 (8.9)
Ear infections are not the only cause of earaches	7 (8.9)	**72 (91.1)**
A child with a red ear drum most likely has an ear infection	28 (35.4)	**51 (64.6)**
The symptoms of ear infections usually do not start at night	**58 (64.6)**	21 (35.4)
By looking into the ear, doctors can tell what is causing an ear infection	**59 (74.7)**	20 (25.3)
It is easy for doctors to tell when babies have ear infections	27 (34.2)	**52 (65.8)**
Antibiotics do not kill the viruses that cause colds and ear infections	30 (38.0)	**49 (62.0)**
Children who are given antibiotics for ear infections get better much quicker than children who are not given antibiotics	17 (21.5)	**62 (78.5)**
Some antibiotics used to treat ear infections are more effective than others	10 (12.7)	**69 (87.3)**
Antibiotics are not an effective treatment for fluid build up in the ear	32 (40.5)	**47 (59.5)**
If children take antibiotics frequently, their immune systems may become resistant to the drugs	14 (17.7)	**65 (82.3)**
The germs that cause ear infections can become resistant to antibiotics	15 (19.0)	**64 (81.0)**
Ear tubes are very effective at preventing ear infections and fluid build up in the ear	26 (32.9)	**53 (67.1)**
Most ear infections do not get better on their own	24 (30.4)	**55 (69.6)**
Untreated ear infections usually spread to other parts of the body	**55 (69.6)**	24 (30.4)
A ruptured ear drum usually does not cause permanent deafness	37 (46.8)	**42 (53.2)**
Children who have frequent problems with ear infection or fluid build up in the ears have trouble hearing and learning to talk	27 (34.2)	**52 (65.8)**
Fluid build up in the ear does not cause learning problems	**49 (62.0)**	30 (38.0)
Which of these symptoms make you think your child has an ear infection?		
Fussiness, irritability, and crying	**67 (84.8)**	12 (15.2)
Fever	**66 (83.5)**	13 (16.5)
Ear pulling	**65 (82.3)**	14 (17.7)
Ear ache	**48 (60.7)**	31 (39.2)

[a] Culturally correct answer in bold.
[b] No consensus.

causative agent. Parents also felt allergies could cause OME. Parents identified day care attendance, exposure to second hand smoke, and upper respiratory infections as risks for OM. There was also agreement about the protective effect of breastfeeding and the risk associated with bottle-feeding in a supine position. Though research suggests that pacifier use may increase the risk of OM, parents did not hold that belief.

While parents were aware of certain epidemiological patterns associated with OM, their explanations for these factors diverged from the biomedical model. For example, parents agreed that infants have more ear infections than older children and that children tend to have fewer ear infections as they age. Yet more parents attributed ear infections in young children to teething than to the immaturity of their immune system and

eustachian tubes. Parents also reported that ear infections were more common in the winter than the summer. Some believed that exposing children to cold weather could cause an ear infection, but this belief was not widely shared.

In response to survey questions that asked which symptoms led them to believe that their child has an ear infection, parents reported behavioral changes such as fussiness, irritability, and crying most frequently, followed by symptoms such as fever, ear pulling, and earache. Parents also believed the symptoms of ear infection usually started at night. Interestingly, there was strong agreement that an earache could be due to other causes and weak agreement that earache was a sign of ear infection. Apparently, changes in a child's disposition coupled with night symptoms of fever, ear pulling, or earache led these parents to suspect an ear infection.

Parents perceived OM to be a potentially serious condition. They did not believe ear infections would resolve spontaneously. They also felt that children who suffer from frequent or persistent ear infections could have trouble hearing, talking, and learning. A small percentage of respondents thought untreated ear infections could spread to other parts of the body and that a ruptured ear drum could cause permanent deafness, but these beliefs were not shared by the majority of respondents.

Parents were confident in the ability of physicians to diagnose OM, and they perceived most treatments for OM to be effective. For example, parents believed that it is easy for doctors to tell when babies are suffering from the condition. They also felt that a red eardrum is a probable sign of ear infection. A small subset of parents thought that doctors could identify the cause of an ear infection by looking in the ear. With regard to treatments, parents believed that children with ear infections get better more quickly when they are given antibiotics, and there was a perception that some antibiotics were better at fighting ear infections than others. Some parents felt that antibiotics were effective for middle ear effusions and viral ear infections, but these beliefs were not widely shared. Finally, there was agreement that tympanostomy tubes aid in the prevention of ear infections.

Parents perceived antibiotics to be an effective treatment for ear infections, but they were aware of the potential for antibiotic resistance. While parents agreed that the germs causing ear infections could become resistant to antibiotics, they also believed a child's immune system could build up resistance to these drugs.

Sources of information about ear infections

Parents most frequently reported learning about OM from doctors and nurses (83.5%), a finding which likely explains why the parental beliefs about OM are biomedically oriented. Some parents learned about ear infections from magazines (26.6%) and television (3.9%), two sources that also could be disseminating biomedically oriented messages about the illness. Family (41.8%) and friends (31.6%) were another important source of information for parents, and some particular ethnomedical beliefs about ear infections (i.e. teething and cold weather can lead to ear infections) are probably transmitted through these sources.

Parents' responses to ear infections

Survey responses revealed several problems that parents face when their children have ear infections. Many parents worried that an ear infection would cause hearing problems (55.7%). Parents also reported that they lose sleep when their children are ill (41.8%) and that they were unsure how to make their children feel better (34.2%). Frequent trips to the doctor were mentioned as a problem by some (31.6%), as were the costs for the visits and prescription drugs (27.8%). Although schools and day care centers often send children home during bouts of illness, few parents reported this to be a problem (16.5%). Most could afford to miss work when their children were ill (84.8%), and few had problems finding alternative sources of childcare for their sick children (10.1%).

Home management strategies

When asked about the strategies they use to manage ear infections at home, most parents (91.1%). reported giving their children drugs that relieve pain and reduce fever, such as Tylenol (acetaminophen) and Motrin (ibuprofen). Few parents used warm or cold compresses over the ear (24.1%), elevation of the head (22.8%), or homemade eardrops (10.1%) to relieve pain. Herbal medicines or other natural remedies were used least frequently (6.3%).

Modeling parents' beliefs about ear infections

Parental beliefs about OM likely interact with social factors in ways that influence care-seeking behaviors. Fig. 1 presents a schematic model, to be read as a series of sequential hypotheses, about how the cultural beliefs of parents in this study interact with their anxieties and the circumstances of family life to guide treatment-seeking behavior.

Parents report that day care attendance, exposure to cigarette smoke, upper respiratory infection, formula feeding, and teething predispose children to ear infections. They believe that bacteria usually cause the disease, but they do recognize that viruses and allergies can play a role. Most parents feel that ear infections do

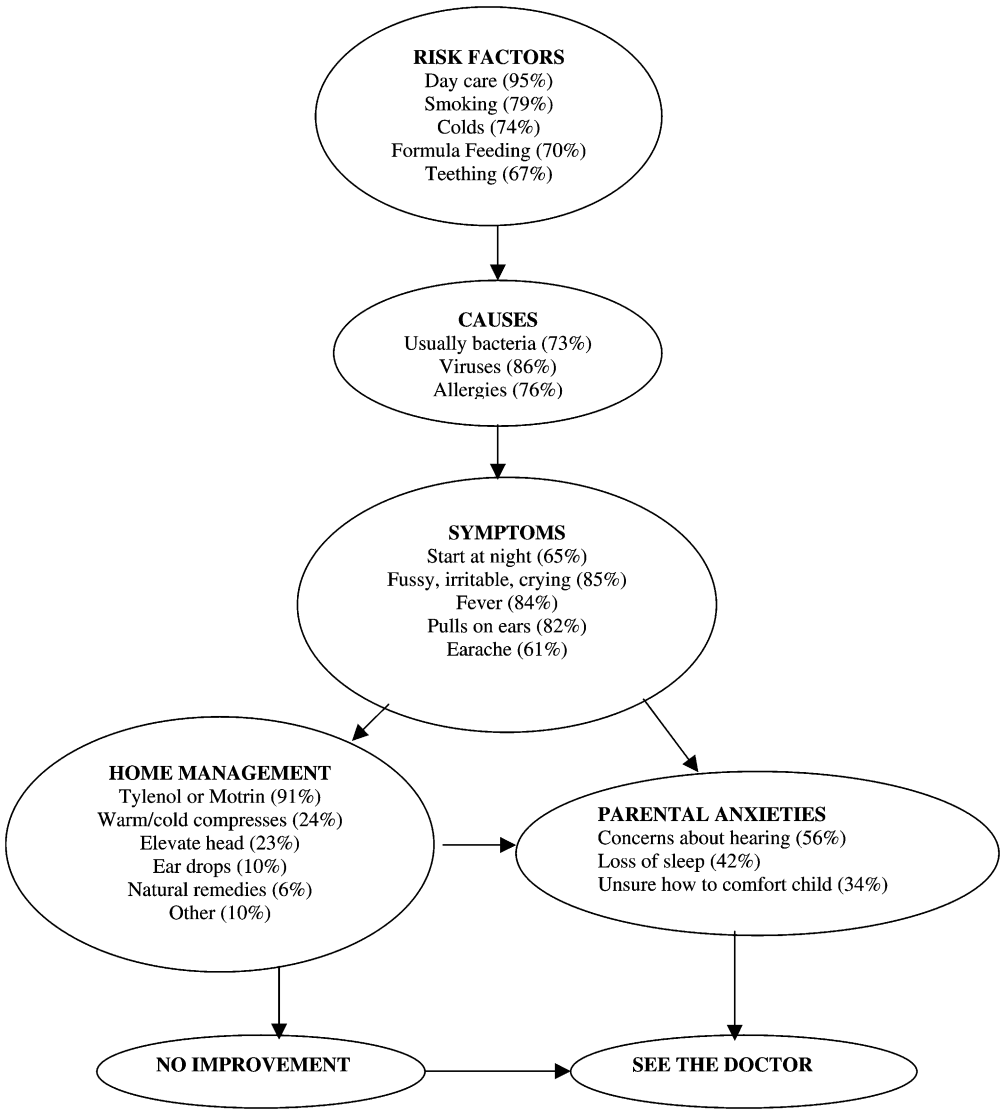

Fig. 1. Schematic of parents' beliefs about and responses to ear infections.

not get better on their own, and a small percentage fear that the disease will cause permanent deafness or spread to other parts of the body. Thus, parents may feel compelled to seek advice from a physician when they believe their child has OM.

Parents associate ear infections with vague symptoms such as irritability, fever, ear pain, and ear pulling, especially when the symptoms start at night. Though many of the symptoms do occur in children with OM (i.e., high sensitivity), they also occur with other illnesses (i.e., low specificity). Parents were also aware that ear infection was not the only cause of earaches. With no way to differentiate OM from other diseases, parents appropriately suspect ear infections as the cause for these symptoms.

Fig. 2 is a model of how parental beliefs influence their expectations during the biomedical encounter, their preferences for certain treatments, and their evaluation of treatment outcomes. The onset of symptoms is a source of parental anxiety. Many parents worry about how the disease will affect their child's hearing. Others perceive ear infections as troublesome because children with fever and earaches are often unable to sleep and difficult to soothe. Consequently, they use medications like Tylenol or Motrin to soothe their children. When symptoms persist despite home management, parents may seek the attention of a physician.

Parents take their children to the physician believing that the diagnosis of OM is a simple and straightforward

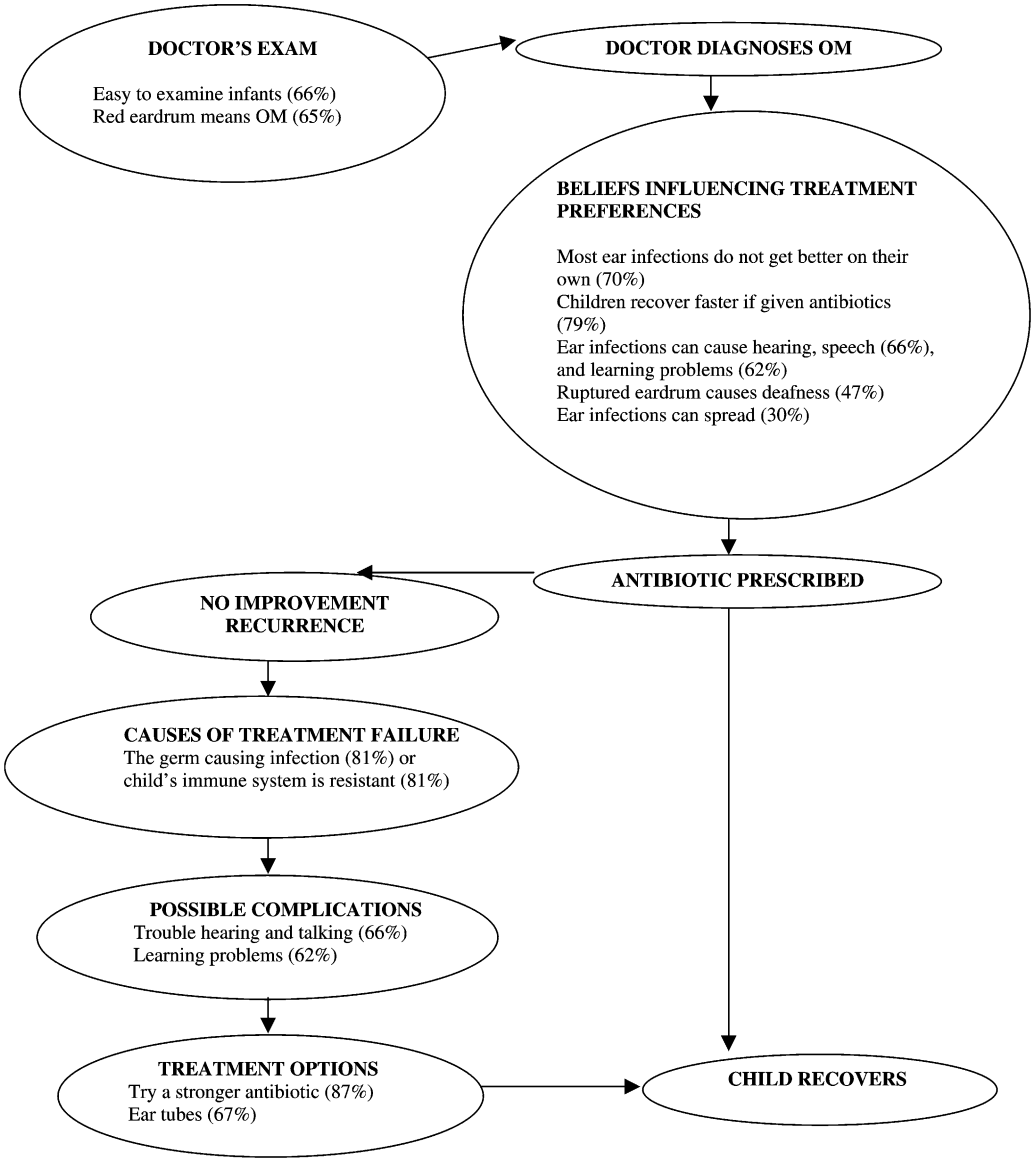

Fig. 2. Schematic of parent's response to the biomedical encounter.

process. For example, parents think that it is easy for doctors to tell when infants have ear infections, and some believe that physicians can tell what is causing an ear infection by simply looking in the child's ear. Like some physicians, parents believe that a red eardrum is a definite sign of OM. However, physicians often find infants difficult to examine because of the small diameter of their external ear canals, the horizontal position of their eardrums, and the child's reluctance to comply with the exam. Moreover, diagnostic criteria vary from physician to physician. Because parents are unaware of these diagnostic limitations, a diagnosis of OM likely serves to reinforce their own ideas about the symptoms of ear infections.

Once the diagnosis of OM is established, the parent and physician must agree on a treatment plan. Although physicians ultimately make therapeutic decisions, parental preferences are often taken into consideration. The majority of parents in this study believe that antibiotics speed recovery from OM. As previously discussed, fears about serious complications contribute to the perception that children with OM need antibiotics. Social factors may also influence treatment-seeking behaviors. For example, parents may seek antibiotics for OM because

their daycare center requires febrile children to stay at home (see Froom & Culpepper, 1991). Other parents simply seek symptomatic relief for their child.

After the office visit, parents must evaluate therapeutic outcomes and sometimes make additional decisions about treatment. When ear infections persist or recur despite antibiotic therapy, parents may suspect that either the germs causing the infection or the child's immune system has become resistant to antibiotics. They may take their child for a return visit and receive a second course of drugs. After trying different medications for recurrent ear infections, parents probably begin to perceive that some antibiotics are more effective (i.e. stronger, faster acting) than others. If antibiotics fail to provide a cure, physicians may recommend tympanostomy tubes, a treatment parents perceive to be effective for the prevention of recurrent and persistent infections. This aggressive measure may be deemed necessary because parents think that children who repeatedly suffer from ear problems have trouble hearing, speaking, and learning.

Conclusions

To our knowledge, this is the first ethnographic study to use qualitative and quantitative methods to study parents' beliefs about ear infections and their responses to the disease. One quantitative study has examined parental knowledge about risk factors for OM (Daly et al., 1997), but there have been no attempts to examine other beliefs about the illness or the source of parental beliefs. Likewise, one qualitative study found that ear infections cause a variety of problems for the families (Wuest & Stern, 1990), but these findings have not been replicated with larger groups of parents using quantitative techniques. This study demonstrates the importance of using multiple ethnographic methods to understand parental beliefs about OM and their responses to the illness.

The findings of this study suggest that parents share a common model of ear infections, and this model is consistent in many respects with the current biomedical model of the disease. For example, parents' beliefs about risk factors, causes, and symptoms of ear infections coincide with biomedical concepts. These findings are not surprising, as parents reported physicians and nurses an important source of information about OM. On the other hand, parents' beliefs about the diagnosis, prognosis, and treatment of OM do not correspond with recent findings published in the biomedical literature. General cultural notions about illness and personal experience no doubt contribute to some of the divergent beliefs of parents, like their explanations for epidemiological patterns associated with ear infections.

While parental beliefs do not completely correspond with current biomedical concepts published in academic medical journals, the beliefs they express may, in fact, be very similar to those of practicing physicians who provide care to their children. Studies indicate that physicians often fail to follow evidence-based guidelines for the diagnosis and treatment of OM (Christakis & Rivara, 1998; Flores, Lee, Bauchner, & Kastner, 2000), suggesting that community physicians have different beliefs and practices than academic physicians and scientists whose research and expert opinions appear in medical journals and clinical practice guidelines. Perhaps parents and community physicians share a common model of OM that differs in important ways from the model held by experts, particularly beliefs about the diagnosis and management of OM. Alternatively, the beliefs of community physicians and parents could be divergent because new medical knowledge does not reach them as rapidly as it reaches academic physicians and scientists. A comparative study examining the beliefs of parents, practicing pediatricians, academic pediatricians, otolaryngologists, and scientists could shed light on this issue.

Further research is needed to verify that the model of OM held by parents in this study is more widely shared. Our ability to generalize survey results to parents outside of the study area is limited because our sample of survey respondents was small and non-representative of the general population. However, given that OM is such a common childhood problem, we suspect that the beliefs identified in this study may be held by parents from similar demographic backgrounds who live in other geographic regions of the country. Of course, specific beliefs may vary from group to group, and the model probably does not apply to recent immigrants from other countries or to parents from other cultures.

Despite these limitations, our study shows that an understanding of parents' beliefs about ear infections and their responses to the disease can inform OM prevention and control efforts. For example, since the majority of parents are knowledgeable about major risk factors for OM, health care providers may want to spend time working with parents to develop strategies for prevention, watchful waiting, and home therapy (see Curry, Andrews, & Daniel, 1997). On the other hand, clinicians may need to address parents' concerns about complications of OM in order to reduce unnecessary antibiotic use. Clinicians may also need to elicit parental beliefs about drug resistance, as these ideas may determine parental preference for certain medications, their perceptions of drug efficacy, and the ways in which they administer antibiotics. These and other findings underscore the importance of understanding sociocultural factors that influence care-seeking behaviors. By addressing parental beliefs and behaviors, health care providers may be able to prevent and control the disease more effectively, thereby reducing the significant morbidity and costs associated with this condition.

Acknowledgements

The authors wish to thank all of the parents who participated in this study and the directors of each study site for their assistance. We would also like to thank two anonymous reviewers for their constructive comments on an earlier version of this manuscript.

References

Adair-Bischoff, C. E., & Sauve, R. S. (1998). Environmental tobacco smoke and middle ear disease in preschool-age children. *Archives of Pediatric and Adolescent Medicine*, *152*, 127–133.

Aniansson, G., Alm, B., Andersson, B., Håkansson, A. H., Larsson, P., Nylén, O., Peterson, H., Rignér, P., Svanborg, M., Sabharwal, H., & Svanborg, C. (1994). A prospective cohort study on breast-feeding and otitis media in Swedish infants. *Pediatric Infectious Disease Journal*, *13*, 183–188.

Barden, L. S., Dowell, S. F., Schwartz, B., & Lackey, C. (1998). Current attitudes regarding use of antimicrobial agents: Results form physicians' and parents' focus group discussions. *Clincial Pediatrics*, *37*, 665–671.

Barros, F. C., Victoria, C. G., Semer, T. C., Filho, S. T., Tomasi, E., & Weiderpass, E. (1995). Use of pacifier is associated with decreased breast-feeding duration. *Pediatrics*, *95*, 497–499.

Beauregard, W. G. (1971). Positioned otitis media. *Journal of Pediatrics*, *79*, 294–296.

Belongia, E. A., & Schwartz, B. (1998). Strategies for promoting judicious use of antibiotics by doctors and patients. *British Medical Journal*, *317*, 668–671.

Berman, S. (1995). Otitis media in children. *New England Journal of Medicine*, *332*, 1560–1565.

Bluestone, C. D., & Klein, J. O. (1995). *Otitis media in infants and children* (2nd ed.). Philadelphia, PA: W.B. Saunders.

Bodner, E. E., Browning, G. G., Chalmers, F. T., & Chalmers, T. C. (1991). Can meta-analysis help uncertainty in surgery for otitis media in children? *Journal of Laryngology and Otology*, *105*, 812–819.

Borgotti, S. (1992). *ANTHROPAC 4.0*. Columbia, SC: Analytic Technologies.

Bright, R. A., Moore, R. M., Jeng, L. L., Sharkness, C. M., Hamburger, S. E., & Hamilton, P. M. (1993). The prevalence of tympanostomy tubes in children in the United States, 1988. *American Journal of Public Health*, *83*, 1026–1028.

Buchman, C. A., Doyle, W. J., Skoner, D., Post, J. C., Alper, C. M., Seroky, J. T., Anderson, K., Preston, R. A., Hayden, F. G., Fireman, P., & Ehrlich, G. D. (1995). Influenza A virus-induced acute otitis media. *Journal of Infectious Diseases*, *172*, 1348–1351.

Cantekin, E. I., Mandel, E. M., Bluestone, C. D., Rockette, H. E., Stool, S. E., Fria, T. J., & Rogers, K. J. (1983). Lack of efficacy of a decogestant–antihistamine combination for otitis media with effusion ('secretory' otitis media) in children. Results of a double-blind, randomized trial. *New England Journal of Medicine*, *10*, 297–301.

Cantekin, E. I., McGuire, T. W., & Griffith, T. L. (1991). Antimicrobial therapy for otitis media with effusion ('secretory' otitis media). *Journal of the American Medical Association*, *266*, 3309–3317.

Center for Health Services Research and Development. (1997). *Eastern North Carolina Health Care Atlas: A resource for healthier communities*. Greenville, NC: East Carolina University.

Center for Health Services Research and Development. (2000). *Directory of physicians practicing in Eastern North Carolina*. Greenville, NC: East Carolina University.

Chavez, L. R., Hubbell, F. A., McMullin, J. M., Martinez, R. G., & Mishra, S. I. (1995). Understanding knowledge and attitudes about breast cancer. *Archives of Family Medicine*, *4*, 145–152.

Christakis, D. A., & Rivara, F. P. (1998). Pediatricians' awareness of and attitudes about four clinical practice guidelines. *Pediatrics*, *101*, 825–830.

Curry, M. D., Andrews, A. W., & Daniel, H. J. (1997). A community-based nursing approach to the prevention of otitis media. *Journal of Community Health Nursing*, *12*, 81–110.

Daly, K. A., Selvius, R. E., & Lindgren, B. (1997). Knowledge and attitudes about otitis media risk: Implications for prevention. *Pediatrics*, *100*, 931–936.

Damoiseaux, R. A. M. J., van Balen, F. A. M., Hoes, A. W., Verhiej, T. J. M., & de Melker, R. A. (2000). Primary care based randomized, double blind trial of amoxicillin versus placebo for acute otitis media in children under 2 years. *British Medical Journal*, *320*, 350–354.

Daniel, H. J. (1999). Otitis media: An evolutionary perspective. In W. Trevathan, E. O. Smith, & J. McKenna (Eds.), *Evolutionary medicine* (pp. 75–100). Oxford: Oxford University Press.

Del Mar, C., Glasziou, P., & Hayem, M. (1997). Are antibiotics indicated as an initial treatment for children with acute otitis media? *A meta-analysis*. *British Journal of Medicine*, *314*, 1526–1529.

Diamant, M., & Diamant, B. (1974). Abuse and timing of use of antibiotics in acute otitis media. *Archives of Otolaryngology*, *100*, 226–232.

Duncan, B., Ey, J., Holberg, C. J., Wright, A. L., Martinez, F. D., & Taussig, L. M. (1993). Exclusive breast-feeding for at least 4 months protects against otitis media. *Pediatrics*, *91*, 867–872.

Etzel, R. A., Pattishall, E. N., Haley, N. J., Fletcher, R. H., & Henderson, F. W. (1992). Passive smoking and middle ear effusion among children in day care. *Pediatrics*, *90*, 228–232.

Ey, J. L., Holberg, C. J., Aldous, M. B., Wright, A. L., Martinez, F. D., Taussig, L. M., & Group Health Medical Associates. (1995). Passive smoke exposure and otitis media in the first year of life. *Pediatrics*, *95*, 670–677.

Flores, G., Lee, M., Bauchner, H., & Kastner, B. (2000). Pediatricians' attitudes, beliefs, and practices regarding clinical practice guidelines: A national survey. *Pediatrics*, *105*, 496–501.

Froom, J., & Culpepper, L. (1991). Otitis media in day-care children. A report from the International Primary Care Network. *Journal of Family Practice*, *32*, 289–294.

Froom, J., Culpepper, L., Grob, P., Bartelds, A., Bowers, P., Bridges-Webb, C., Grava-Gubins, I., Green, L., Lion, J.,

Somaini, B., Stroobant, A., West, R., & Yodfat, Y. (1990). Diagnosis and antibiotic treatment of acute otitis media: Report from the International Primary Care Network. *British Medical Journal*, *300*, 582–586.

Froom, J., Culpepper, L., Jacobs, M., DeMelker, R. A., Green, L. A., van Buchem, L., Grob, P., & Heeren, T. (1997). Antimicrobials for acute otitis media? A review from the International Primary Care Network. *British Medical Journal*, *15*, 98–102.

Garro, L. C. (1988). Explaining high blood pressure: Variation in knowledge about illness. *American Ethnologist*, *15*, 98–119.

Garro, L. C. (1996). Intracultural variation in causal accounts of diabetes: A comparison of three Canadian Anishinaabe (Ojibiway) communities. *Culture, Medicine, and Psychiatry*, *20*, 381–420.

Gates, G. A. (1996). Cost-effectiveness considerations in otitis media treatment. *Otolaryngology-Head and Neck Surgery*, *114*, 525–530.

González-Vallejo, C., Sorum, P. C., Stewart, T. R., Chessare, J. B., & Mumpower, J. L. (1997). Physicians' diagnostic judgements and treatment decisions for acuteotitis media in children. *Medical Decision Making*, *18*, 149–162.

Gravel, J. S., & Wallace, I. F. (1998). Language, speech, and educational outcomes of otitis media. *Journal of Otolaryngology*, *27* (Suppl. 2), 17–25.

Hardy, A. M., & Fowler, M. G. (1993). Child care arrangements and repeated ear infections in young children. *American Journal of Public Health*, *83*, 1321–1325.

Hayden, G. F. (1981). Acute suppurative otitis media in children: Diversity of clinical diagnostic criteria. *Clinical Pediatrics*, *20*, 99–104.

Henderson, F. W., Collier, A. M., Sanyal, M. A., Watkins, J. M., Fairclough, D. L., Clyde, W. C., & Denny, F. W. (1982). A longitudinal study of respiratory viruses and bacteria in the etiology of acute otitis media with effusion. *New England Journal of Medicine*, *306*, 1377–1383.

Heikkinen, T., & Ruuskanen, O. (1995). Signs and symptoms predicting acute otitis media. *Archives of Pediatric and Adolescent Medicine*, *149*, 26–29.

Hurst, D. L. (1990). Allergy management of refractory serous otitis media. *Otolaryngology-Head and Neck Surgery*, *102*, 644–669.

Johnson, J. C. (1990). *Selecting ethnographic informants*. Newburry Park, CA: Sage.

Johnson, J. C., & Griffith, D. C. (1996). Pollution, food safety, and the distribution of knowledge. *Human Ecology*, *24*, 87–108.

Johnson, J. C., & Weller, S. C. (2001). In J. Gubrium, & J. Holstein (Eds.) Elicitation techniques in interviewing. *The handbook of interviewing research* (pp. 491–514). Newbury Park, CA: Sage, in press.

Kaleida, P. H., Casselbrant, M. L., Rockette, H. E., Paradise, J. L., Bluestone, C. D., Blatter, M. M., Reisinger, K. S., Wald, E. R., & Supance, J. S. (1990). Amoxicillin or myringotomy or both for acute otitis media: Results of a randomized clinical trial. *Pediatrics*, *87*, 466–474.

Kleinman, A., Eisenberg, L., & Good, B. (1978). Culture, illness, and care: Clinical lessons from anthropological and cross-cultural research. *Annals of Internal Medicine*, *88*, 251–258.

Kontiokari, T., Koivunen, P., Niemelä, M., Pokka, T., & Uhari, M. (1998). Symptoms of acute otitis media. *Pediatric Infectious Disease Journal*, *17*, 676–679.

Marx, J., Osguthorpe, J. D., & Parsons, G. (1995). Day care and the incidence of otitis media in young children. *Otolaryngology—Head and Neck Surgery*, *112*, 695–699.

McCaig, L. F., & Hughes, J. M. (1995). Trends in antimicrobial drug prescribing among office-based physicians in the United States. *Journal of the American Medical Association*, *273*, 214–219.

Neely, J. G. (1979). *Complications of suppurative otitis media: Part I Aural complications*. Washington, DC: American Academy of Otolaryngology.

Niemelä, M., Uhari, M., Jounio-Ervasti, K., Luotonen, J., Alho, O., & Vierimaa, E. (1994). Lack of specific symptomatology in children with acute otitis media. *Pediatric Infectious Disease Journal*, *13*, 765–768.

Niemelä, M., Uhari, M., & Möttönen, M. (1995). A pacifier increases the risk of recurrent acute otitis media in children in day care centers. *Pediatrics*, *96*, 884–888.

Nsouli, T. M., Nsouli, S. M., Linde, R. E., O'Mara, F., Scanlon, R. T., & Bellanti, J. A. (1994). Role of food allergy in serous otitis media. *Annals of Allergy*, *73*, 251–259.

Palmer, D. A., & Bauchner, H. (1997). Parents' and physicians' views on antibiotics. *Pediatrics*, *99*(6), E6.

Paradise, J. L., Bluestone, C. D., Colburn, D. K., Bernard, B. S., Smith, G. C., Rockette, H. E., & Kurs-Lasky, M. (1999). Adeniodectomy and adenotonsillectomy for recurrent acute otitis media: Parallel randomized clinical trial in children not previously treated with typanostomy tubes. *Journal of the American Medical Association*, *282*, 945–953.

Paradise, J. L., Dollaghan, C. A., Campbell, T. F., Feldman, H. M., Bernard, B. S., Colburn, D. K., Rockette, H. E., Janosky, J. E., Pitcairn, D. L., Sabo, D. L., Kurs-Lasky, M., & Smith, C. G. (2000). Language, speech sound production, and cognition in three-year-old children in relation to otitis media in their first three years. *Pediatrics*, *105*, 1119–1130.

Paradise, J. L., Rockette, H. E., Colborn, K., Bernard, B. S., Smith, C. G., Kurs-Lasky, M., & Janosky, J. E. (1997). Otitis media in 2253 Pittsburg-Area infants: Prevalence and risk factors during the first two years of life. *Pediatrics*, *99*, 318–333.

Roberts, J. E., Burchinal, M. R., Zeisel, S. A., Neebe, E. C., Hooper, S. R., Roush, J., Bryant, D., Mundy, M., & Henderson, F. W. (1998). Otitis media, the caregiving environment, and language and cognitive outcomes at 2 years. *Pediatrics*, *102*, 346–354.

Roger, A. M. J. D., van Balen, F. A. M., Hoes, A. W., Verheij, T. J. M., & de Melker, R. A. (2000). Primary care based randomized, double blind trial of amoxicillin versus placebo for acute otitis media in children under 2 years. *British Medical Journal*, *320*, 350–354.

Romney, A. K., Weller, S. C., & Batchelder, W. H. (1986). Culture as consensus: A theory of culture as information accuracy. *American Anthropologist*, *88*, 313–338.

Rosenfeld, R. M. (1995). What to expect from medical treatment of otitis media. *Pediatric Infectious Disease Journal*, *14*, 731–738.

Rosenfeld, R. M., & Post, C. (1992). Meta-analysis of antibiotics for the treatment of otitis media with effusion. *Otolaryngology—Head and Neck Surgery*, *106*, 378–386.

Rosenfeld, R. M., Vertress, J. E., Carr, J., Cipolle, R. J., Uden, D. L., Giebink, G. S., & Canafax, D. M. (1994). Clinical efficacy of antimicrobial drugs for acute otitis media: Meta-analysis of 5400 children from thirty-three randomized trials. *Journal of Pediatrics*, *124*, 355–367.

Rovers, M. M., Straatman, H., Ingels, K., van der Wilt, G., van den Broek, P. & Zeilhuis, G. A. (2000). The effects of ventilation tubes on language development in infants with otitis media with effusion: A Randomized Trial. *Pediatrics*, *106*(3), E42.

Ruuskanen, O., & Heikkinen, T. (1994). Otitis media: Etiology and diagnosis. *Pediatric Infectious Disease Journal*, *13* (Suppl. 1), 23–36.

Sassen, M. L., Brand, R., & Grote, J. J. (1994). Breast-feeding and acute otitis media. *American Journal of Otolaryngology*, *15*, 351–357.

Schappert, S. M. (1992). Office visits for otitis media: United States, 1975–1990. *Advance Data* no. 214. National Center for Health Statistics, Hyattsville, MD.

SPSS, Inc. (1998). *SPSS for Windows, Version 9.0.0*. Chigaco, IL: SPSS, Inc.

Stool, S. E., Berg, A. O., Berman, S., Carney, S. J., Cooley, J. R., Culpepper, L., et al. (1994). *Managing otitis media with effusion in young children. Quick reference guide for clinicians*. Publication No. 94-0623. Rockville, MD: Agency for Health Care Policy and Research, Public Health Services, U.S. Department of Health and Human Services.

Teele, D. W. (1994). Long-term sequelae of otitis media: Fact or fiction? *Pediatric Infectious Disease Journal*, *13*, 1069–1073.

Teele, D. W., Klein, J. O., Chase, C., Menyuk, P., Rosner, B. A., & the Greater Otitis Media Study Group. (1990). Otitis media in infancy and intellectual ability, school achievement, speech, and language at age 7 years. *Journal of Infectious Diseases*, *162*, 685–693.

Teele, D. W., Klein, J. O., Rosner B. A., & the Greater Boston Otitis Media Study Group. (1989). Epidemiology of otitis media during the first seven years of life in children in greater Boston: A prospective, cohort study. *Journal of Infectious Diseases*, *160*, 83–94.

Uhari, M., Niemelä, M., & Hietala, J. (1995). Prediction of acute otitis media with symptoms and signs. *Acta Pædiatrica*, *84*, 90–92.

van Buchem, F. L., Dunk, J. H., & van't Hof, M. A. (1981). Therapy of acute otitis media: Myringotomy, antibiotics, or neither? *Lancet*, *2*, 883–887.

van Buchem, F. L., Peeters, M. F., & van't Hof, M. A. (1985). Acute otitis media: A new treatment strategy. *British Medical Journal*, *290*, 1033–1037.

Vuckovic, N. (1999). Fast relief: Buying time with medications. *Medical Anthropology Quarterly*, *13*, 51–68.

Weller, S. C., Baer, R. D., Pachter, L. M., Trotter, R. T., Glazer, M., De Alba Garcia, J. E. G., & Klein, R. E. (1999). Latino beliefs about diabetes. *Diabetes Care*, *22*, 722–728.

Williams, R. L., Chalmers, T. C., Stange, K. C., Chalmers, F. T., & Bowlin, S. J. (1993). Use of antibiotics in preventing recurrent acute otitis media and in treating otitis media with effusion: A meta-analytic attempt to end the brouhaha. *Journal of the American Medical Association*, *270*, 1344–1351.

Wuest, J., & Stern, P. N. (1990). Childhood otitis media: The family's endless quest for relief. *Issues in Comprehensive Pediatric Nursing*, *13*, 25–39.