Editorial Manager(tm) for Nursing Research
Manuscript Draft

Manuscript Number: NRES-D-08-00174

Title: Effect of Intensive Education on Knowledge, Attitudes and Practices Regarding Upper Respiratory Infections Among Urban Latinos

Article Type: Original Article

Corresponding Author: Dr. Elaine L. Larson, PhD, RN, FAAN

Corresponding Author's Institution: Columbia University

First Author: Elaine L. Larson, PhD, RN, FAAN

Order of Authors: Elaine L. Larson, PhD, RN, FAAN; Yu-hui Ferng, MPA; Jennifer Wong McLoughlin, BSN; Shuang Wang, PhD; Stephen S Morse, PhD

Manuscript Region of Origin: UNITED STATES

Abstract: Background: Although upper respiratory infections (URI) take a major social and economic toll, little research has been conducted to assess the impact of educational interventions on knowledge, attitudes, and practices (KAP) of community members regarding prevention and treatment of URI, particularly in among recently immigrated urban Latinos who may not be reached by the 'mainstream' healthcare system.
Objectives: To assess the impact of a culturally-appropriate, home-based educational intervention on the KAP regarding prevention and treatment of URI among urban Latinos.
Methods: Using a pre-post test design, Spanish language educational materials available from sources such as The Centers for Disease Control and Prevention were adapted based on feedback from community focus groups, and provided to households during an in-person home visit every 2 months (generally 3-4 visits). Outcome data regarding KAP were collected in home-based interviews using an 85-item instrument adapted and pilot tested from three other validated

instruments. Non-parametric and multiple linear regression analyses were used to summarize data and identify predictors of knowledge scores.
Results: 422 households had complete data at baseline and 6-months. Knowledge and attitude scores were significantly improved and use of alcohol hand sanitizer and rates of influenza vaccine were significantly increased (all $p < .01$).
Discussion: While this home-based educational intervention was successful in improving KAP among newly immigrated Hispanics regarding prevention and treatment of URI, further research is needed to determine the cost effectiveness of such a person-intensive intervention, the long term outcomes, and whether less intensive interventions might be equally effective.

8/11/2008

To: Editor, *Nursing Research*
Re: Manuscript submission

Please find attached electronically a manuscript, Effect of Intensive Education on Knowledge, Attitudes and Practices Regarding Upper Respiratory Infections Among Urban Latinos, submitted for consideration for publication in *Nursing Research*. Thank you in advance for your consideration and for the time and resources required to conduct this review.

Sincerely,

Elaine Larson
Corresponding author

*** Title Page & Acknowledgements**

Effect of Intensive Education on Knowledge, Attitudes and Practices Regarding Upper Respiratory Infections Among Urban Latinos

Elaine L Larson, RN, PhD,
Associate Dean for Research; Professor of Therapeutic and Pharmaceutical Research
School of Nursing
Professor of Epidemiology, Mailman School of Public Health
Yu-hui Ferng, MPA, Project Manager, The Stuffy Trial
School of Nursing
Jennifer Wong McLoughlin, BSN, Data Manager, The Stuffy Trial
School of Nursing
Shuang Wang, PhD, Assistant Professor, Biostatistics
Mailman School of Public Health
Stephen S Morse, PhD, Professor of Clinical Epidemiology
Mailman School of Public Health

Columbia University
New York, NY

Corresponding Author:
Elaine Larson
Columbia University School of Nursing
630 W. 168th St.
New York, NY 10032
212-305-0723
Ell23@columbia.edu

Acknowledgements

Funded by grant 1 U01 CI000442-01, “Stopping URIs and Flu in the Family: The Stuffy Trial”. Thanks to our wonderful research coordinators: Maria Alvarez-Cid, Angela Barrett, Maria J. Gonzalez.

Abstract

Background: Although upper respiratory infections (URI) take a major social and economic toll, little research has been conducted to assess the impact of educational interventions on knowledge, attitudes, and practices (KAP) of community members regarding prevention and treatment of URI, particularly in among recently immigrated urban Latinos who may not be reached by the 'mainstream' healthcare system.

Objectives: To assess the impact of a culturally-appropriate, home-based educational intervention on the KAP regarding prevention and treatment of URI among urban Latinos.

Methods: Using a pre-post test design, Spanish language educational materials available from sources such as The Centers for Disease Control and Prevention were adapted based on feedback from community focus groups, and provided to households during an in-person home visit every 2 months (generally 3-4 visits). Outcome data regarding KAP were collected in home-based interviews using an 85-item instrument adapted and pilot tested from three other validated instruments. Non-parametric and multiple linear regression analyses were used to summarize data and identify predictors of knowledge scores.

Results: 422 households had complete data at baseline and 6-months. Knowledge and attitude scores were significantly improved and use of alcohol hand sanitizer and rates of influenza vaccine were significantly increased (all $p < .01$).

Discussion: While this home-based educational intervention was successful in improving KAP among newly immigrated Hispanics regarding prevention and treatment of URI, further research is needed to determine the cost effectiveness of such a person-intensive intervention, the long term outcomes, and whether less intensive interventions might be equally effective.

Key Words: Hispanic, community health, upper respiratory infections

Upper respiratory infections (URI) such as the common cold and influenza are ubiquitous around the world. The common cold is generally self-limited and is characterized by symptoms which last about a week. On average, adults have 2-4 colds and children have 6-10 colds each year (National Institute for Allergy and Infectious Diseases, 2008). Despite the generally benign nature of URI, there are considerable economic and socials costs due to lost time at school and work, reduced productivity, and increased and/or inappropriate use of healthcare resources and antibiotics. Annually, people in the United States have about 1 billion colds which account for approximately 25 million primary care visits, 1.6 million visits to the emergency department, and 42 million missed work or school days ((National Institute for Allergy and Infectious Diseases, 2008; Gonzales et al., 2006).

Primary interventions to prevent URI transmission include hygiene, education, and influenza vaccination. Although leading health indicators such as influenza and pneumococcal vaccination rates continue to lag behind for Latinos (Chowdhury, Balluz, Okoro, & Strine, 2006), longterm, culturally appropriate educational strategies regarding URI have been minimal among recently immigrated Latinos who may be outside the 'mainstream' health care system. The aim of this study was to assess the impact of a culturally-appropriate, home-based educational intervention on the knowledge, attitudes and practices (KAP) regarding prevention and treatment of URI among urban Latinos.

Background

Etiology and impact of common URI

The common cold is most frequently caused by one of >100 serotypes of rhinovirus; by age 2 years, >90% of children have antibodies against rhinovirus (Savolainen, Blomqvist, & Hovi, 2003). Despite their ubiquitous nature, rhinoviruses are not well described. More than 200 viruses cause the common cold, including, in addition to the rhinoviruses, coronaviruses, parainfluenza viruses, respiratory syncytial virus, enteroviruses, human metapneumovirus, and adenoviruses, but in about 25% of colds the causative agent is unknown. Further, not everyone exposed to rhinovirus becomes symptomatic; apparently 25% of infected persons do not develop symptoms (van Benten et al., 2003).

The specific pathogenic mechanisms of various agents causing URI vary and involve a complex interaction between the host and agent. In general, virus is deposited into the front of the nasal passages by contaminated fingers or by droplets from coughs

and sneezes. The virus is then transported by mucociliary action to the back of the nose and onto the adenoid area where it attaches to a receptor. After attachment, virus particles are produced and the infected cell ruptures, releasing newly made cold virus to infect other cells in the nose and start the process over again. The incubation period is 8-12 hours and the time to peak symptoms is 36-72 hours. Small doses of virus (1-30 particles) are sufficient to produce infection. Cold symptoms result from host inflammatory mediators which cause vasodilatation and increased vascular permeability, manifested as rhinorrhea, congestion, sneezing and coughing.

Influenza viruses are also a common cause of URI and a special concern. Influenza A and B viruses from the orthomyxovirus family are of importance in human disease. Influenza A is categorized by its two major antigenic determinants, hemagglutinin (H or HA with 16 subtypes, H1-H16) and neuraminidase (N or NA with 9 subtypes, N1-N9) transmembrane glycoproteins. Since 1977, influenza A (H1N1), influenza A (H3N2) and influenza B viruses have been in global circulation. In 2001, influenza A (H1N2) viruses that probably emerged after genetic reassortment between human A (H3N2) and A (H1N1) viruses began circulating widely. More recently, there is growing concern about the potential for a pandemic with avian influenza A (H5N1) because of animal-to-human and subsequent human-to-human transmission (Abdel-Ghafar et al., 2008). One of the predominant features of influenza viruses is their ability to mutate rapidly ('antigenic drift') or have genomic reassortment ('antigenic shift'), resulting in the need for frequent modifications of vaccines to keep pace with the rapidly changing antigenic characteristics of the virus. These two features of the influenza virus—the fast and unpredictable antigenic changes of immune targets and the ability to reassort and circulate among non-human reservoirs (birds and pigs, for example)— are responsible for much of the global spread and persistence of the infection (Lavenu et al., 2006).

One U.S. study of >1,000 children attending day care reported that at any given time, 23% had a URI (Carabin et al., 1999). URI have been shown to reduce alertness and slow reaction times at work, even during the incubation period and after clinical symptoms have resolved (Smith, Thomas, Kent, & Nicholson, 1998). In a survey of >3,000 healthy university students, 91% reported having at least one URI and 36.7% reported at least one influenza-like illness in the previous year. These illnesses resulted in 6,023 days in bed, 7,438 missed school or work days, and >45,000 days of illness. In addition, 22.2% made a health care visit, 15.8% took an antibiotic, and 74.1% reported

doing poorly on a test or assignment as a result of their illness (Nichol, D'Heilly, & Ehlinger, 2005). Lee, et.al.(Lee, Friedman, Ross-Degnan, Hibberd, & Goldmann, 2003) in a prospective cohort study of 208 families with at least one child <5 years old reported 0.45 viral URI/person-month, with a secondary transmission rate within the household of 0.63 illnesses/person-month. Among 383 children aged 2 months-12 years followed by 7 pediatricians in Toronto, 72% had symptoms of a URI within 6 months and medical attention was sought by 56% (Saunders, Tennis, Jacobson, Gans, & Dick, 2003). Influenza-like illnesses are estimated to account for 10-12% of all sickness-related work absence (O'Reilly & Stevens, 2002).

Colds and influenza are spread from person to person primarily through direct contact, airborne particles and aerosols (Kamps, Hoffmann, & Preiser, 2006), but only a few studies have focused on transmission in the home environment (Carrat et al., 2002; Lee et al., 2003). Unfortunately, because there are >100 different serotypes of rhinovirus, vaccines are not a feasible option against the common cold. For influenza, on the other hand, vaccination is the primary mode of prevention and is associated with significantly reduced influenza-related costs in healthy children and their unvaccinated family members. For example, the unvaccinated household members of children who were vaccinated against influenza had 42% fewer febrile illnesses ($p=0.04$), 70% fewer missed school days ($p=0.02$) and significantly fewer physician visits (p-0.007) compared with unvaccinated household members of control children (Hurwitz et al., 2000). Vaccination of ~25% of 1.5-18 year old children conferred protection to 8-18% of adults ≥35 years in several communities (Piedra et al., 2005). Despite the effectiveness of vaccination, Latinos are less likely than non-Hispanic whites to be vaccinated (Straits-Troster et al., 2006; Winston, Wortley, & Lees, 2006).

Education to prevent transmission of URI

In some studies, educational interventions have been effective at improving influenza vaccination rates. For parents of high risk children as well as Medicare recipients, the most significant predictors of higher immunization rates were awareness of vaccination and provider recommendation to become vaccinated (Daley et al., 2006; Larson et al., 2008; Winston et al., 2006). Although parental knowledge regarding URI and inappropriate antibiotic use is one important predictor of behavior (Friedman, Lee, Kleinman, & Finkelstein, 2003), interventions that have only included parental education have had limited impact on practices regarding viral URI (Finkelstein et al., 2001; Taylor, Kwan-Gett, & McMahon, 2005). Further, these interventions have been in primary care

settings such as pediatric clinics and therefore would miss individuals outside the 'mainstream' of the healthcare system. In the Latino community, families and cultural context have been shown to have an important impact on health behaviors and access to healthcare may be more challenging (Cespedes & Larson, 2006; Larson, 2007). Hence, more household-focused interventions are indicated. To date, there has been little effort to provide culturally appropriate information and education at the community/household level. Although it has been estimated that about one-third of transmission of influenza occurs within the home and that household-level interventions are likely to have a significant impact on reducing transmission (Ferguson et al., 2006), the majority of educational efforts have been through mass media or through care providers in clinics or private offices. Such efforts are likely to miss those who live in urban, crowded conditions, persons who may not be fluent in English and who are from cultures in which health information is more likely to be sought from family and friends, and recent immigrants who are more likely to be uninsured.

Methods

This was a pre-post test design to examine changes in KAP associated with the educational intervention described under "Intervention" below. Data were collected by bilingual research coordinators in home-based interviews. This study was one component of a larger randomized clinical trial funded by The Centers for Disease Control and Prevention, CDC, ("Stopping URIs and Flu in the Family: The Stuffy Trial", 1 U01 CI000442) which was conducted over a 20 month time period, November 2006 through June 2008.

Sample and Setting

The study was conducted in a predominantly Latino neighborhood of upper Manhattan which is densely populated with multi-generational households living primarily in multiple unit apartment buildings. Study inclusion criteria were households comprised of at least three persons with at least one child <5 years old, English or Spanish speaking, access to a telephone, willing to participate in study activities and have a member of the study team make bimonthly home visits, and with no immediate plans to move outside the metropolitan area. Sample size for the larger study, of this was a part, was calculated to estimate the number of households needed to find a difference in URI symptoms of ≥ 25% among the intervention groups. Neighborhood snowballing techniques were used to recruit households through churches, schools, Women, Infants and Children's (WIC) offices, word-of-mouth, clinics, and local community organizations.

The duration of household participation varied from 2-20 months because recruitment into the study continued throughout two influenza seasons.

Development of Culturally Sensitive Educational Materials

Because viral URI account for about three-quarters of antibiotics prescribed in the community, CDC in 1995 initiated the National Campaign for Appropriate Antibiotic Use in the Community which was named the GetSmart Program in 2003 (Centers for Disease Control and Prevention, 2003). One of the goals of that program was to decrease public demand for antibiotics for viral URI. As part of this program a series of health education and behavioral change materials were developed in English and Spanish to educate the public about causes, prevention and treatment of viral URI and to prevent inappropriate antibiotic use for such infections. Available materials include brochures, posters, question and answer fact sheets for parents regarding runny nose and otitis media, information for child care centers, and a viral URI 'prescription pad'. These materials have been field tested and widely disseminated through state health departments (Weissman & Besser, 2004), but no testing has been done to assess their impact among recently immigrated Latino populations. Therefore we convened several focus groups of Latino, African-American, and non-Latino white local residents to review and critique those materials and identify those which they perceived to be most relevant, acceptable and easy to read. We also reviewed the Spanish and English language materials with the principal and members of the sixth grade classes at a local elementary school to assess the acceptability of the reading level and presentation of content. Based on their feedback, a portfolio of informational materials was prepared, including brochures, coloring books, refrigerator magnets, checklists, and other informational fact sheets such as the location of clinics where free or low cost vaccine could be obtained. Since availability of Spanish language materials are limited, our team also identified and adapted materials from sources such as NIH and Department of Health from different states, but the content is similar to materials from CDC.

Procedure

The study was approved by the Columbia University Medical Center Institutional Review Board and an informant, usually the mother, in each household signed a written consent form. Research coordinators experienced in community-based health research with Spanish as their first language provided the standardized educational materials during home visits every two months. They also conducted in-home interviews of approximately an hour in length at the inception and end of the study period. Prior to the

inception of the study, the research coordinators underwent an extensive training program of several months in duration during which they were oriented to study protocols, educational materials, and interviewing techniques. Coordinators were required to demonstrate their competence through role playing, feedback and practice sessions, and were initially accompanied during home visits by the project manager to assure standardized and consistent delivery of the educational materials and participant interviews.

Each of the three research coordinators was assigned a group of approximately 150 households for which they had responsibility throughout the entire course of the study. Appointments for the home visits were made by each research coordinator at the convenience of the household informant. At the initial home visit, each household was provided with a packet of Spanish-language educational materials which included a table describing symptoms to differentiate between the common cold and influenza, a child's coloring book about germs, contact information regarding locations for influenza vaccination, prevention strategies such as hand hygiene and cough etiquette (e.g. 'cover your cough'), and a CDC pamphlet regarding appropriate use of antibiotics. At each subsequent bimonthly home visit the household received additional, varied educational materials on the same topics. The research coordinators reviewed all material with at least one household member, usually the mother, answered questions and reinforced information provided. Two additional products were provided to a random sub-sample of the households (alcohol-based hand sanitizers and/or facial masks), but all households received educational material every two months, which was the same for all participants but varied with each home visit. Ongoing quality monitoring included routine, random, unannounced visits in which the project manager accompanied the research coordinators on approximately 10% of home visits, daily inspection and 'cleaning' of data by the data manager, and ongoing reinforcement of procedures and trouble shooting during weekly research team meetings. The KAP Instrument was administered by interview to a single household informant twice—once during the first home visit and a second time after three visits (at six months).

KAP Instrument

The questionnaire was adapted from three other validated instruments used in previous community studies to assess knowledge and awareness of antibiotic resistance and appropriate antibiotic use (Trepka, Belongia, Chyou, Davis, & Schwartz, 2001), to assess knowledge and attitudes about URI (Lee et al., 2003), and from questions

generated by several focus groups of Latinas (Larson, Dilone, Garcia, & Smolowitz, 2006). The baseline questionnaire included 85 items to assess KAP regarding transmission, prevention and treatment of URI and prevention practices such as hand hygiene and influenza vaccination. Demographic information regarding household size and characteristics of household members (age, location of birth, ethnicity, education, occupation, general health, and hours spent outside the household) was obtained. As described previously (Larson et al., 2008), the questionnaire and consent forms were translated into Spanish by a professional, certified translator, back-translated to assure accuracy of the meaning of all words and phrases, and pilot-tested with Spanish-speaking members of the community for readability, time required to complete, and clarity.

Data analysis

Analyses were conducted at the household (rather than individual) level because responses were obtained for each household from a single informant, usually the mother. Data were entered initially by the research coordinators during household visits directly onto a portable tablet computer which was programmed by a data management contractor. A fulltime data manager reviewed and cleaned the data on an ongoing basis so that inconsistencies or data entry errors could be corrected in real time. Data were stored in Microsoft Access software and analyzed using SAS and SPSS statistical software packages. Initially, descriptive statistics were computed to summarize demographic characteristics and response percentages. Chi square tests were used to examine changes in proportions of correct KAP responses for each item between the baseline and final interview. As previously described (E. Larson et al., 2008), a composite score of knowledge ranging from 0 to 10 was compiled from 10 knowledge questions and the Wilcoxon Signed Rank Test was used to compare scores at baseline and final interview. Finally, a multiple linear regression analysis was conducted to identify potential sociodemographic predictors of the final composite knowledge score. Variables included in the model were baseline score, number of weeks in the study, educational level (less than high school, high school, some college, college graduate), birth location (inside or outside US) and time spent by the informant outside the home (<10 hours, 11-20 hours, 21-40 hours, or >40 hours/week). A two-sided p value of <.01 was considered to be statistically significant.

Results

A total of 422 households had two complete sets of interview data (baseline and post-intervention). All participants lived in multiple unit apartment buildings; mean number of household members was 5.1 (range: 3-12). Most informants (91.0%) were Latinos born outside the US, 67.8% had high school education or less, and the majority (62.5%) spent less than 20 hours/week outside the home. The majority of informants (99.9%) were the female heads of household. The mean duration of households in this component of the study was 26.8 weeks (range: 12-39 weeks).

As summarized in Table 1, following the intervention knowledge scores related to the causes of URI, modes of transmission, prevention and treatment were significantly improved. Significantly more respondents after the intervention, when compared with baseline, disagreed that URI were caused by bacteria (11.8 pre-intervention and 17.1% post-intervention, respectively, $p < .001$), the evil eye (92.0 and 95.0%, $p < .001$), or sudden fright (96.1 and 98.3%, $p < .001$), and agreed that colds and flu would get better without medicine (29.9 and 44.2%, $p < .001$). Significantly more respondents after the educational intervention agreed with strategies to prevent URI such as getting enough sleep, avoiding contact with person with a cold or objects handled by person with cold, and avoiding sharing utensils handled by person with cold or getting the influenza vaccine. Significantly fewer respondents reported that URI could be prevented with strategies such as taking antibiotics or cold medicine before getting sick, taking herbs, prayer or meditation, or wearing protective jewelry (manita de asabache). Similarly, respondents were significantly more likely to identify important modes of transmission such as touching, close contact, and kissing.

The mean composite knowledge scores (total maximum score=10) at baseline and end of study were 5.19 (+/-standard deviation 1.60) and 5.91 (+/-SD 1.71), Wilcoxon Signed Rank Test $p<0.001$). In the regression analysis, neither birth location nor time spent outside the home were significant predictors of knowledge scores ($p > .50$), but respondents with college degrees scored higher than other groups, controlling for baseline scores (mean score for college graduates, 6.39; mean score for other levels of education, 5.82, $p = .04$).

Attitudes regarding whether children should be kept from school or day care when a viral URI is present were also significantly improved. After the educational intervention, significantly more respondents reported that children should stay home if they had a viral throat infection (84.6 pre- and 90.8% post-intervention, respectively, $p < .001$) or influenza (85.9 and 92.9%, $p < .001$), and fewer responded that children should

stay home with asthma (28.1 and 19.4%, p <.001). Significantly fewer reported that antibiotics should be given to persons with viral infections such as colds, viral sore throats, and influenza, fewer felt that antibiotics should be given to persons with asthma. Significantly fewer reported after the intervention that they were worried about taking antibiotics because germs might develop resistance (59.7% pre- and 44.5% post-intervention, respectively, p<.001).

With regard to reported practices, significantly more participants following the intervention reported using alcohol hand sanitizers (1.4% baseline and 66.8% post-intervention, respectively, p<.001) and fewer reported using antibacterial soap after the intervention (45.3% versus 24.9%, p<.001). Significantly more also reported that one or more members in their household had received influenza vaccination following the intervention (63.7% at baseline versus 73.9% post-intervention, p<.001), as summarized in Table 2.

Discussion

The principal goal of this study was to determine whether a relatively simple educational intervention using only written materials and person-to-person communication would improve the knowledge, attitudes and practices of recently immigrated Hispanics with regard to prevention and treatment of URIs. While adequate knowledge is clearly not sufficient to effect behavior change, misconceptions can lead to inappropriate practices. In previous research, pervasive knowledge deficits and misconceptions regarding causes and treatment of colds and flu have been identified in this population(Cespedes & Larson, 2006; Larson et al., 2006); hence the next logical step was to identify effective strategies to deliver information to Hispanic households in which members were frequently uninsured and recently new to this culture.

While health-related educational materials are widely available through a variety of media, they are less accessible to minority populations with lower literacy levels and/or English as a second language. For example, Duerksen and colleagues (Duerksen et al., 2005) reported that magazines targeted to African-American and Hispanic women had less advertisement with positive health messages than did magazines targeted to White women. Hispanic women with less English proficiency have also been found to express less interest in obtaining health information (Tortolero-Luna et al., 2006). Further, recent Hispanic immigrants are less likely to seek information electronically via the internet (Beach et al., 2006; Fox & Livingston, 2007). Hispanic female homemakers who participated in focus groups in upper Manhattan

confirmed that they infrequently used computers (Larson et al., 2006). Hence, despite the fact that educationally sound informational materials are available electronically and in written form from health care settings such as primary care clinics, these materials may not be relevant or accessible to certain sub-groups within the community. The selection of a 'low-tech' intervention for this study was based on previous findings from focus groups that the most valued sources of health information among urban, recently immigrated Hispanics was word-of-mouth and trusted individuals such as family members (Cheong, 2007; Larson et al., 2006).

This home-based intervention using culturally-appropriate and pilot tested Spanish language educational materials delivered by trained research coordinators had a significant impact on participants' understanding of the causes and transmission and prevention strategies for viral URI. Additionally, their understanding that antibiotics are inappropriate for viral infections was improved. This is of particular relevance to this population because inappropriate use of antimicrobial agents in the community is associated with the emergence of resistance (E. Larson, 2007), and misunderstandings and misuse of antibiotics are more prevalent among recently immigrated Hispanics in this neighborhood (Larson & Grullon-Figueroa, 2004; Larson, Lin, & Gomez-Duarte, 2003).

It is paradoxical that fewer respondents expressed concern about antibiotic resistance after the intervention since the inappropriate use of antibiotics for viral URI and subsequent potential for the development of resistance was one point of emphasis in the educational materials. It could be that providing such information empowered participants to feel more effective or in control when making decisions about treatment for viral infections.

In addition to improvements in knowledge and attitudes in this study, participants' self-reported hand hygiene and vaccination practices improved. While there are major gaps in immunization rates between Hispanics and non-Hispanic Caucasians (Burnett, Genao, & Wong, 2005), the gaps have not been associated with unequal access or resistance to vaccination, but rather to a lower likelihood of seeking vaccination among Hispanics (Chowdhury et al., 2006; Hebert, Frick, Kane, & McBean, 2005). In a telephone survey of five US communities, respondents were significantly more likely to receive influenza vaccination when it was recommended by a health care provider (Relative risk = 1.31, 95% confidence intervals: 1.25-1.38) (Winston et al., 2006), and participants in this study at baseline indicated that an important factor in their decision to

get vaccinated was a recommendation from a health care professional (E. Larson et al., 2008). The increased vaccination rate associated with this intervention provides confirmatory evidence that, among Hispanics, such a recommendation may be an important strategy to increase vaccination rates.

Limitations

It was unfortunately not possible to confirm the accuracy of participant reports regarding hand hygiene and vaccination practices, and because the data were obtained by self-report there is a risk of social desirability bias. Attempts to minimize this bias included conducting the interviews in the comfortable environment of the participant's home and careful training of research coordinators to assure standardized administration of psychometrically sound and carefully tested interview questions. Households participated in the intervention for varying lengths of time. This was controlled in the multiple regression analysis, however.

Conclusions and Recommendations

Even when accurate information is provided, educational interventions have had mixed results on knowledge and behavior (Cheung, Finegan, Torok-Both, Donnelly-Warner, & Lujic, 2007; Gupta, Romney, Briggs, & Benker, 2007; Martinez & Eddy, 2005). While this home-based educational intervention was successful in improving KAP among newly immigrated Hispanics regarding prevention and treatment of URI, further research is needed to determine the cost effectiveness of such a person-intensive intervention, the long term outcomes, and whether less intensive interventions might be equally effective.

Abdel-Ghafar, A. N., Chotpitayasunondh, T., Gao, Z., Hayden, F. G., Nguyen, D. H., de Jong, M. D., et al. (2008). Update on avian influenza A (H5N1) virus infection in humans. *N Engl J Med, 358*(3), 261-273.

Beach, M. C., Gary, T. L., Price, E. G., Robinson, K., Gozu, A., Palacio, A., et al. (2006). Improving health care quality for racial/ethnic minorities: a systematic review of the best evidence regarding provider and organization interventions. *BMC Public Health, 6*, 104.

Burnett, M., Genao, I., & Wong, W. F. (2005). Race, culture, and trust: why should I take a shot if I'm not sick? *Ethn Dis, 15*(2 Suppl 3), S3-13-S13-16.

Carabin, H., Gyorkos, T. W., Soto, J. C., Penrod, J., Joseph, L., & Collet, J. P. (1999). Estimation of direct and indirect costs because of common infections in toddlers attending day care centers. *Pediatrics, 103*(3), 556-564.

Carrat, F., Sahler, C., Rogez, S., Leruez-Ville, M., Freymuth, F., Le Gales, C., et al. (2002). Influenza burden of illness: estimates from a national prospective survey of household contacts in France. *Arch Intern Med, 162*(16), 1842-1848.

Centers for Disease Control and Prevention. Get Smart: Know when antibiotics work campaign information Retrieved July 18, 2008, from http://www.cdc.gov/drugresistance/community/campaign_info.htm

Cespedes, A., & Larson, E. (2006). Knowledge, attitudes, and practices regarding antibiotic use among Latinos in the United States: Review and recommendations. *Am J Infect Control*.

Cheong, P. H. (2007). Health communication resources for uninsured and insured Hispanics. *Health Commun, 21*(2), 153-163.

Cheung, A., Finegan, B. A., Torok-Both, C., Donnelly-Warner, N., & Lujic, J. (2007). A patient information booklet about anesthesiology improves preoperative patient education. *Can J Anaesth, 54*(5), 355-360.

Chowdhury, P. P., Balluz, L., Okoro, C., & Strine, T. (2006). Leading health indicators: a comparison of Hispanics with non-Hispanic whites and non-Hispanic blacks, United States 2003. *Ethn Dis, 16*(2), 534-541.

Daley, M. F., Crane, L. A., Chandramouli, V., Beaty, B. L., Barrow, J., Allred, N., et al. (2006). Influenza among healthy young children: changes in parental attitudes and predictors of immunization during the 2003 to 2004 influenza season. *Pediatrics, 117*(2), e268-277.

Duerksen, S. C., Mikail, A., Tom, L., Patton, A., Lopez, J., Amador, X., et al. (2005). Health disparities and advertising content of women's magazines: a cross-sectional study. *BMC Public Health, 5*, 85.

Ferguson, N. M., Cummings, D. A., Fraser, C., Cajka, J. C., Cooley, P. C., & Burke, D. S. (2006). Strategies for mitigating an influenza pandemic. *Nature*.

Finkelstein, J. A., Davis, R. L., Dowell, S. F., Metlay, J. P., Soumerai, S. B., Rifas-Shiman, S. L., et al. (2001). Reducing antibiotic use in children: a randomized trial in 12 practices. *Pediatrics, 108*(1), 1-7.

Fox, S., & Livingston, G. (2007). *Hispanics with lower levels of education and English proficiency remain largely disconnected from the internet*. Washington DC: Pew Hispanic Center and Pew Internet Projecto. Document Number)

Friedman, J. F., Lee, G. M., Kleinman, K. P., & Finkelstein, J. A. (2003). Acute care and antibiotic seeking for upper respiratory tract infections for children in day care: parental knowledge and day care center policies. *Arch Pediatr Adolesc Med, 157*(4), 369-374.

Gonzales, R., Camargo, C. A., Jr., MacKenzie, T., Kersey, A. S., Maselli, J., Levin, S. K., et al. (2006). Antibiotic treatment of acute respiratory infections in acute care settings. *Acad Emerg Med, 13*(3), 288-294.

Gupta, K., Romney, D., Briggs, M., & Benker, K. (2007). Effects of a brief educational program on knowledge and willingness to accept treatment among patients with hepatitis C at inner-city hospitals. *J Community Health, 32*(4), 221-230.

Hebert, P. L., Frick, K. D., Kane, R. L., & McBean, A. M. (2005). The causes of racial and ethnic differences in influenza vaccination rates among elderly Medicare beneficiaries. *Health Serv Res, 40*(2), 517-537.

Hurwitz, E. S., Haber, M., Chang, A., Shope, T., Teo, S., Ginsberg, M., et al. (2000). Effectiveness of influenza vaccination of day care children in reducing influenza-related morbidity among household contacts. *Jama, 284*(13), 1677-1682.

Kamps, B., Hoffmann, C., & Preiser, W. (2006). *Influenza Report 2006*. Cologne: Flying Publisher.

Larson, E. (2007). Community factors in the development of antibiotic resistance. *Annu Rev Public Health, 28*, 435-447.

Larson, E., Ferng, Y. H., Wong, J., Alvarez-Cid, M., Barrett, A., Gonzalez, M. J., et al. (2008). Knowledge and misconceptions regarding upper respiratory infections

and influenza among urban Hispanic households: Need for targeted messaging. *J Immigr Minor Health*.

Larson, E., & Grullon-Figueroa, L. (2004). Availability of antibiotics without prescription in New York City. *J Urban Health, 81*(3), 498-504.

Larson, E., Lin, S. X., & Gomez-Duarte, C. (2003). Antibiotic use in Hispanic households, New York city. *Emerg Infect Dis, 9*(9), 1096-1102.

Larson, E. L., Dilone, J., Garcia, M., & Smolowitz, J. (2006). Factors which influence Latino community members to self-prescribe antibiotics. *Nurs Res, 55*(2), 94-102.

Lavenu, A., Leruez-Ville, M., Chaix, M. L., Boelle, P. Y., Rogez, S., Freymuth, F., et al. (2006). Detailed analysis of the genetic evolution of influenza virus during the course of an epidemic. *Epidemiol Infect, 134*(3), 514-520.

Lee, G. M., Friedman, J. F., Ross-Degnan, D., Hibberd, P. L., & Goldmann, D. A. (2003). Misconceptions about colds and predictors of health service utilization. *Pediatrics, 111*(2), 231-236.

Martinez, C. R., Jr., & Eddy, J. M. (2005). Effects of culturally adapted parent management training on Latino youth behavioral health outcomes. *J Consult Clin Psychol, 73*(5), 841-851.

National Institute for Allergy and Infectious Diseases. (2008). Common cold. Retrieved July 18 2-8, from http://www3.niaid.nih.gov/healthscience/healthtopics/colds/default.htm

Nichol, K. L., D'Heilly, S., & Ehlinger, E. (2005). Colds and influenza-like illnesses in university students: impact on health, academic and work performance, and health care use. *Clin Infect Dis, 40*(9), 1263-1270.

O'Reilly, F. W., & Stevens, A. B. (2002). Sickness absence due to influenza. *Occup Med (Lond), 52*(5), 265-269.

Piedra, P. A., Gaglani, M. J., Kozinetz, C. A., Herschler, G., Riggs, M., Griffith, M., et al. (2005). Herd immunity in adults against influenza-related illnesses with use of the trivalent-live attenuated influenza vaccine (CAIV-T) in children. *Vaccine, 23*(13), 1540-1548.

Saunders, N. R., Tennis, O., Jacobson, S., Gans, M., & Dick, P. T. (2003). Parents' responses to symptoms of respiratory tract infection in their children. *Cmaj, 168*(1), 25-30.

Savolainen, C., Blomqvist, S., & Hovi, T. (2003). Human rhinoviruses. *Paediatr Respir Rev, 4*(2), 91-98.

Smith, A., Thomas, M., Kent, J., & Nicholson, K. (1998). Effects of the common cold on mood and performance. *Psychoneuroendocrinology, 23*(7), 733-739.

Straits-Troster, K. A., Kahwati, L. C., Kinsinger, L. S., Orelien, J., Burdick, M. B., & Yevich, S. J. (2006). Racial/ethnic differences in influenza vaccination in the Veterans Affairs Healthcare System. *Am J Prev Med, 31*(5), 375-382.

Taylor, J. A., Kwan-Gett, T. S., & McMahon, E. M., Jr. (2005). Effectiveness of a parental educational intervention in reducing antibiotic use in children: a randomized controlled trial. *Pediatr Infect Dis J, 24*(6), 489-493.

Tortolero-Luna, G., Byrd, T., Groff, J. Y., Linares, A. C., Mullen, P. D., & Cantor, S. B. (2006). Relationship between English language use and preferences for involvement in medical care among Hispanic women. *J Womens Health (Larchmt), 15*(6), 774-785.

Trepka, M. J., Belongia, E. A., Chyou, P. H., Davis, J. P., & Schwartz, B. (2001). The effect of a community intervention trial on parental knowledge and awareness of antibiotic resistance and appropriate antibiotic use in children. *Pediatrics, 107*(1), E6.

van Benten, I., Koopman, L., Niesters, B., Hop, W., van Middelkoop, B., de Waal, L., et al. (2003). Predominance of rhinovirus in the nose of symptomatic and asymptomatic infants. *Pediatr Allergy Immunol, 14*(5), 363-370.

Weissman, J., & Besser, R. E. (2004). Promoting appropriate antibiotic use for pediatric patients: a social ecological framework. *Semin Pediatr Infect Dis, 15*(1), 41-51.

Winston, C. A., Wortley, P. M., & Lees, K. A. (2006). Factors associated with vaccination of medicare beneficiaries in five U.S. communities: Results from the racial and ethnic adult disparities in immunization initiative survey, 2003. *J Am Geriatr Soc, 54*(2), 303-310.

Table 1. Significant Pre-to-Post Study Changes in Knowledge and Attitudes Regarding URI and Influenza (all p<0.01), n=422 households

Item	Pre: %	Post: %
Causes of URI:		
Bacteria (Disagree)	11.8	17.1
Evil eye (mal de ojo, Disagree)	92.1	95.0
Susto (sudden fright, Disagree)	96.1	98.3
Most colds and flu get better without medicine (Agree)	29.9	44.2
Prevention (Item rated Important):		
Get enough sleep	81.0	89.2
Avoid contact with person with a cold	88.5	96.1
Avoid contact with objects handled by person with cold	28.0	85.5
Avoid sharing utensils handled by person with cold	80.2	90.9
Take antibiotics before getting sick	32.5	13.1
Give cold medicine before illness starts	34.9	17.8
Get flu vaccine	92.5	95.5
Take herbs	63.6	48.6
Prayer or meditation	37.0	16.1
Wear protective jewelry (manita de asabache)	13.5	7.7
Modes of Transmission (Agree):		
Talking to someone with a cold within 3 feet	81.7	88.2
Sharing food/drinks with some with a cold	90.4	91.7
Shaking hands with someone with a cold	64.0	74.6
Touching objects touched by someone with a cold	63.2	74.6
Kissing someone with a cold	90.8	94.1
Attitudes:		
Who should stay home from school or day care?		
Children with viral throat infections	84.6	90.8
Children with flu	85.9	92.9
Children with asthma attacks	28.1	19.4
Who should get an antibiotic?		
(Usually or Sometimes):		

Persons with a cold	51.2	32.5
Persons with viral sore throat	89.4	84.6
Persons with asthma	28.1	19.4
Persons with influenza	47.5	32.9
Often worry about antibiotic resistance	59.7	44.5

*Table 2. Significant Changes in Reported Practices to Prevent Viral URI (n=422 households)**

Practice	Pre: % (#)	Post: % (#)
Hand hygiene		
Wash with antibacterial soap most or all of the time	45.3 (191)	24.9 (105)
Use alcohol hand sanitizer some of the time	1.4 (6)	66.8 (282)
Influenza vaccination		
One or more household members vaccinated	63.7 (269)	73.9 (312)

*Chi square tests comparing proportions at baseline and after intervention, all p<.001