

Investigating Approaches to Improving Appropriate Antibiotic Use Among Higher Risk Ethnic Groups

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Abstract

A field study with follow up investigations sought to: 1) determine whether cold packs (over-the-counter symptomatic treatments), coupled with in-office education, improve antibiotic-related knowledge, attitudes and behaviors more than in-office education alone in patient populations with high percentages of Asian Americans and Hawaiian/Pacific Islanders; 2) identify possible reasons for intervention outcomes as described by physicians who participated in the field study; and 3) explore potential future directions based on a large sample survey of physicians in the field study's highly ethnic county. The intervention resulted in a pre- to post-consultation decrease in perceived need for and an increase in knowledge about antibiotic risks but had no impact on frequency of reported receipt of an antibiotic prescription. Unexpectedly, in-office education alone was more effective in increasing knowledge than in-office education plus the cold pack. In-depth interviews of field study physicians and a large scale physician survey suggest that cold pack interventions targeting patient populations with high percentages of Asian Americans and Hawaiian/Pacific Islanders may be more likely to succeed if accompanied by mass public education regarding risks and physician training regarding effective ways to talk to patients. Use of in-office education with cold packs alone may not achieve desired results.

Introduction

Inappropriate antibiotic use for treatment of upper respiratory infections (URI) remains a critical public health issue in the United States¹ and many other countries^{2,3} and is particularly acute among certain ethnic subpopulations.⁴ In cooperation with primary care physicians, a field study examined alternative strategies for reducing inappropriate use of antibiotics in Honolulu City and County — a region in which the majority of residents are either Asian American or Hawaiian/Pacific Islanders. The field study compares two approaches to reducing inappropriate antibiotic use: providing in-office education about the dangers of inappropriate antibiotic use versus providing in-office education plus a free “cold pack” containing over-the-counter symptomatic treatments. Post-intervention interviews with participating physicians and a survey of area primary care physicians sought to understand reasons for field study outcomes.

A recent in-depth review of 22 national and 6 regional campaigns in high income countries to improve antibiotic use found evidence of positive effects but that evidence was mixed.⁵ For example, a study in Colorado found a reduction in antibiotic (ABX) use in a community (versus a control community) following a mass media campaign in that area.⁶ However, a statewide campaign in Wisconsin failed to reduce ABX prescription rates more than in a control state without such a campaign.⁷ In the in-depth review,⁵ only one intervention using a combination of education and in-office substitute products such as the cold pack is mentioned but it appears that evaluative data on related outcomes has not been published. Thus, despite some indication of the positive effects of public education, mixed evidence and the absence of published quasi-experimental research examining the impact of cold packs in conjunction with education suggests the importance of further research.

The need for additional research is particularly acute for patient populations with high percentages of ethnic minorities and newly arrived immigrants as are found in the state of Hawai'i. For example, a random sample survey of different ethnicities in Hawai'i found that self-identified Filipinos have lower levels of ABX knowledge, express higher perceived ABX need, and report more frequent ABX use.⁸ Whites were found to be at the opposite end of these indicators with other Asian-American groups (Japanese, Chinese, and Korean) and Hawaiian/Pacific Islanders scoring in-between. This study also found that Filipinos and Japanese Americans preferred an interaction style with their physician characterized by lower levels of information exchange between both parties. The researchers suggest that interventions in such highly ethnic patient populations may benefit from use of a tangible product that serves as a substitute for an antibiotic prescription and fosters patient-physician communication about URI treatment and antibiotics. Tangible products are often used in social marketing interventions. Most often, the purpose of tangible products is to facilitate and enhance the impact of education and other tactics on healthful behavior change.⁹ Testing the hypothesis that in-office education plus a cold pack (EDCP) will increase knowledge, improve attitudes and reduce reported receipt of an ABX prescription more than in-office education alone (ED) in a patient population with high percentages of Asian Americans and Hawaiian/Pacific Islanders, the following field study was undertaken.

Methods

Eight Asian American primary care physicians with independent clinical practices were selected based on 1) higher than average prescription rates as indicated in the records of the State's largest private insurance provider and 2) practice location, specifically in areas of Honolulu City and County with high proportions of Asian Americans and Hawaiian/Pacific Islanders. Four physicians participated in the ED treatment and four physicians participated in the EDCP treatment.

The education treatment for both groups consisted of a brochure entitled, “Antibiotics — Did You Know?” The brochure contained basic information about bacterial versus viral infection with cartoon schematics and photos regarding URI and antibiotics. Patients with additional questions were urged to talk with their doctor about the risks of antibiotics. A concluding comment noted that “Antibiotics are not always the answer.” All study procedures and materials were reviewed and approved by the human subjects committee of the University of Hawai'i.

The cold pack's design and contents were based on input from focus groups with Asian American and Pacific Islander patients as well as internal medicine physicians who routinely treat ethnic patients in Honolulu County for URI. The kit included products designed to provide symptomatic relief identified by the targeted ethnic population and approved by the physicians. The products (Tylenol®, lemon throat lozenges, instant chicken soup packets and ginger tea) were placed inside a zip lock bag and lined with

colored paper to provide a professional look while maintaining the low cost nature of the intervention. Cold pack physicians each received 100 cold packs for use over the three week study period and were asked to briefly describe the cold pack's contents and the benefits of treating symptoms without ABX. They were also asked to only give the cold pack to a patient when they had determined that viral infection was probable and that symptomatic relief was the most appropriate treatment.

Patients were asked to complete a pre-consultation questionnaire that measured: patient knowledge; attitudes and practices with respect to URI infection and treatment; and demographic characteristics. They were also asked to read the ABX educational brochure. Following their visit with the physician, patients completed a post-consultation questionnaire that included objective measures of knowledge and subjective measures regarding treatment of URI. Established scales^{8,10,11} were used to compare treatment groups on ABX attitude/knowledge and reported receipt of an ABX prescription using t-tests, chi-square statistics and MANOVA.

Of the 299 adult patients with URI symptoms who completed surveys during the study period, 147 were in the ED treatment and 152 were in the EDCP treatment. The mean age was 45.6 with a range from 19 to 89. A large majority (71%) reported total family incomes between \$25,001 and \$125,000. Major ethnic groups included East and Southeast Asians (primarily Japanese, Chinese, Koreans; 45.3%); Filipinos and Hispanics (34.2%); Hawaiian and South Pacific Islanders (10.2%); Whites and Blacks (7.2%); and missing (3%). Age, marital status, gender, education and major group ethnicity did not vary significantly by treatment. Differences across treatment were significant for household income ($p < .023$) and primary occupation ($p < .02$), but, the directional association as indicated by Goodman-Kruskal lambda (λ) was not statistically significant ($p > .70$).

Results

Pre-Consultation

Perceived need for ABX in treating URI was measured with a multi-item 7-point scale used in several studies.^{10,11} A higher score indicates greater perceived need and thus, a more positive attitude toward ABX (Chronbach's alpha = 0.89). Pre-consultation attitudes toward ABX were positive (i.e., significantly greater than the midpoint, t-test, $P < .045$) and did not differ by treatment group. Only 11% of the subjects stated that they never used ABX to treat URI, while 86% reported using them one or more times a year. There were no significant differences across treatment in terms of reported ABX use, how well they felt that day, and their overall perceived state of health. A multi-item scale (see Table 1) assessing pre-consultation knowledge of appropriate ABX use indicated low levels of knowledge that did not vary significantly by treatment group.

1. Antibiotics should be used to treat only viral infections.
2. Antibiotics should be used to treat only bacterial infections.
3. Cough, cold and flu illnesses are most often caused by viruses.
4. Cough, cold and flu illnesses are are most often caused by bacteria.

*7-point "Agree-Disagree" scale collapsed to binomial measure with "don't know" included with those who agreed or disagreed incorrectly with the statement. Using this approach, only 6% of respondents answered all four questions correctly.

Post-Consultation

Pre- versus post-consultation t-test analyses for the overall sample found that "perceived need for ABX" significantly decreased ($P < .001$) and patient knowledge of appropriate ABX use significantly increased ($P < .034$). To determine whether the "in-office education plus cold pack" (EDCP) when compared with "in-office education only" (ED) treatment resulted in more positive ABX attitudes and knowledge, MANOVA analysis was undertaken. Although the multivariate model was significant ($P < .007$), univariate analysis indicated that this was primarily due to an increase in knowledge from pre- to post-consultation ($F = 8.7$, degrees of freedom = 282, $P < .003$) rather than other outcome measures such as ABX attitude change ($P = 0.098$). Furthermore, t-test analysis of the pre-consultation versus post-consultation means revealed that the increase in appropriate ABX use knowledge was significantly larger for the ED group ($P < .002$) but not the EDCP group.

Within the EDCP group, t-tests indicate that patients who reported receiving the cold pack (28/152) were significantly more satisfied with their consultation ($P < .001$) and with their physician ($P < .001$) when compared with the "education only" group. They also became marginally more negative in their attitudes toward antibiotics ($P < .062$). However, it is not possible to know the causal direction suggested by these results, i.e., whether giving the cold pack increased satisfaction or the physician chose to give the cold pack to patients who appeared more satisfied. Finally, chi-square analysis revealed that EDCP patients reporting receipt of the cold pack did not significantly differ from the ED group in terms of obtaining a prescription.

These results raise many questions regarding the cold pack's failure to stimulate additional discussion between patient and physician, improve knowledge, reduce positive ABX attitudes overall and produce fewer ABX prescriptions. Furthermore, given that only 18.4% of EDCP patients reported receiving a cold pack and that more than half of these patients also received an ABX prescription, one may question physician willingness to substitute over-the-counter symptomatic relief for prescriptive ABX treatment. Seeking clarification, two follow up investigations were undertaken. First, all eight physicians were interviewed to learn more about possible reasons for the intervention results. Second, a questionnaire was administered to a large sample of Honolulu County physicians who treat URI.

Follow-up Interviews with Field Study Physicians

Several field study physicians stated that the cold pack would have been more effective if the study had taken place over a longer time period. Others commented that, regardless of the study's timeframe, the cold packs were "just too much trouble" to use though none suggested that appearance or ingredients posed a problem. No comments regarding greater or lesser challenges for one ethnic group versus another arose during the interviews. Physician responses indicated that a majority believed public education regarding ABX risk would increase physician willingness to offer the substitute cold pack product instead of a prescription. The fact that only one physician mentioned the need for improvement of physician communication skills suggests that field study physicians generally viewed inappropriate ABX use as a patient issue rather than a physician problem.

Follow-up Cross-Sectional Physician Survey

A questionnaire was administered to Honolulu County physicians to determine whether they agreed with the field study physicians' assessments and to identify potential solutions to the challenge of reducing inappropriate ABX use for treatment of URI in an area with large Asian American and Pacific Islander populations. A complete listing of primary care physicians in Honolulu County likely to see URI patients was obtained from the Hawai'i State Department of Health. A cover letter and questionnaire were mailed to 900 physicians on the list. The cover letter informed physicians of the results from the cold pack intervention and the eight participating doctors' opinions regarding reasons for the outcomes. Two-hundred and nine physicians (23.2%) responded with varying characteristics (Table 1).

Confirming thoughts expressed by the field study physicians, respondents ranked a mass media campaign targeting the general public as the most effective intervention in terms of reducing inappropriate ABX use (Table 3). This was followed by interventions that would: 1) encourage physicians to tell patients directly about appropriate ABX use, 2) place printed and poster materials in patient waiting

rooms, 3) distribute cold packs as alternatives to ABX for URI, and 4) promote the use of alternative strategies for different patient populations, e.g., delaying ABX coverage for younger, healthier patients rather than every patient. While statistically different from the midpoint, physician attitudes toward the cold pack intervention ($\chi = 3.3$) were very close to neutral. Interventions judged least effective were: 1) promoting use of a delayed prescription to be filled in 2-3 days, 2) providing physicians with more information about the risks of ABX, and 3) promoting physician decision-making based on cultured pathogen identification.

Discussion

This study compared "in-office education" (ED) with "in-office education plus cold pack" (EDCP) in a field study that involved eight primary care practices with relatively high ABX prescription rates and relatively high percentages of Asian Americans and Hawaiian/Pacific Islanders. The EDCP intervention performed less effectively than the ED treatment, which accounted for a majority of the significant overall improvement in patient knowledge regarding ABX use. Follow up interviews with the eight field study physicians

Table 2.— Descriptive characteristics of surveyed physicians

Physician Sample Size		209	Physician Ethnicity	Frequency	%	Estimated Patient Volume	Frequency	%	Average Estimated Ethnicity of Patient Base	%
Physician Average Age		52.6	Black	1	0.5%	0-5	12	6%	Black	10.1%
Average Number of Years in Practice		20.4	Chinese	48	23.6%	6-10	25	12.5%	Chinese	19.2%
Physician Gender	Frequency	%	Filipino	18	8.9%	11-15	24	12%	Filipino	16.4%
Male	127	60.76%	Hawaiian & Pac Isl.	10	4.4%	16-20	46	23%	Hawaiian & Pac Isl.	18.3%
Female	80	38.27%	Japanese	50	24.6%	>20	93	46.5%	Japanese	4%
Missing	2	0.95%	Korean	2	1%	Not available	9		Korean	4.6%
			White	67	33%				White	17.8%
			Other	7	3.4%				Other	3.7%
			Missing	6						

Table 3.— Ranked physician evaluations of potential interventions to reduce inappropriate antibiotic use

	Average Rating* (5-point scale)
Conduct a mass media campaign on radio, TV, newspaper directed at the general public regarding appropriate antibiotic use	4.1
Encourage physicians to tell patients directly about appropriate antibiotic use	3.8
Provide printed and poster educational materials in patient waiting rooms regarding appropriate antibiotic use	3.4
Promote use of a cold pack (symptomatic therapy with anti-pyretic, antihistamine and chicken soup or equivalent) as an alternative to antibiotics for URI	3.3
Promote use of different approaches for different patient populations, e.g., delaying antibiotic coverage for younger, healthier patients rather than for every patient	3.2
Promote idea of asking the patient to call back in two or three days for an antibiotic prescription if symptoms persist or worsen	3.1
Provide video educational programs in patient waiting rooms regarding appropriate antibiotic use	3.0
Provide physicians with more information about the adverse effects of antibiotic therapy	2.8
Promote taking of a culture and prescribing an antibiotic only if a bacterial pathogen is found	2.8
Promote use of a "delayed prescription" to be filled in 2-3 days or antibiotics should URI symptoms not improve or worsen	2.7

*5-point scale with 5 = "most effective" and 1 = "least effective"

indicated that they perceived mass education about ABX risk as a pre-intervention need. Thus, a combination of physician concerns about patient understanding of cold pack substitution for ABX and ability to “sell” the cold pack concept to those patients may have led to the intervention’s failure. While future research may result in refinement of cold pack contents so that the packs themselves are more appealing to physicians, perceived “selling” of the pack appears problematic and may prove easier in conjunction with a mass public health education campaign. It is important to note that our physician sample was purposively selected and thus, the findings apply most directly to physicians with relatively high ABX prescription rates and relatively high percentages of Asian American and Hawaiian/Pacific Islander patient populations.

However, it should also be noted that a county-wide survey of physicians in Honolulu found that they also thought that public health education and physician training on more effective communication were needed. Even so, contrary to the high numbers of patients reporting receipt of ABX prescriptions in the field study, surveyed physicians strongly supported symptomatic treatment and waiting to see if ABX were necessary when presented with different case studies. Tempered by the fact that field study physicians were higher than average ABX prescribers, the survey suggests that a gap may exist between physicians’ aspirations and their actual behavior when faced with an ill patient in predominantly Asian American and Hawaiian/Pacific Islander communities.

Emphasis on public health education via the mass media and in the physician’s waiting room, coupled with physician continuing medical education (CME) training, may constitute effective strategies. CME lectures were rated most positively along with the “opinions of infectious disease consultants.” Attitudes toward other sources such as mailings from the Centers for Disease Control, mailings from the State Department of Health and quarterly reports on ABX prescriptions from the State’s major health insurance company were rated as neutral or negative.

The fact that there were few differences between the ED and EDCP treatment groups, coupled with high measure reliabilities and use of established scales,^{8,10,11} suggests that the field study possessed fairly high internal validity. Of course, this validity is limited to the predominantly Asian and Hawaiian/Pacific Islander ethnic segments involved but there is no reason to believe that it would not extend to ethnic segments with similar cultural orientations. In addition, the physician survey sample was not a census, pointing to the importance of replication. Even so, the repeated finding in the follow up studies of the perceived need for additional physician training on commu-

nicating more effectively the costs and benefits of ABX suggests an important topic for future research. These findings are in line with the stream of research on reducing inappropriate ABX use referred to earlier^{5,6,7} which points to the likelihood that a multidimensional effort is needed involving mass public education, in-office education, substitute products such as cold packs, and physician CME training on effective communication with their patients regarding proper ABX use. Of course, these conclusions seem most appropriate for addressing ABX misuse in patient populations comprised of high percentages of Asian Americans and Hawaiian/Pacific Islanders but, given past research, the importance of a multi-pronged and sustained effort in general appears clear. While the problem of inappropriate ABX prescriptions remains a major challenge, this study in combination with the broader literature stream suggests potential directions for future research and progress.

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Ho‘omau: to persevere, to be persistent