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A Web-Based Educational Video to Improve Asthma Knowledge for Limited English Proficiency Latino Caregivers

Antonio Riera, MD^a, Agueda Ocasio^b, Gunjan Tiyyagura, MD^a, Anita Thomas, MD^c, Patricia Goncalves, APRN^d, Lauren Krumeich, MD^e, Kyle Ragins, MD, MBA^f, Sandra Trevino, MSSW^b, Federico E. Vaca, MD, MPH^g

^aYale University School of Medicine, Pediatric Emergency Medicine;

^bJunta for Progressive Action, New Haven, Connecticut;

^cUniversity of Washington School of Medicine, Pediatric Emergency Medicine;

^dYale-New Haven Children's Hospital, Pediatric Respiratory Medicine;

^eUniversity of Pennsylvania, Surgery;

^fUniversity of California Los Angeles, Emergency Medicine;

^gYale University School of Medicine, Emergency Medicine

Abstract

Objectives: To evaluate limited English proficiency (LEP) Latino caregiver asthma knowledge after exposure to an educational video designed for this target group.

Methods: A cross-sectional, interventional study was performed. We aimed to evaluate the post-test impact on asthma knowledge from baseline after exposure to a patient-centered, evidence-based, and professionally produced Spanish asthma educational video. Participants included LEP Latino caregivers of children 2–12 years old with persistent asthma. Enrollment was performed during ED encounters or scheduled through a local community organization. Asthma knowledge was measured with a validated Spanish parental asthma knowledge questionnaire. Differences in mean scores were calculated with a paired t-test.

Results: Twenty caregivers were enrolled. Participants included mothers (100%) from Puerto Rico (75%), with a high-school diploma or higher (85%), with no written asthma action plan (65%), whose child's asthma diagnosis was present for at least three years (80%). Mean baseline asthma knowledge scores improved 8 points from 58.4 to 66.4 after watching the educational video (95% CI 5.3–10.7; $t(19) = 6.21$, $p < 0.01$). Knowledge improvements were similar across the

Corresponding Author: Antonio Riera, Yale University School of Medicine, Pediatric Emergency Medicine, 100 York Street, Ste 1F, New Haven, CT 06511, antonio.riera@yale.edu, p:203-737-7439, f:203-737-7447. Antonio Riera wrote the first draft of the manuscript. No honorarium, grant, or other form of payment was given to anyone to produce the manuscript.

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ED and community groups. Knowledge gains were observed in the areas of ED utilization, medication usage, and activity limitations.

Conclusions: The developed educational video improved caregiver asthma knowledge for a Latino population facing communication barriers to quality asthma care. Dissemination of this educational resource to LEP caregivers has the potential to improve pediatric asthma care in the United States.

Keywords

Pediatrics; Education

Introduction

Latino caregivers who experience limited English Proficiency (LEP) face communications barriers to quality health care(1). For this vulnerable population, disparities in health care outcomes related to language exist(2–4). While the Agency for Healthcare Research and Quality has stressed the importance of good communication during all patient-doctor encounters(5), universal access to effective, culturally sensitive, and language concordant asthma instructional materials is limited(6).

Pediatric asthma prevalence by race and ethnicity in the United States is highest for Puerto Rican children, at 18.3%(7). In Puerto Rican households, culturally-specific ideologies may reduce parental use of prescription asthma medications. These include reliance on folk remedies, other holistic treatments and behavior modifications as “first line” methods to treat asthma(8). Parental discomfort with controller medication administration has been reported(9). Parents from other Latino subgroups have similarly described the use of alternative treatments and expressed concerns with daily medication administration(10, 11). Latino asthma caregivers have been shown to struggle with the ability to discriminate between rescue and controller medications(9, 12). A potential area for improvement is the unacceptably low use rate of language concordant asthma action plans(13).

The pediatric asthma prevalence in Connecticut is above the national average (11% vs. 9.5%). In 2010, child emergency department (ED) visits led to almost \$4 million in costs incurred by the state’s Medicaid program(14). Further, from 2007–2009 asthma care ED utilization by Latino children, which started higher than other race and ethnicity groups, disproportionately rose, while utilization rates by Black and White children remained relatively unchanged(15). This pattern of utilization coincided with a modest increase in the state’s Latino population, from 403,475 in 2005 to 434,471 in 2009(16, 17). In an attempt to address these higher utilization trends, a targeted and readily accessible educational tool for LEP asthma caregivers was developed.

The primary objective of this study was to evaluate asthma knowledge after exposure to an educational video designed for LEP Latino asthma caregivers. A secondary objective was to monitor participation and compare the process of educational video delivery in both ED and community settings. We hypothesized that LEP caregiver exposure to this educational video would increase their asthma knowledge scores compared to baseline.

Methods

Study Population and Setting

A cross-sectional, interventional study was conducted in two separate sites over the course of 16 months from 2013–2015. We investigated the difference in post-test asthma knowledge compared to baseline after LEP caregivers were exposed to a Spanish asthma educational video. The first site was an ED located in an urban, academic children's hospital with an annual census of 38,000 emergency visits. A subject was eligible for enrollment if all of the following inclusion conditions were met: 1.) He or she self-identified as a Latino caregiver with LEP; 2.) The child had an established diagnosis of persistent asthma; 3.) The child was between 2–12 years old; and, 4.) The child had an active prescription for an inhaled corticosteroid. We chose these criteria to capture a more "experienced" population of pediatric asthma caregivers while keeping in mind that the video content specifically addresses the philosophical difference between controller (inhaled corticosteroid) and rescue (β -agonist) medications. Subjects were excluded if they had any prior exposure to the educational video. LEP was defined as the self-reported ability to speak English less than "very well," as this is the typical data collection method for language proficiency employed by the U.S. Census Bureau(18). Subjects were recruited and enrolled by the lead investigator either during a child's asthma-related visit or during an emergency visit that was not related to asthma symptoms. In an effort to enroll only caregivers with prior exposure to some amount of asthma education, we were able to reference data available through our hospital's electronic medical record system. We could thereby verify the child's age, any prior asthma-related clinic or ED visits, hospitalizations, asthma severity categorization, and their outpatient medication lists. To evaluate whether the ED setting would be a suitable place to disseminate the video, subjects were also enrolled from a second site where no clinical activity occurs. This site was a local community center that provides services for the local Latino community and has participated in prior collaborative efforts to improve the asthma health of their clients(12). A trained research assistant used the above inclusion criteria to recruit eligible caregivers from the community. Community center enrollment was performed by the lead investigator with a secure laptop computer connection to the same electronic medical record system used during the ED visits. The estimated time required to complete participation in the study was approximately 60 minutes. Demographic and questionnaire data were collected with a 12.9-inch tablet device and digitally stored to a password protected on-line survey management program. A modest monetary incentive in the form of a gift card was provided to the participant upon completion. This study was approved by our institutional Human Investigation Committee.

Video Development Process and Content

Using insights from prior qualitative research, a professionally produced Spanish asthma educational video was developed. Video content combined findings derived from semi-structured interviews and a follow-up focus group with current evidence-based recommendations. The process for how the qualitative, patient-centered content was obtained before its integration into this educational video has been previously described(19). The inception for the video storyboard originated from a focus group session with Latino asthma caregivers whom shared personal experiences related to asthma care. This group also

participated in a screening session to provide feedback before the production was finalized. The cast consisted of two Latino actors as clinicians (male and female), and a mother who shared a personal testimonial and is depicted alongside the clinicians during the final portion of the video. The three protagonists suggest ways for Latino caregivers to be empowered over certain aspect of their child's asthma care. These steps were taken so that the educational video would convey a culturally tailored message, which is a recommended strategy to help achieve disparity reduction for Hispanics(20).

The patient-centered content included messages related to the importance of understanding asthma types, effective communication, medication recognition and delivery, home management steps (including how to use and follow an action plan), caregiver consistency, and how to deal with cigarette smoke exposure(19). The evidence-based content for the educational video was derived from recommendations for asthma educational projects by the 2007 expert panel report from the National Asthma Education and Prevention Panel(21). We incorporated instruction on asthma self-management skills to include a basic understanding of airway inflammation, trigger avoidance, the correct use of medications, and symptom monitoring techniques (including the use of individualized action plans(22).

The educational video is available on the website www.asmaplan.com. The duration of the educational video is approximately 12 minutes. The video is divided into eight sections, each preceded by a new title heading. The content covers how to use a personalized asthma action plan with a stoplight theme and emphasizes the difference between maintenance and rescue medications. It reviews appropriate home asthma care and contains video clips of symptoms that should prompt an immediate office or ED visit. The video ends with resource information for a smoking cessation program and a state-funded home visitation environmental assessment program. It is publicly available online without access restrictions.

For purposes of this study, participants viewed the video once in private on a 12.9-inch tablet with a Wi-Fi connection. During the emergency visits, children were encouraged to watch the video together with their parent/caregiver. ED enrollment was discussed with treating physicians to ensure the study protocol would not adversely impact length of stay or patient care needs. During the community visit recruitment process, caregivers were offered the opportunity to schedule the visit with or without their child present, based on their scheduling preference.

Measures

A validated Spanish asthma knowledge questionnaire was administered (23). This questionnaire provides a quantitative measurement, the asthma knowledge score, which describes the degree of parental understanding and agreement with some general principles related to asthma care. We opted to administer the questionnaire to minimize potential problems with comprehension due to reading literacy and/or difficulty navigating the tablet device. Responses were collected on the same tablet device used to watch the video and were electronically stored in a secure online server. The questionnaire was originally developed in Spanish for parents/guardians of children with asthma in Colombia and has 17 statements about asthma health. Each item was scored from 1 to 5 using a 5-point Likert

scale of “strongly disagree” to “strongly agree.” Higher scores reflected greater asthma knowledge (i.e. a score of 85 is “perfect” asthma knowledge). This validation research captured a mean score of 57.9 for “low knowledge” parents and a mean score of 72.1 for those with “high knowledge,” which provided useful reference points for our project. Our study’s participants gave baseline responses to the questionnaire, viewed the educational video, and immediately repeated the same questionnaire. If a participant was unsure about how to respond to any of the statements, the following prepared response was provided: “this is not a test and there are no right or wrong answers, we only want to know how you feel about that sentence.” The video content was not designed to “cover” the collection of statements found in this asthma knowledge questionnaire.

Subject Participation

In order to monitor subject participation and compare whether video delivery could be delivered in both ED and community settings, we recorded details of ED encounters to include chief complaint, treatment course, and disposition. In the ED, subjects that declined participation were asked to provide any reservation(s) for watching the video. Caregivers that declined participation were given the option to return on a separate day. Attention was given to any potential interruptions in one’s ability to view the educational video. In the community, any challenges related to the recruitment and scheduling of caregivers were tracked.

Statistical Analysis

We hypothesized that LEP caregiver exposure to this educational video would increase their asthma knowledge scores compared to baseline. To develop an *a priori* sample size, we postulated that if we were to see an increase in 10 points between baseline and post-test scores, with a standard deviation of 2–3 points, only 2 pairs of subjects would be required to detect that difference with an α 0.05 and β of 0.8(24). To account for the possibility of relatively high asthma baseline scores, where smaller gains would be anticipated, we chose to enroll a total of 20 subjects, 10 from an ED setting and 10 from a community setting. For group comparisons, categorical variables were dichotomized and analyzed using a two by two contingency table and Fisher’s exact test. Continuous data was analyzed using a standard t-test to compare mean values between groups. Overall differences in mean asthma knowledge test scores were measured with a paired t-test.

Results

We analyzed data from 20 caregivers, all mothers 20–48 years old able to speak English well (30%), not well (45%), or not at all (25%). Participants from Puerto Rican, Mexican, and Guatemalan backgrounds spoke Spanish “very well” (100%), attained a high school diploma (60%) or a higher educational degree (25%), and reported they could read Spanish either “very well” (80%) or “well” (20%). Eighty percent of parents reported at least one asthma-related missed day of school in the prior calendar year. A substantial proportion reported one to two weeks (20%) and more than 2 weeks (20%) of school absenteeism during the most recent academic year due to their child’s asthma.

Overall, the baseline mean asthma knowledge scores significantly improved after a single viewing of the educational video (Figure 1). The mean ED group baseline score of 55.9 (95% CI 51.2 – 60.6) was lower than the average community group score of 60.9 (95% CI 56.1 – 65.7). However, the ED group experienced a similar gain in asthma knowledge (8, 95% CI 3.3–12.8; $t(9) = 3.81$, $p < 0.01$) when compared to the community group (8, 95% CI 4.4–11.7; $t(9) = 4.96$, $p < 0.01$) during the post video assessment. A sub-group analysis performed on the ED group revealed a statistically significant benefit only for caregivers enrolled during an asthma-related ED visit (9.4, 95% CI 2.4–16.3; $t(5) = 3.47$, $p = 0.02$). Evaluation of demographic data did not reveal any significant differences between ED participants and community center participants (Table 1). Evaluation of participants with and without an action plan also did not reveal any significant differences among demographic variables or their site of enrollment.

For 17/20 participants, a higher post-test score was observed when compared to their baseline score. There were 12 “low knowledge” caregivers whose baseline scores were 58. There were no “high knowledge” caregivers whose baseline score was 72. Five caregivers achieved a “high knowledge” score 72 during the post-test assessment. In 15/17 questionnaire items, a higher overall mean statement agreement (either strong agreement/disagreement or agreement/disagreement in the expected direction) was observed during the post-video assessment. Item 5 experienced a reduction in agreement to the statement: “children with asthma should use asthma medications only when they have symptoms (coughing, congestion, or wheezing).” Item 13 had 100% agreement (caregivers either strongly agreed or agreed) during both baseline and post video assessments to the statement: “It’s best not to smoke or let anyone else smoke near a child who has asthma.” Overall, a 20% or greater improvement in statement agreement was observed in 13/17 questionnaire items. Figure 2 shows specific examples of knowledge gained determined by improved agreement with statements related to ED utilization, medication use and activity limitations.

Complete participation by LEP caregivers identified in the ED reached 91%. One caregiver that was approached for enrollment was unable to complete the video. This father asked to be removed from the study because he had a headache. His child was also being treated for a leg fracture. Another caregiver was unable to participate in the study during the ED visit because she was approached for enrollment towards the end of her child’s care. This caregiver was able to return alone to the ED on a different date, and analyzed as part of the ED group. Six of the ED group participant’s children were being evaluated and treated for asthma symptoms, with one child requiring admission. The other ED visits were for allergic reaction, epistaxis, dental pain, and seizure activity. All enrolled ED subjects were able to watch the entire video on the 12.9-inch tablet, without interruption, while connected to our hospital’s Wi-Fi service. Caregivers typically watched the video while waiting for laboratory and imaging results, consultants, or during periods of patient monitoring.

Complete participation by LEP caregivers in the community center reached 100%. For all recruited subjects, inclusion criteria were able to be verified during enrollment using a laptop computer with a secure connection to the same electronic medical record used for the ED visits. Caregivers scheduled this visit without their child being present in 70% of the community encounters. Caregivers from two different households were enrolled during

“back to back” sessions on four separate occasions. One caregiver had to reschedule her appointment on short notice. All enrolled community caregivers were able to watch the entire video on the 12.9-inch tablet, without interruption, while connected to the community center’s Wi-Fi service.

Discussion

Our study is the first to evaluate an asthma educational video designed for LEP Latino caregivers in the United States. Our sample is made up of Latino caregivers of children with persistent asthma. Most of the participating caregivers are Puerto Rican and describe an active disease burden for a minimum of 3 years. The video itself is unique in that it combines content drawn from both expert panel recommendations and participatory, patient-centered input. The video is shown to be effective in its ability to impart asthma knowledge using a validated instrument.

We found immediate asthma knowledge acquisition by our study participants across the majority of items that include statements related to resource utilization, medication delivery, and activity restrictions. Interestingly, our mean baseline score and standard deviation were similar to the “low knowledge” parents from Rodriguez and Sossa’s validation study 58.4 (6.1) vs 57.9 (5.9), and our mean post intervention score 66.4 (7.9) approached the mean score 72.1 (4.3) obtained by the “high knowledge” parents(23). Based on this comparison, we expect that the greater asthma knowledge found after the educational video intervention, as measured by this particular scoring instrument, to be clinically meaningful as well. This video was found to be effective in both a community center environment and during ED encounters.

For the ED encounters, a sub-group analysis revealed that the greatest benefit was experienced by those caregivers that presented for asthma-related visits. For this group, the mean asthma knowledge scores improved from 58.3 to 67.7 after watching the educational video. The group that watched the video during ED visits not related to asthma care did not achieve statistical significant improvement in asthma knowledge scores. Due to the small size of this group (4 caregivers), the findings are susceptible to a Type-II error and lack of power to detect a true difference. Considering these findings, we believe that intentional dissemination of this video would be most beneficial during urgent care and primary care asthma-related visits. Further research is needed to delineate the optimal setting for caregiver receptivity of this educational video.

Our study findings coincide with a growing body of literature that support appropriate use of web-based resources and leveraging available technology to fill education gaps, foster self-management, and enhance health status for patients with chronic illness(25–27). Web-based pediatric asthma support resources designed to engage and interact with children have been shown to increase knowledge and self-management skills(28–30). Interactive web-based asthma content designed to engage parents have been found to improve child medication adherence(31, 32). To our knowledge, there are no published studies that have described the utility of web-based asthma instructional media designed for LEP Latino caregivers in the United States.

This educational video can be used to augment and reinforce asthma teaching with an at-risk group of Spanish-speaking LEP asthma caregivers. Recent research has shown that visually enhanced action plans that minimize literacy barriers improve clinician counseling during dedicated, office-based asthma encounters(33). A video delivery method that obviates the need to review written handouts, with appropriate interpreter assistance, is likely to provide similar benefits for busy clinicians. Moreover, emergent themes from qualitative research with LEP asthma caregivers have described the value placed on comprehensible, language-concordant asthma action plans(13, 19). The general role of asthma plan readability and suitability to maximize parental and patient understanding has been previously described(34). For these reasons, we felt it was imperative to dedicate a portion of the video with the heading “What is an asthma action plan?” In this section, a sample Spanish plan (from the New York Department of Public Health website) with the spotlight theme is reviewed. We aimed to clarify the ideal implementation of green, yellow, and red zones with actual patients who exhibit the worsening symptom severity cues of nasal flaring and intercostal retractions. It is plausible that detailed attention to action plan utilization and symptom recognition/management had a consequential impact on the improved asthma knowledge scores related to resource utilization (ED versus home management).

Mindful consideration to the projected population growth for Latinos in the United States is necessary. In the year 2050, it is estimated that the Latino child population (age < 18) will be 35% of the total population compared to the 20% share of the child population from 2005(35). The projected influx should stimulate the need for a widespread approach and feasible distribution of high quality asthma education for LEP Latino caregivers. There is a need for a systematic, evidence-based process to disseminate comprehensible, culturally competent asthma education. This would alleviate cultural, language, and literacy barriers to care. Once a robust infrastructure of literacy-enhanced asthma education tools is in place, clinicians and policy makers can focus on additional environmental, social, and economic factors that influence, and often overwhelm, behaviors related to child asthma care.

There are some limitations to our findings that deserve attention. First, knowledge retention was not assessed with a delayed post-video assessment. Therefore, we are not able to comment on any enduring knowledge that this educational video may impart. To potentially mitigate this limitation, we have made a concerted effort to ensure this educational tool is accessible at all times online, at no cost, on the website asmaplan.com. Caregivers and patients are able to access the full-length video (and shorter segments that are easier to digest in a single sitting) at any time, when needed. This mode of information delivery is highly desirable considering that cell phones and mobile devices are commonly used to access the internet by Latino adults(36, 37). Second, since Latinos have been shown to score higher on indicators of socially desirable responding(38) we are unable to comment on whether social desirability bias, rather than an enduring agreement with newly acquired knowledge, played a role in the improved statement agreement scores. Third, we realize that there is the potential for cultural subgroup measurement bias(39). Since the survey instrument was developed and validated in a population of Colombian adults, it is possible that certain nuances or colloquial phrases may have influenced responses to certain statements by non-Colombian Latino caregivers. Although this cultural limitation exists, the Spanish measurement instrument used was felt to be better suited than any English language

instrument that would subsequently require translation into Spanish. Fourth, our exploratory design did not randomize subjects to a control group with a different educational intervention tailored to this study population. Additional work is needed to better understand the true impact of this educational video on asthma knowledge. Finally, we acknowledge that changes in knowledge gained may not directly lead to changes in asthma-related behaviors that influence clinical outcomes like compliance and resource utilization.

Conclusions

The developed educational video improved LEP Latino caregiver asthma knowledge for an at-risk population that faces communication barriers to quality asthma care. Dissemination of this educational resource to Spanish-speaking LEP caregivers has the potential to improve pediatric asthma care in the United States.

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Abbreviations:

LEP	limited English proficiency
ED	emergency department

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Mean Caregiver Asthma Knowledge Scores

Figure 1:
Overall asthma knowledge gained from baseline to post-test.

Figure 2:

Examples of asthma knowledge gained in areas of ED utilization, medication use, and activity limitations.

Table 1.

Comparison of Participant Characteristics

	ED (n=10)	Community (n=10)	P Value
Mean Parental Age (SD), y	34 (8)	33 (4)	.72
Child Age Range, y			.63
6–12 (%)	6 (60)	8 (80)	
2–5 (%)	4 (40)	2 (20)	
Asthma Diagnosis Duration, y			.58
>3 (%)	9 (90)	7 (70)	
<3 (%)	1 (10)	3 (30)	
Place of Origin			1.0
Puerto Rico (%)	7 (70)	8 (80)	
Other* (%)	3 (30)	2 (20)	
Ability to Speak English			.63
“less than well” or “not at all” (%)	8 (80)	6 (60)	
“well” (%)	2 (20)	4 (40)	
Ability to Read English			.63
“less than well” or “not at all” (%)	8 (80)	6 (60)	
“well” (%)	2 (20)	4 (40)	
Ability to Read Spanish			.58
“very well” (%)	9 (90)	7 (70)	
“well” (%)	1 (10)	3 (30)	
Have Asthma Action Plan			1.0
Yes (%)	3 (30)	4 (40)	
No (%)	7 (70)	6 (60)	

* Other = Four caregivers from Mexico and one from Guatemala (part of the ED group).