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Provider-adolescent discussion and provider education about asthma triggers during pediatric visits: results of a randomized trial

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ABSTRACT

Objective: We examined how an asthma question prompt list with video intervention influenced discussion of and provider education about asthma triggers.

Methods: English or Spanish-speaking adolescents ages 11–17 with persistent asthma and their caregivers were enrolled from four pediatric clinics. Adolescents were randomized to the intervention or usual care groups. Adolescents in the intervention group watched the video on an iPad and then completed a one-page asthma question prompt list before their visits. All visits were audio-recorded. Generalized Estimating Equations were used to predict the number of trigger areas discussed and the number of areas providers educated adolescents about during visits.

Results: Forty providers and 359 patients participated. Triggers were discussed during 89% of intervention group visits and 81% of usual care visits; providers educated adolescents about triggers during 59% of intervention group visits and 46% of usual care visits. More triggers were significantly more likely to be discussed and providers educated about more trigger areas during visits of adolescents in the intervention group and when adolescents asked one or more questions during visits. More trigger areas were significantly more likely to be discussed if the adolescent was White and male. Providers were significantly more likely to educate adolescents whose family spoke Spanish at home about more trigger areas than adolescents who spoke English at home.

Conclusions: More trigger areas were significantly more likely to be discussed and providers educated about more trigger areas during visits of adolescents who received the intervention and when adolescents asked one or more questions.

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Introduction

Childhood asthma accounts for an annual loss of more than 14 school days per year and more hospitalizations than any other childhood disease (1). Prior work has documented that environmental trigger control can reduce asthma exacerbations (2–4). The National Heart Lung and Blood Institute's Guidelines for the Diagnosis and Management of Asthma emphasize the importance of trigger control in asthma management (5).

Yet at the same time, research has shown that parents have trouble identifying triggers (6) and parents report that their children do not recognize triggers (7). One research team found that many parents

joined their Green Housing Study just so that they could better understand home exposures and how they influenced their child's asthma (8). Other focus group work in pediatric asthma with children, parents, and providers found that children often avoid everyday activities and become complacent with suffering (9).

Healthcare providers can play an important role in helping adolescents and caregivers better understand triggers (10). Prior work using self-report and medical records found that triggers were discussed during 42% to 61% of visits (11,12). In contrast, an observational study of audio-taped visits found that trigger discussion occurred more often, with providers and

adolescents discussing triggers during 86% of visits and educating about triggers during 46% of these visits (10).

One way to possibly increase communication about triggers during pediatric visits would be to focus on motivating adolescents to ask more questions and be more involved. Children and adolescents are not actively involved during their medical visits (13–15). In a randomized controlled trial, we found that a pre-visit asthma question prompt list with video intervention increased youth question asking during pediatric asthma visits and that adolescents in the intervention group who asked one or more questions were more likely to have their asthma controlled and better quality-of-life 12 months later (16). One of the six main themes of the pre-visit video was asthma triggers and the question prompt list had several questions about triggers that adolescents could check (17,18). Therefore, the purpose of this manuscript is to examine how the pre-visit question prompt list with video intervention influenced provider and adolescent discussion of triggers and provider education about triggers during pediatric asthma visits.

Methods

Procedure

Forty-six providers from four pediatric practices (one academic and three private) in North Carolina agreed to participate in the study. Two clinics were in rural areas and two were in suburban areas. Clinic staff referred potentially eligible patients who were interested in learning more about the study to a research assistant. During pre-visit wait time, the research assistant explained the study, obtained caregiver consent and adolescent assent, and administered an eligibility screener (5,19). Adolescents were eligible if they were: ages 11 to 17 years; spoke and read English or Spanish; had persistent asthma; were present for an acute or follow-up asthma visit or a well-child visit; and had previously visited the clinic at least once for asthma. Using information from the eligibility screener that caregivers completed with the research assistant, persistent asthma was defined as experiencing asthma-related daytime symptoms more than twice a week, asthma-related nighttime symptoms more than twice a month or receiving one or more long-term controller therapies for asthma (13,20).

The study statistician prepared the randomization envelopes for the research assistants to use. Adolescents were randomized within providers and opaque envelopes were prepared for the research

assistants at each site. A group of envelopes was prepared for each enrolled provider. Eligible adolescents of participating providers were then randomized to the intervention or usual care group.

Adolescents in the intervention group watched the video with their caregivers on an iPad. Depending on the clinic, either they watched it in a private area before the visit or they watched it with headphones in the waiting area. The adolescents then received the one-page asthma question prompt list so that they could check the questions that they wanted to ask the provider for use during their visits. Providers were blinded to the adolescent's group assignment. All adolescents' visits were audio-tape recorded. All adolescents were interviewed after their medical visits by a research assistant while their caregivers completed questionnaires. Adolescents and caregivers each received \$25 for their time.

Intervention

The question prompt list with video intervention is significant because it uses pre-visit wait time to encourage adolescent to be more actively involved and caregivers less involved during asthma visits. The intervention is based on Social Cognitive Theory (SCT). Self-confidence or self-efficacy is a central component of SCT (21–23).

The video was eleven minutes in length and had six themes (asthma triggers, staying active with asthma, how to get mom off your back, tracking asthma symptoms, how to talk to your doctor, and having confidence with asthma) which is discussed in detail elsewhere (17). The video encouraged adolescents to ask their providers the questions that they had during their medical visits. Each theme area of the video had its own section that ranged in length from one to two minutes. The trigger section emphasized that triggers could cause asthma symptoms, every person reacts differently to triggers, families should have a plan to reduce triggers, and patients should always carry their rescue inhaler. The one-page asthma question prompt list had 14 questions about asthma medications, eight questions about triggers and asthma in general, and an area where adolescents could write in questions (Figure 1). The adolescents checked the questions that they wanted to ask their provider for use during their medical visits. The question prompt list took adolescents in the intervention group less than four minutes to complete. The trigger questions on the prompt list included: Can you tell me what asthma triggers are?, When should I stay indoors?, Can I be around my pet?

Family ID: _____ Date: _____

Read these questions and put checks by the ones you want to ask the doctor.**Questions about asthma**

- ☐ What causes my asthma?
- ☐ How do I prevent breathing problems?
- ☐ Can you tell me what asthma triggers are?
- ☐ How can I make my asthma better?
- ☐ How severe is my asthma?
- ☐ What can I do if someone is smoking around me?
- ☐ When should I stay indoors?
- ☐ Can I be around my pet?

Questions about asthma medicines:

- ☐ What do you call my asthma medicine?
- ☐ What medicine do I use when my chest is tight or when I wheeze or cough?
- ☐ Which asthma medicine do I take every day and why?
- ☐ How do I use a spacer?
- ☐ When should I use my medicine?
- ☐ How much medicine should I take each time I use it?
- ☐ How long do I hold my breath after I inhale my medicine?
- ☐ Why do I hold my breath after I inhale my medicine?
- ☐ How many times a day do I take it?
- ☐ Should I use my asthma medicine before I play or exercise?
- ☐ Is it okay to take my asthma medicine with my other medicines?
- ☐ Can you show me how to use my medicine?
- ☐ Can I show or tell you how I use my medicine so you tell me if I am doing it right?
- ☐ Should I always carry my asthma medicine with me?

Write any other questions you have in the space below:

Figure 1. Question prompt list.**Measurement**

Adolescent age, years the adolescent has been living with asthma, caregiver years of education, and provider age were measured as continuous variables. Adolescent and provider sex were measured as dichotomous variables. Adolescent and provider race were coded into five categories: Non-Hispanic White, African American, Native American/American Indian, Hispanic, or Other. Caregiver report of language spoken at home with their child was measured as English or Spanish. Asthma severity was

classified as mild persistent versus moderate/severe persistent according to the National Heart Lung and Blood Institute's guidelines (13,20). Reason for visit was measured as a dichotomous variable (asthma versus other [e.g. physical]). Whether the adolescent had Medicaid insurance was measured as a dichotomous variable (yes/no).

Communication during visit

All of the medical visit audio-tapes were transcribed verbatim. Three research assistants were trained to

Table 1. Adolescent and provider characteristics.

Characteristics	Intervention group (N = 185) Percent (N)	Usual care group (N = 174) Percent (N)	p value
Adolescent sex			
Male	58.9 (109)	55.2 (96)	0.522
Female	41.1 (76)	44.8 (78)	
Adolescent race/Ethnicity			
Caucasian	32.4 (60)	40.2 (70)	0.508
African American	38.4 (71)	36.2 (63)	
Hispanic	14.1 (26)	10.9 (19)	
Native American	13.0 (24)	9.8 (17)	
Other	2.2 (4)	2.9 (5)	
Adolescent has Medicaid insurance			
Yes	57.8 (107)	51.2 (89)	0.203
No	42.2 (78)	48.8 (85)	
Asthma severity			
Mild	49.2 (91)	44.3 (77)	0.397
Moderate/Severe	50.8 (94)	55.7 (97)	
Provider sex			
Male	33.5 (62)	32.2 (56)	0.823
Female	66.5 (123)	67.8 (118)	
Provider race/Ethnicity			
Caucasian	73.0 (135)	73.0 (127)	0.970
African American	11.4 (21)	10.9 (19)	
Asian American	4.9 (9)	6.3 (11)	
Hispanic	1.6 (3)	1.1 (2)	
Native American	9.2 (17)	8.6 (15)	
Other	0 (0)	0 (0)	
Family speaks Spanish at home			
Yes	10.3 (19)	6.9 (12)	0.255
No	89.7 (166)	93.1 (162)	
Reason for visit			
Asthma	68.1 (126)	64.9 (113)	0.52
Other (e.g. physicals)	31.9 (59)	35.1 (61)	
	Mean (Standard Deviation)	Mean (Standard Deviation)	p value
Adolescent age	13.2 (1.9)	13.2 (1.9)	0.655
Years living with asthma	9.2 (4.3)	9.9 (3.9)	0.10
Caregiver educational level-years	13.5 (3.1)	13.8 (3.5)	0.389
Provider age	44.2 (11.5)	44.0 (11.4)	0.912

code the transcripts using a detailed tool developed and used in prior asthma communication work (13,24,25). The transcriptionists and coders were blinded as to whether patients were in the intervention or usual care groups. Discussion of any triggers or specific triggers occurred during visits if the adolescent and provider simply discussed any of the triggers listed below without elaborating any further for the remainder of the visit. One example would be the provider saying, "It sounds like exercise is a trigger for you." Provider education about triggers was defined as the provider educating the adolescent during the visit about any of the triggers listed below. An example of education would be the provider telling the adolescent how to minimize the impact of a trigger. One example of provider education is the following "It sounds like exercise is an asthma trigger for you. One way to help reduce that is to take 2 puffs of your albuterol about 15 or 20 min before PE, especially on the days you are

going to be running." The following trigger areas were examined: allergies/pollen, colds, exercise, laughter, crying, chemical/cleaning products, candles, perfume, pets, mold, roaches, dust/dust mites, weather/season, and other. The other category included things such as general triggers, grass, and stress. Smoking was not examined as a trigger because discussion of smoking and smoking cessation is being examined in a separate in-depth analysis. The research assistants coded the following: (a) whether the adolescent asked one or more questions about asthma triggers, (b) whether the caregiver asked one or more questions about triggers, (c) how many trigger areas the provider discussed and (d) how many trigger areas the provider educated the family about during the visit. Three coders coded thirty-four of the same transcripts throughout the study period to assess inter-rater reliability. Inter-rater reliability ranged from 0.72 to 0.97 for the following communication variables: (a) whether the adolescent asked

Table 2. Provider and adolescent discussion of triggers and provider education of trigger areas by intervention ($N = 184$) or usual care ($N = 172$).

	Any trigger discussion, intervention group Percent (N)	Any trigger discussion, usual care group Percent (N)	Any trigger education, intervention group Percent (N)	Any trigger education, usual care group Percent (N)
Allergies/pollen	56.5 (104)	36.6 (63)***	35.9 (66)	15.7 (27)***
Colds	38.6 (71)	41.3 (71)	22.3 (41)	14.5 (25)
Exercise	59.2 (109)	51.7 (89)	34.8 (64)	24.4 (42)*
Laughter	0.5 (1)	1.7 (3)	0.5 (1)	0.6 (1)
Crying	0.5 (1)	0.0 (0)	0.5 (1)	0.0 (0)
Chemicals/Cleaning products	1.6 (3)	0.6 (1)	1.1 (2)	0.0 (0)
Candles	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
Perfume	2.7 (5)	1.2 (2)	1.6 (3)	0.6 (1)
Pets	15.1 (28)	4.1 (7)***	8.7 (16)	2.3 (4)**
Mold	3.2 (6)	0.6 (1)	1.6 (3)	0.6 (1)
Roaches	1.6 (3)	0.0 (0)	1.6 (3)	0.0 (0)
Dust/Dust mites	9.2 (17)	2.3 (4)**	5.4 (10)	0.6 (1)**
Weather/Season	57.1 (105)	38.4 (66)***	27.3 (50)	14.0 (24)**
Other	14.7 (27)	4.1 (7)***	9.7 (18)	1.7 (3)**

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ based on Pearson chi-square statistics.

one or more questions about asthma triggers was 0.92, (b) whether the caregiver asked one or more questions about asthma triggers was 0.97, (c) the number of trigger areas that were discussed during the visits was 0.86, and (d) the number of trigger areas the provider educated the family about was 0.72.

Analysis

All analyses were conducted using SPSS (IBM SPSS, Armonk, New York). Adolescent and provider race were recoded into dichotomous variables (White, non-White). First, we computed descriptive statistics for all variables. Next, we described the asthma trigger areas discussed during visits and the areas providers educated about by intervention and usual care group. Finally, we used Generalized Estimating Equations (GEE) with the linear link to predict the number of asthma trigger areas that providers and adolescents discussed and the number of asthma triggers areas that providers educated families about during visits. We used GEE to handle the correlation of responses within providers.

The independent variables in the GEE model included: adolescent group assignment (intervention or usual care), whether the adolescent asked one or more questions about triggers, whether the caregiver asked one or more questions about triggers, adolescent gender, race, age, years living with asthma, asthma severity, reason for visit, years of caregiver education, whether the family speaks Spanish at home, adolescent has Medicaid insurance, provider age, gender, and race.

Results

Forty-six providers agreed to participate in the study and 40 of these providers enrolled patients. Providers

ranged in age from 28 to 62 (mean age = 41.2, standard deviation = 11.2). Twenty-seven of the 40 providers who had patients enrolled into the study were female. Four providers were Native American, three were African American, three were Asian American, 29 were White, and one was Hispanic.

Participants were enrolled from June 2015 to November 2016. Three hundred and fifty-nine of 469 screened adolescents and their caregivers were eligible and enrolled. One hundred and ten did not meet inclusion criteria. Fifty-three refused to participate (87% participation rate). Of the 359 eligible families, 185 were randomly allocated to the experimental intervention group and 174 were allocated to the control group or usual care. We have conducted our analysis using 356 adolescents because three of the visits were not properly audio-tape recorded. Table 1 presents the demographic characteristics by whether adolescents were randomized to the intervention or usual care. The groups were balanced on all adolescent and provider demographic characteristics. Nine percent of caregivers reported that they spoke Spanish at home; 91% spoke English at home.

Ten percent of adolescents asked one or more questions about triggers during their medical visits, 16.3% of adolescents in the intervention group and 2.3% in the usual care group (Pearson chi-square = 20.11, $p = 0.00$). Seven percent of caregivers asked one or more questions about triggers during their medical visits, 8.2% of caregivers in the intervention group and 6.4% in the usual care group (Pearson chi-square = 0.40, $p = 0.52$).

There was a discussion of triggers during 86% of adolescent visits. Providers were significantly more likely to discuss triggers with adolescents in the intervention group than adolescents in the usual care

Table 3. GEE estimating the number of asthma trigger areas providers and adolescents discussed and the number of areas providers educated families about ($N = 356$).

Independent variables	Increase/Decrease in number of trigger areas discussed Beta (CI 95%)	Increase/Decrease in number of trigger areas provider educated families about Beta (CI 95%)
Adolescent received intervention	0.53 (0.23, 0.84)**	0.54 (0.19, 0.89)**
Adolescent asked one or more questions about triggers	1.9 (1.2, 2.6)***	1.7 (1.1, 2.4)***
Caregiver asks one or more questions about triggers	−0.37 (−0.81, 0.08)	−0.27 (−0.71, 0.18)
Adolescent sex-male	0.40 (0.06, 0.74)*	0.22 (−0.07, 0.51)
Adolescent race-White	0.40 (0.02, 0.78)*	0.26 (−0.62, 0.09)
Adolescent age	0.01 (−0.05, 0.06)	0.01 (−0.06, 0.06)
Years living with asthma	−0.01 (−0.04, 0.02)	−0.02 (−0.05, 0.02)
Asthma severity-moderate/severe	−0.04 (−0.35, 0.28)	−0.04 (−0.31, 0.23)
Caregiver education (in years)	0.02 (−0.03, 0.07)	0.14 (−0.27, 0.06)
Reason for visit-asthma	0.26 (−0.03, 0.54)	0.23 (−0.13, 0.58)
Family speaks Spanish at home	−0.49 (−0.99, 0.02)	0.41 (0.05, 0.78)*
Adolescent has Medicaid insurance	0.08 (−0.33, 0.48)	−0.01 (−0.33, 0.31)
Provider age	0.02 (0.01, 0.03)*	0.01 (−0.01, 0.02)
Provider sex-female	−0.25 (−0.65, 0.16)	−0.20 (−0.44, 0.04)
Provider race-White	−0.17 (−0.60, 0.26)	−0.07 (−0.40, 0.25)

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Note. CI = confidence interval.

group (89% compared to 81%; Pearson chi-square = 4.4, $p = 0.04$). Table 2 presents the extent to which providers and adolescents discussed triggers during visits by intervention and usual care group.

Providers educated about triggers during 52% of adolescent visits. Adolescents in the intervention group were significantly more likely to be educated by providers than adolescents in the usual care group (59% compared to 46%; Pearson chi-square = 6.3; $p = 0.01$). Table 2 also presents the extent to which providers educated about triggers during visits by intervention and usual care group. Adolescents in the intervention group were significantly more likely to be educated by providers about triggers, allergies/pollen, dust/dust mites, exercise, weather/season, pets and other triggers than adolescents in the usual care group.

Providers and adolescents discussed an average of 2.24 trigger areas (standard deviation = 1.62, range = 0–10). Table 3 presents the GEE results predicting the number of trigger areas that were discussed during visits. The betas illustrate the increase or decrease in the number of trigger areas discussed. For example, significantly more triggers were discussed if the adolescent was in the intervention group than in control group (0.53 triggers on average) and this was independent of whether the adolescent asked one or more questions. When an adolescent asked one or more questions, an additional two triggers were discussed independent of whether they received the intervention or not. Being White and male and seeing an older provider significantly increased the likelihood of more trigger areas being discussed during an adolescent's visit.

Providers educated adolescents about an average of 1.14 trigger areas (standard deviation = 1.46, range 0–9). Table 3 presents the GEE results predicting the number of trigger areas that providers educated adolescents about. The betas show the increase or decrease in the number of trigger areas that the provider educated about. For example, providers educated about significantly more triggers if the adolescent was in the intervention group compared to the control group (0.53 triggers on average) and this was independent of whether the adolescent asked one or more questions. When an adolescent asked one or more questions about triggers, providers educated about an additional 1.7 trigger areas, independent of whether they received the intervention or not. A family speaking Spanish at home significantly increased the likelihood of providers educating about triggers.

Discussion

It was interesting that the findings from this study were similar to an observational study of trigger communication conducted 10 years ago. The current study found that adolescents and providers discussed triggers during 86% of visits (89% in the intervention group versus 81% in the usual care group), and the study conducted ten years ago also found that triggers were discussed during 86% of visits (10). Similarly, we found that providers educated 52% of adolescents about triggers during visits (59% in the intervention group versus 46% in the usual care group); the previous study found that providers educated adolescents about triggers during 46% of visits (10). Therefore, our adolescent question prompt list/video intervention

has the potential to increase provider education about triggers during visits (26).

The areas that providers were significantly more likely to educate youth in the intervention group about included allergies/pollen, exercise, pets, dust/dust mites, weather/season and other. The other area that providers educated about quite a bit but was not significantly different between groups was colds (22% intervention group versus 15% usual care group). Trigger areas that were discussed very rarely during visits of both intervention and usual care group patients included chemicals/chemical cleaners, candles, perfume, mold, and roaches. Perhaps questions could be added to the question prompt list in the future to encourage adolescents to ask questions about these triggers. In fact, future research could design a trigger-specific question prompt list for adolescents with questions only about triggers. Holley et al. (7) suggested that providers use a trigger checklist with adolescents and then discuss strategies to minimize exposure or increasing medication before exposure. A question prompt list also would encourage the adolescents to ask the provider their specific trigger questions.

Providers and adolescents were significantly more likely to discuss more trigger areas and providers were significantly more likely to educate about more trigger areas if the adolescent asked one or more questions about triggers during visits. This finding illustrates the importance of encouraging adolescents to ask questions during visits. Question prompt lists like the one used in this study are one way to increase adolescent question-asking during visits (26). Providers could ask caregivers to leave the room for part of the visit so that adolescents could have a chance to ask all of their questions that they might feel uncomfortable asking in front of their caregivers (e.g. messiness of house, poor indoor air quality).

Providers were significantly more likely to discuss more triggers with male adolescents than with females during visits. Additionally, providers and adolescents were significantly more likely to discuss more triggers if the adolescent was White. Future research should examine why these gender and racial disparities in discussion of triggers existed.

Providers educated adolescents whose families spoke Spanish at home about significantly more triggers than families who spoke English at home. Our trigger video is available in Spanish and English on YouTube (27,28). Contrary to prior work, we did not find that reason for visit was associated with provider education about triggers (10). Part of this could be

because the current study was a randomized trial of a pre-visit intervention to improve adolescent question-asking and being in the intervention group and the adolescent asking one or more trigger questions were significantly associated with the number of trigger areas that the provider educated the adolescent about.

Prior research has shown that providers cite lack of time as a reason for not discussing asthma triggers during medical visits (6,9). If adolescents completed the asthma question prompt list before visits, this would allow the provider to focus their education on the key questions that adolescents had for them. In fact, we found that the asthma question prompt list did not significantly increase the length of the adolescents' visits.

The study is limited in generalizability in that it was conducted in four pediatric clinics in North Carolina. Another limitation is that we do not know how many patients who the clinic staff referred chose not to talk to the research assistant. However, we could not ask the clinic staff to track these numbers because of the busyness of the clinics and our promise not to interrupt flow. Even though adolescents were randomized within providers, there was no evidence of contamination since the intervention was successful at increasing adolescent question-asking in the intervention group but not the usual care group. The adolescents were enrolled over a 15-month period so each clinic enrolled approximately five to eight patients a month and the patients enrolled each month were spread across many providers at each clinic so contamination was unlikely. Another limitation is that we did not include smoking as a trigger in this manuscript because smoking was coded as discussion of environmental control and we are examining provider-patient communication about smoking and smoking cessation in a separate in-depth analysis. Despite the study limitations, the study provides important new information on the relationship between the use of a pre-visit asthma question prompt list/video intervention and increased discussion and education about triggers.

Declaration of interest

The authors have indicated they have no financial relationships relevant to this article to disclose.

Contributors' statement

Drs. Sleath and Tudor contributed to conceptualization and the design of the study, data analysis and

interpretation of data, and they drafted the initial manuscript. Drs. Davis and Sayner contributed to data analysis and interpretation of data and they reviewed and revised the manuscript. Nacire Garcia and Drs. Lee, Carpenter, Reuland, and Loughlin contributed to the conception and design of study, acquisition of data, and they reviewed and revised the manuscript. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work

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