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Inhaled corticosteroid beliefs, complementary and alternative medicine and uncontrolled asthma in urban minority adults

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Abstract

Background—Many factors contribute to uncontrolled asthma; negative inhaled corticosteroid (ICS) beliefs and complementary and alternative medicine (CAM) endorsement are two that are more prevalent in Black as compared to White adults.

Objectives—This mixed methods study 1) developed and psychometrically tested a brief self-administered tool with low literacy demands to identify negative ICS beliefs and CAM

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endorsement and; 2) evaluated the clinical utility of the tool as a communication prompt in primary care.

Methods—Comprehensive literature reviews and content experts identified candidate items for our instrument that was distributed to 304 individuals for psychometric testing. In the second phase, content analysis of 33 audio recorded primary care visits provided a preliminary evaluation of the instrument's clinical utility.

Results—Psychometric testing of the instrument identified 17 items representing ICS beliefs (α .59) and CAM endorsement (α .68). Test-retest analysis demonstrated a high level of reliability (ICC .77 for CAM items and .79 for ICS items). We found high rates of CAM endorsement (93%), negative ICS beliefs (68%), and uncontrolled asthma (69%). CAM endorsement was significantly associated with uncontrolled asthma ($p=.04$). Qualitative data analysis provided preliminary evidence for the instrument's clinical utility in that knowledge of ICS beliefs and CAM endorsement prompted providers to initiate discussions with patients.

Conclusion—Negative ICS beliefs and CAM endorsement were common and were associated with uncontrolled asthma. A brief self-administered instrument that identifies beliefs and behaviors that likely undermine ICS adherence may be a leveraging tool to change the content of communication during clinic visits.

Keywords

asthma; self-management; instrument development; beliefs; complementary and alternative medicine (CAM); inhaled corticosteroids; adherence; Black; minority; urban; mixed methods; patient-provider communication

Introduction

Inhaled corticosteroids (ICS) are the mainstay of asthma management for individuals with persistent disease ⁽¹⁾; with the correct use of ICS, a significant number of asthma attacks and other complications are preventable. ⁽¹⁾ However, ICS adherence is disappointingly low in all patient populations due, in part, to patients' ambivalence about the need for ICS during symptom-free periods, as well as concerns about effectiveness and safety. ⁽²⁻⁷⁾ Recent studies suggest that personal beliefs about asthma and its pharmacologic treatment are among the most significant factors affecting adherence. ^(4,8-11) Further, different racial groups use ICS at different rates even when barriers to access have been removed. ^(3,12,13) Le and colleagues ⁽¹²⁾ offer a conceptual framework that describes the potential relationship between minority status, ICS beliefs and adherence. In testing the model, negative beliefs about ICS therapy were more prevalent in Blacks than Whites and partially mediated the relationship between minority status and adherence to ICS therapy. Negative ICS beliefs held by Black adults with asthma include the fear of being overmedicated, of developing tolerance or addiction to ICS, of serious side effects, and concerns that ICS is a form of medical experimentation. ^(3,4,6,7,12,14-16)

Previous research has shown lower rates of ICS adherence in individuals who endorse complementary and alternative medicine (CAM) modalities. ^(7,14,17) CAM is defined as a group of diverse medical and healthcare systems, practices, and products that are not

generally considered to be part of conventional medicine.⁽¹⁸⁾ When defined broadly, CAM encompasses mind-body interventions, natural products and approaches such as folk medicine, home remedies and spirituality.⁽¹⁸⁾ These latter types of CAM are common, and often include culturally-specific health recommendations such as the benefits of fresh air or avoiding cold weather or rain which are perceived as causing an enhanced susceptibility to colds and viruses^(7, 19, 20). In our previous work, we have found that as many as 88% of urban Black adults with asthma prefer to use both conventional medical therapies and culturally-relevant CAM together for asthma, an approach referred to as integrated therapies or integrated medicine.⁽²⁰⁾ A preference for CAM in Black populations has been attributed to culture-bound traditions resulting from historical inequalities in access to, and racism experienced in, the healthcare system, greater distrust of healthcare providers and a preference for less conventional care.^(21,22)

Although the efficacy of most CAM therapies has not been established, the majority are thought to be innocuous, with a few exceptions.^(7,23-26) However, behaviors associated with CAM use may contribute to poor asthma outcomes when for example, CAM therapies are substituted for ICS and for short-acting β -2 agonists (SABAs), and lead to delays in seeking healthcare.⁽²⁷⁾

Evidence suggests that patient-provider discussion of CAM endorsement and negative ICS beliefs may not routinely occur.^(28,29) Patients may not disclose, even if asked, fearing a disruption to the therapeutic alliance.^(14,29-31) Blacks may be less likely to disclose CAM use than Whites.^(32,33) The goal of this mixed-methods study therefore was to develop and psychometrically test a brief questionnaire with low literacy demands, the *Complementary and Alternative Management for Asthma (CAM-A)* instrument, and evaluate its clinical utility in prompting conversations about CAM endorsement or negative ICS use during brief primary care visits with urban minorities.

Methods

Overview

The initial phase of instrument development began with the identification of the target concept, composition of the items and construction of the item pool. This was accomplished by conducting a literature review and literacy assessment, as well as by convening content experts. This was followed by psychometric testing to determine the properties of the item bank and to test the format of the instrument. The goal of the psychometric testing phase was to reduce the number of items to their most parsimonious form and to produce data that was valid (measures the construct of interest), reliable (reproducible), and that had clinical utility. In this study, reliability was established through item reduction and stability testing. We focused on content (items were developed using experts in the field), construct (items represent the variables being investigated) and concurrent criterion validity (assessment tools effectively indicate the construct). We also explored the association between the instrument's score and level of asthma control. Lastly, we evaluated the clinical utility of the instrument using qualitative content analysis of audio recordings of, and debriefings after, primary care clinic visits.

Instrument development phase

Identification of the target concept, composition of the items and construction of the item pool—

A comprehensive literature review and the results of the team's previous qualitative studies ^(7,20) were used to identify potential items related to ICS beliefs and CAM endorsement to develop the initial instrument. From 115 items, we excluded items reflected in case reports and phenomena of rare occurrence, thereby leaving 45 candidate items. Next, a group of 16 content experts (2 certified asthma educators, 8 primary care physicians, 2 allergists and 4 adults living in a Philadelphia zip code who self-identified as Black with physician-diagnosed persistent asthma) assessed the content validity of the 45 items. No item was retained if 25% (4+) or more of the content experts felt it was “very unlikely” to be endorsed unless one asthma patient and two other content experts characterized it as “very likely” to be endorsed. Using this decision tool, 35 candidate items were retained and 4 additional items were added. This first iteration of the *Complementary and Alternative Management for Asthma (CAM-A)* questionnaire included the 39 items identified by our content experts: 21 CAM items and 18 ICS items. The *CAM-A* was written at a 5.7 Flesch-Kincaid reading level with a calculated Flesch Reading Ease of 72.9 (Fairly Easy).

Psychometric testing phase

Establishing properties of the item bank, formatting and item reduction—

The initial phase of psychometric testing was conducted in a convenience sample of 210 minority (most self-identified as Black) adults (18 years of age) with persistent asthma living in a Philadelphia zip code. Inclusion criteria included that participants be prescribed ICS for provider-diagnosed persistent asthma. Exclusion criteria included inability to speak English or to understand the informed consent process. This was a multi-center study with participants recruited from one federally qualified health clinic, two family medicine practices and two internal medicine practices, representing 3 health systems. Participants were identified via review of electronic health records, were referred by their primary care providers or self-referred into the study in response to posted flyers. When medical records were not available for review, self-referred subjects were required to bring their prescription ICS medicines and photo identification to the study visit to confirm that they had been dispensed an ICS for persistent asthma.

Establishing initial validity—As a result of item reduction, the 39 item questionnaire was reduced to 17 items. Candidate items for removal were those with more than 5% missing data (no item met this criterion) and items where more than 70% of the responders chose one end of the scale (“floor” or “ceiling” effects): five items met this criterion. An analysis of the inter-item correlation matrix showed that 17 item pairs had correlations of greater than 0.4. The decision as to which of the highly correlated items to keep was based on their clinical relevance and clarity determined through cognitive interviewing, described elsewhere. ⁽³⁴⁾ These 17 items were then submitted to principle components analysis using varimax rotation ⁽³⁵⁾ which confirmed two domains: CAM endorsement (9 items; Cronbach's α coefficient = .68) and ICS beliefs (8 items; 6 reflecting negative beliefs and 2 indicating positive beliefs; Cronbach's α coefficient = .59).

Establishing reliability—The 17 item questionnaire was then re-tested in a second convenience sample of 94 adults meeting the same inclusion/exclusion criteria as those recruited in the item reduction phase (see Table I). In this phase, we recruited from the federally qualified health clinic and the two internal medicine practices used previously, again representing 3 health systems. Forty-one of the 210 subjects (19.5%) who had participated in the initial psychometric testing phase more than six months earlier were allowed to re-enroll in this second phase of testing.

In this phase, the instrument was administered twice; the second administration occurred 2-4 weeks after the initial administration. Test-retest analysis demonstrated that the median item difference score was equal to 0, indicating consistency between responses in the test and re-test phases. The intraclass correlation coefficient was 0.77 for the CAM items and 0.79 for the ICS beliefs items; these values indicate a high level of agreement between the responses in test re-test phases. ⁽³⁶⁾

Examining the instrument's predictive ability—The predictive ability of CAM-A to identify level of asthma control (controlled/uncontrolled) was examined in exploratory regression modeling using the two subscales separately. First, we dichotomized the CAM-As 7-point Likert scale (1 'strongly disagree' to 7 'strongly agree') in the following manner. Responses 1-4 were characterized as not endorsing CAM or not holding negative ICS beliefs, Responses 5-7 were characterized as endorsing CAM or holding negative ICS beliefs. A cumulative score were calculated by summing up the individual items endorsed by each participant. For CAM endorsement the cumulative score ranged from 0-9 (higher scores representing more CAM endorsement), representing the 9 CAM items. For negative ICS beliefs the range was 0-6 (higher scores representing more negative ICS beliefs), representing the 6 negative ICS belief items (2 ICS items reflected positive endorsement and were not included).

Next, using metrics recommended by the national guidelines, ⁽¹⁾ asthma control was calculated using two standard patient-reported outcomes: the number of SABA doses in the prior 7 days and/or the number of nocturnal awakening due to asthma in the prior 30 days. Participants were classified as 'Well-controlled' (SABAs ≤2 days per week and/or awakenings ≤2× per month), 'Not Well-Controlled' (SABAs >2 days per week and or awakenings 1–3× per week) or 'Very Poorly-Controlled' (SABAs several times a day and/or awakenings ≥4× per week). For the purpose of analysis and interpretation we then collapsed the two categories of uncontrolled asthma ('Not Well-Controlled' and 'Very Poorly Controlled') into one category ('Uncontrolled') which allowed us to characterize participants as either 'Controlled' or 'Uncontrolled'.

Statistical analysis

Statistical analysis was performed using the SPSS v. 20 statistical analysis package. ⁽³⁷⁾ Demographic categorical variables were summarized by frequencies, while continuous variables were summarized by the mean and 95% confidence intervals, median, standard deviation and range. We also executed logistic regression models that included variables that were significant in bivariate comparisons.

Procedures for qualitative data collection at the primary care clinic visit (audio recordings and debriefings)

A convenience sample of 33 patients and 10 providers was recruited from 3 of the sites (representing 3 health systems) used for instrument development: the federally qualified health clinic and the two internal medicine practices. We chose these sites because they were busy practices with high rates of asthma and a largely minority patient panel. Providers were eligible for enrollment if they were either a medical doctor or a nurse practitioner responsible for the care of a panel of adults with persistent asthma. Providers received no training about this project. Informed consent simply stated that this was a study to learn more about how providers and patients talk about asthma. Patient participants were either identified by electronic medical records, their primary care providers or self-referred into the study in response to posted flyers; these patient participants met identical inclusion and exclusion criteria as used in the instrument development and psychometric testing phase. Five subjects (15%) who had previously participated in the initial phase of psychometric testing (establishing the item bank, formatting and item reduction) were allowed to enroll in this qualitative data collection phase as they had completed the instrument more than 18 months earlier (range 18-44 months, mean 30 months) and were not likely to recall the content of the instrument. After qualitative data collection was complete, subjects were invited to return in 2-4 weeks to contribute data towards the test-retest stability (reliability) phase; all 33 did so.

Because we were interested in the influence of the *CAM-A* on clinic visits, we implemented a protocol to assign half of the visits to receive *CAM-A* reports prior to the visit, and half did not receive *CAM-A* reports. Providers were allowed to participate up to 6 times (with different patients); patients participated only once. Each time a new provider was enrolled the *CAM-A* was administered to the patient after the visit was complete, meaning neither the provider nor the patient could be influenced by having seen the *CAM-A*. However, if the provider participated more than once, then the *CAM-A* administration was alternated at each visit, either before or after. Using this pattern, providers did not see the *CAM-A* summary report the 1st, 3rd and 5th time they participated but providers were given *CAM-A* summary report with their 2nd, 4th and 6th patients. Three providers participated only once, 1 provider twice, 3 providers 4 times, 2 providers 5 times, and 1 provider 6 times. When providers participated more than once, we attempted to space the visits out over several weeks to reduce contamination from previous exposure to the *CAM-A*; an average of 23 days elapsed between visits when providers participated more than once.

Immediately after all 33 visits both patients and providers were debriefed by the RA to determine what they perceived to be the key discussion points during the visit and what they had learned about asthma self-management at that visit. The debriefing was a 3-item RA-administered paper-and-pencil tool. Patients and providers were asked to elaborate on any 'yes' answers. The patient debriefing asked patients to recall if the visit had included any discussions about non-pharmacologic management of asthma or personal ICS beliefs. Patients were also asked to evaluate the ability of the provider to advise them regarding CAM. The provider debriefing tool asked if they had learned anything new about their patient's asthma management or ICS beliefs from the visit. In addition, providers were asked

to comment on their confidence in responding to patient's questions about CAM. The accuracy of the debriefings was confirmed by review of transcripts.

Ethical considerations

The Institutional Review Boards (IRB) of the University of Pennsylvania and Thomas Jefferson University approved the study. The University of Pennsylvania served as the IRB of record for the federally-qualified health center. Both patient and provider participants provided informed consent. Patient participants received a \$20 cash payment for their participation in the item development phase, \$50 for their involvement in the psychometric or clinical utility testing, as well as tokens or cash to cover their transportation and parking costs. Provider participants received a prepaid debit card (\$100) after debriefings.

Results

We enrolled a total of 304 adults with persistent asthma (77% female; 78% Black/African American; 81% high school education; mean age 49.7) into the psychometric testing phases of the study. We evaluated the clinical utility of using the CAM-A in an additional 33 adults with persistent asthma (97% female; 100% Black/African American; 83% high school education; mean age 48.1) and their 10 primary care providers (5 physicians; 5 nurse practitioners; 80% female; 80% White, a mean of 18.3 years in practice) (see Table I).

Prevalence of CAM endorsement

Endorsement of CAM for asthma self-management was high with 93% of participants endorsing at least one CAM behavior for asthma self-management. The importance of fresh air/air movement was most popular (67%), followed by water (42%), steam or prayer (38%), and coffee (20%). An item about the importance of finding natural ways to manage asthma was endorsed by 82% (see Table II).

Prevalence of ICS beliefs

There was high endorsement for the need for daily ICS (75%) and a belief that ICS use controlled asthma (82%). However, negative ICS beliefs were also common with 68% of participants identifying at least one negative belief. Forty-two percent of participants believed they were the best judge of whether ICS was needed. Twenty-three percent expressed fears of tolerance from regular use and 12% believed that ICS could cause cancer or organ failure (see Table II).

Predictive ability of CAM-A to identify level of asthma control

Most participants (69%) were characterized as having uncontrolled asthma. We explored whether CAM endorsement or negative ICS beliefs were associated with asthma control. To conduct the analysis, we first examined the bivariate differences in clinical/socio-demographic variables and prevalence of CAM/ICS beliefs in individuals with controlled and uncontrolled asthma.

We found that race, educational level, insurance status, CAM and ICS beliefs differed significantly between the participants with controlled and uncontrolled asthma. Specifically,

Black race, lower educational attainment, higher CAM endorsement and more negative ICS beliefs were all associated with uncontrolled asthma. Logistic regression models found that CAM endorsement ($p=.04$) and lower levels of education ($p=.011$) were significantly associated with uncontrolled asthma. A one unit increase in cumulative CAM endorsement score (described above) increased the odds of uncontrolled asthma by 1.41. Further, participants with less than a high school degree were almost ten times more likely to experience uncontrolled asthma than participants with college or post graduate degrees (see Table III).

Preliminary evaluation of clinical utility—Lastly, we evaluated the clinical utility of using the *CAM-A* at 33 primary care visits. At 15 of the 33 visits (45%), providers were given their patients' *CAM-A* summary report prior to the audio recorded visit; at 18 visits the *CAM-A* was administered after the audio recorded visit and the providers did not receive *CAM-A* results. The length of the primary care visits ranged from 9 to 50 minutes with a median time of 22 minutes (which included 6 minutes of silence) in both groups (see Table IV).

Of the providers given patients' *CAM-A* summary reports prior to the visit, during 80% of the visits, providers reported that they learned something new about their patients' asthma self-management. This included new knowledge about negative ICS beliefs (e.g., fears about developing tolerance or addiction) and culturally-relevant CAM behaviors (e.g., use of fans, black coffee, tea, and prayer for asthma self-management). These data provide support for the *CAM-A*s construct validity.

If the providers did not receive *CAM-A* data, 39% reported that they learned something new. However, debriefings indicated that providers felt confident in their ability to address negative ICS beliefs or advise their patients on CAM in only 15 of 33 (45%) visits.

When providers knew their patients' *CAM-A* summary report, 73% of patients reported that their provider initiated a dialogue on the correct use of ICS, their negative ICS beliefs or non-pharmacologic management of asthma (e.g., diet and weight loss, adequate hydration, exercise, breathing techniques, and herbal preparations). Importantly, 85% characterized their provider as “able to advise and answer questions” about CAM despite the providers low self-rating.

The accuracy of the patient and provider debriefings was verified by review of the audiotaped clinic visit (concurrent criterion validity). Audio recordings also revealed that providers did not initiate any discussion about negative ICS beliefs at visits in which they did not see *CAM-A* summary report despite having seen the *CAM-A* previously. This was also true for CAM discussions with the exception of one provider who participated multiple times; this provider initiated a discussion about CAM use at a visit in which the *CAM-A* had not yet been administered. These data suggest that the washout period was generally adequate.

Patients never initiated discussions about negative ICS beliefs or CAM use when the *CAM-A* summary report was shared with their provider. Only once did a patient initiate a discussion

of CAM with their provider and this was at a visit in which the *CAM-A* had not yet been administered. Blinded transcriptionists characterized 88% of the clinic visits as having a friendly tone even when negative ICS beliefs or CAM endorsement was discussed. Together, these data provide preliminary evidence for the clinical utility of the *CAM-A*.

Discussion

We developed a robust measure of negative ICS beliefs and CAM endorsement and have preliminary evidence of its clinical utility as a communication prompt in a multi-center primary care study. This study documents high prevalence of CAM use and negative ICS beliefs in urban minority adults with asthma. To our knowledge, this is the largest study of these beliefs and behaviors in Black adults and is the only study in minority adults to associate negative ICS beliefs and a broad range of culturally-relevant CAM behaviors with poor disease control.

In bivariate comparisons we observed that Black race, lower educational attainment, higher CAM endorsement and more negative ICS beliefs were associated with poorer asthma control. However, in the logistic regression model only lower educational attainment and higher CAM endorsement predicted uncontrolled asthma. The logistic regression model also identified a trend ($p = 0.099$) towards more negative ICS beliefs and greater likelihood of having uncontrolled asthma, supporting a link between disease control and non-adherence due to negative ICS beliefs^(3, 12) and CAM use^(38,39) reported by others. This has important research implications since both CAM endorsement and negative ICS beliefs are potentially modifiable barriers to adherence. Greater concordance in patients' and providers' treatment preferences has been shown to improve medication adherence in other chronic diseases, such as acute coronary syndrome⁽⁴⁰⁾ diabetes⁽⁴¹⁾ and hypertension⁽⁴²⁾.

Providers do not routinely ask patients about their CAM use or negative ICS beliefs perhaps due to the limited time with patients that forces providers to focus on traditional medications to the exclusion of other important topics. Or providers may fail to appreciate the clinical relevance of these beliefs and behaviors on medication adherence. Patients do not volunteer this information. A reluctance to disclose CAM use may be rooted in patients' fears that their provider will not respond approvingly, or will become angry, ridicule them, or be unable to engage in a knowledgeable discussion of CAM. Although these types of responses have been reported⁽⁴³⁾ they are not typical of current patient-centered management styles. In addition, there are many reasons why disclosures are necessary, particularly when patients are using dangerous types of CAM or when CAM use contributes to unnecessary delays in seeking medical attention.^(6, 20, 26)

Negative ICS beliefs are not likely to be modified by educational interventions alone. These beliefs may reflect trepidation about ICS side effects (e.g., osteoporosis, blood sugar and blood pressure elevation, weight gain, bruising) that may be legitimately concerning patients and causing them to decline ICS use, as well as deep-rooted distrust of the medical establishment that often has a historical basis. Minority patients' fear of being exploited or experimented on will require long-term engagement by the provider if patients' treatment beliefs are to be more closely aligned with the medical model. Motivational and cognitive-

behavioral interventions may be more effective strategies for both engaging and changing patients' ICS beliefs than educational strategies alone. Therefore, openly discussing these beliefs and negotiating for a mutually acceptable disease management plan are necessary first steps to optimizing patient outcomes.

Our study also found an association between low educational attainment and asthma control which suggests an important clinical role for the *CAM-A*s use. Although it is unclear what role health literacy played in this association, low health literacy has been linked to negative medication beliefs ⁽⁴⁴⁾ as well as other measures of low socioeconomic status implicated in a wide range of poor clinical outcomes ⁽⁴⁵⁾. The *CAM-A* questionnaire may be useful in clinical practice because it is brief, can be self-administered, has low literacy demands, and can quickly identify areas around medication beliefs for discussion. In this study, knowing patients' beliefs or behaviors prompted providers to initiate a conversation with their patients. These discussions, while not lengthening the time of the office visit, appeared to change the content of the clinical conversation. Patients never initiated these discussions.

High rates of CAM endorsement and negative medication beliefs is a compelling area for future research and supports the need for clinical models of care to enhance patient-provider communication and shared decision-making. When providers have knowledge of patients' "hidden" beliefs and behaviors, a discussion of the risks and merits associated with treatment options can help reconcile differences. These conversations may lead to higher quality decisions that best match patients' needs with evidence-based recommendations ^(46,47). This model has been applied to asthma where ICS adherence, asthma quality of life, pulmonary function, and disease control improved in those in the shared decision making condition ⁽⁴⁸⁾. Improved ICS adherence has also been reported in a randomized controlled trial of treatment negotiation delivered at home visits in inner-city children with asthma ⁽⁴⁹⁾ and in a quasi-experimental study of office-based treatment negotiation in rural children with asthma ⁽⁵⁰⁾. Approaches such as these should be evaluated for their usefulness in urban minority adult populations.

There are several important limitations of this study. There is a potential for selection bias when participants are either referred or are recruited as part of a convenience sample. Enrolled participants are likely different from those who declined participation. The generalizability of these findings is limited by the use of a sample from one geographic location. The *CAM-A* may require validation in other populations. There is also the risk that participants over reported CAM use or negative ICS beliefs (Hawthorne effect) and that self-reported asthma control may be inaccurate due to recall bias. It should also be noted that the reliability of the ICS items (α .59) was lower than desired. In future studies we plan to validate the *CAM-A* with an outcome measuring ICS adherence and to comprehensively assess control using validated questionnaires, objective measures of lung function and additional patient-reported outcomes.

In conclusion, we have developed a robust self-administered questionnaire that captures CAM endorsement and negative ICS beliefs in urban minority adults with persistent asthma. We also offer preliminary evidence of its clinical utility in prompting providers to initiate conversations about beliefs and behaviors not typically discussed but that likely undermine

adherence to medical advice. It is the provider who must take responsibility for eliciting this information and for responding in a manner that strengthens the partnership with the patient. Further research is needed to fully understand the clinical value that such patient-provider communication might have on enhanced disease control.

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Abbreviations

ICS	inhaled corticosteroid
CAM	complementary and alternative medicine

Clinical Implications

Patient-provider discussions about CAM endorsement and negative ICS beliefs may not routinely occur. This study demonstrates that both are associated with uncontrolled asthma and likely undermine ICS adherence.

Table I
Patients' characteristics N=337

Characteristics (N=337)	
Age Mean (SD)	47.2 (12.8)
Gender n(%)	
Male	72 (21.4%)
Female	265 (78.6%)
Race n(%)	
Black/African American	270 (80.1%)
White	48 (14.2%)
Other *	19 (5.6%)
Marital status n(%)	
Single	150 (44.5%)
Married	90 (26.7%)
Divorced/Separated	76 (22.6%)
Widowed	21 (6.2%)
Occupation n(%)	
Unemployed	140 (41.5%)
Manual/service	43 (12.8%)
Skilled professional	79 (23.4%)
Student	12 (3.6%)
Retired	38 (11.3%)
Other (chef; EMS; on disability)	24 (7.1%)
Highest educational level n(%)	
Some high school	62 (18.4%)
Completed high school/obtained GED or vocational training	129 (38.3%)
Some college	80 (23.7%)
College graduate/post graduate	64 (19.0%)
Insurance n(%)	
Medicaid	129 (38.3%)
Medicare/SSI	71 (21.1%)
Commercial	111 (32.9%)
Other	25 (7.4%)
Income n(%)	
\$0-9,999	131 (38.9%)
\$10-19,999	62 (18.4%)
\$20-29,999	38 (11.3%)
\$30-39,999	30 (8.9%)
\$40-49,999	30 (8.9%)
\$50,000	32 (9.5%)
Refused to disclose	18 (5.3%)
Age when first diagnosed with asthma mean (SD)	23.6 (17.8)

Characteristics (N=337)	
Level of asthma control [^] n(%)	
Controlled asthma	114(30.9%)
Uncontrolled asthma	233(69.1%)

* Other category included: American Indian/Alaskan Native; Asian; Native Hawaiian/Pacific Islander.

[^] Albuterol use > 3 in last 7 days or nocturnal awakening > 3 in last 30 days

Table II
Conventional and Alternative Management for Asthma (CAM-A)* instrument items n = 304

Item	Item Domain	n (%) Positive Response
(Insert BRAND NAME ICS) controls my asthma	+ ICS belief	250 (82%)
Having air movement from a fan, air conditioner or open window helps my asthma	CAM endorsement	202 (66%)
I need my (insert BRAND NAME ICS) every day	+ ICS belief	227 (75%)
It is important to me that I find a natural way to treat my asthma	CAM endorsement	128 (42%)
Drinking water helps my asthma	CAM endorsement	128 (42%)
I am the best judge of whether I need to take my (Insert BRAND NAME ICS)	- ICS belief	127 (42%)
Steam or warm things on my chest helps my asthma	CAM endorsement	116 (38%)
Praying, or having someone pray for me, helps my asthma	CAM endorsement	114 (37%)
My asthma can get worse if I go out with a wet head	CAM endorsement	109 (36%)
I make decisions about whether I need my (Insert BRAND NAME ICS) on a day-by-day dose-by-dose basis	- ICS belief	106 (35%)
Drinking tea (herbal or regular) helps my asthma	CAM endorsement	99 (32%)
I am afraid that I will build up a tolerance to (Insert BRAND NAME ICS)	- ICS belief	71 (23%)
Drinking coffee helps my asthma	CAM endorsement	61 (20%)
Using Vicks VapoRub helps my asthma	CAM endorsement	53 (17%)
Doctors compensated for writing ICS prescriptions	- ICS belief	39 (13%)
ICS causes cancer or organ damage	- ICS belief	35 (11%)
ICS causes side effects	- ICS belief	33 (11%)

*
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Table III
Bivariate comparisons and multivariate logistic regression of factors associated with asthma control

Characteristics	Bivariate comparison		Logistic regression **	
	Controlled asthma (n=97)	Uncontrolled asthma (n=207)	p-value	OR (95% CI), P value
Level of CAM endorsement	2.9(21)	3.5(.15)	p=.032	1.41(1.1-2.31), .04
Level of ICS negative beliefs endorsement	1.12(1.19)	1.5(1.33)	p=.035	1.4 (.94-2.1), .099
Age Mean (SD)	48.1(1.53)	50.5(.87)	p=.15	
Gender				
male	26(27%)	44(21%)	p=.29	
Female	71(73%)	163(79%)		
Race			p=.001	p=.56
White	28(29%)	20(10%)		Referent
Black/African American	63(65%)	174(84%)		1.6(.55-4.63), .39
Other *	6(6%)	13(6)		2.37(.43-12.9), .32
Marital status				
Single	36(37%)	99(49%)	p=.33	
Married	32(34%)	50(25%)		
Divorced/Separated	19(21%)	43(21%)		
Widowed	8(8%)	11(5%)		
Occupation				
Unemployed	30(31%)	99(49%)	p=.06	
Manual/service	11(11%)	27(13%)		
Skilled professional	35(36%)	36(18%)		
Student	4(4%)	6(3%)		
Retired	12(13%)	22(11%)		
Other (chef; EMS; on disability)	5(5%)	11(6%)		
Highest educational level				p=.011
Some high school	7(7%)	46(22%)	p=.001	Referent
Completed high school/obtained GED/vocational training	31(32%)	87(42%)		.44(.15-1.34), .17
Some college	23(24%)	52(25%)		.32(.1-1.1), .07
College graduate/post graduate	36(37%)	22(11%)		.09(.02-.38), .048
Insurance				p=.77
Medicaid	27(27%)	91(45%)	p=.002	Referent
Medicare/SSI	15(16%)	46(22%)		1.57(.61-4.03), .35
Commercial	48(50%)	53(26%)		1.11(.46-2.7), .81
Other	7(7%)	15(7%)		.83(.22-3.04), .78
Income				
\$0-9,999	23(24%)	91(44%)	p=.08	
\$10-19,999	16(17%)	40(20%)		

Characteristics	Bivariate comparison		Logistic regression **	
	Controlled asthma (n=97)	Uncontrolled asthma (n=207)	p-value	OR (95% CI), P value
\$20-29,999	12(12%)	24(12%)		
\$30-39,999	12(12%)	14(7%)		
\$40-49,999	10(10%)	11(5%)		
\$50,000	17(18%)	11(5%)		
Refused to disclose	7(7%)	14(7%)		
Age when first diagnosed with asthma mean (SD)	22.4(18.1)	23.6(18.6)	p=.588	

* Other category included: American Indian/Alaskan Native; Asian; Native Hawaiian/Pacific Islander.

** For the logistic regression, 0 indicated controlled asthma and 1 indicated uncontrolled asthma

Table IV

Description of clinic visits (N=32*)

	Saw CAM-A results			Did not see CAM-A results			p-value (t- test)
	Mean (SD)	Range		Mean (SD)	Range		
Length of visit	23.05 (9.14)	12.53-50.04		23.36 (9.04)	9.23-38.23		p=.93
Time when provider is talking	9.29 (3.57)	4.03-12.3		9.33 (3.57)	3.21-16.56		p=.97
Time when patient is talking	7.63 (3.94)	3.08-17.47		7.69 (3.9)	1.45-14.18		p=.96
Time of Silence	6.87 (8.26)	1.3-29.08		5.14 (3.19)	0.25-12.04		p=.43
Number of interruptions made by provider	8.21 (8.15)	0-30		7.72 (5.89)	1-23		p=.84
Number of interruptions made by patient	7.71 (7.48)	0-23		7.89 (6.82)	0-24		p=.95

* The recording of one primary care visit was corrupted and was not included in the interview analysis.