The Asthma Control and Communication Instrument: A clinical tool developed for ethnically diverse populations

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Background: Lower levels of quality asthma care among racially diverse populations might be due to inaccurate disease status assessments. The Asthma Control and Communication Instrument (ACCI) is a new tool that captures patient report of disease status during routine care.
Objective: We sought to test the ACCI's psychometric properties in a racially diverse population.
Methods: We performed a cross-sectional study. Subjects were recruited from specialist and generalist urban outpatient clinics. The ACCI and measures of asthma control, quality of life, lung function, and specialist rating of asthma status were collected. Four ACCI domains were separately validated: Acute Care, Bother, Control, and Direction. Principal component analysis, internal consistency, concurrent, discriminative, known-groups validity, and accuracy were evaluated.
Results: Two hundred seventy asthmatic patients (77% female subjects, 55% black) participated. ACCI Control domain internal consistency was 0.80. ACCI Bother, Control, and Direction domains showed strong concurrent validity with asthma control and quality-of-life measures (all $P < .001$). ACCI Acute Care and Direction domains showed strong concurrent validity with individual validation items (all $P < .001$). The ACCI Control domain discriminated clinically important levels of disease status measured by asthma control, quality of life (both $P < .001$), and percent predicted peak expiratory flow rate ($P = .005$) and was associated with specialist rating of disease status ($P < .001$), confirming known-groups validity. The accuracy of the ACCI Control domain in classifying patients with uncontrolled asthma was very good (area under the curve, 0.851; 95% CI, 0.742-0.95870). Results were similar for both black and white subjects.
Conclusion: The ACCI is a promising clinical tool that measures asthma disease status during routine health care and is valid for use in both black and white populations. (J Allergy Clin Immunol 2008;122:936-43.)

Key words: *Asthma control, asthma treatment assignment, validation, racial disparities, quality of asthma care*

Despite advances in our understanding of asthma pathophysiology and the availability of highly effective treatments, this chronic disease continues to disproportionately affect black subjects in the United States.[1-5] In fact, the gap in morbidity and mortality has widened between black and white subjects during the past 2 decades. In 2004, emergency department visits and hospitalizations were 457% and 340% higher among black subjects compared with those among white subjects, and in 2003, mortality was 267% higher.[6,7] Differences in assessment of asthma[8] and in the quality of asthma care received (eg, daily inhaled corticosteroid use, receipt of an asthma action plan, and referral to an asthma specialist) have been implicated as contributing factors to racial/ethnic disparities in the quality of asthma treatment independent of access to care, health insurance status, and socioeconomic status.[5,9-13]

Inaccurate assessment of disease status is most likely to occur in the context of poor clinician-patient communication about asthma during the clinical encounter. A number of studies have reported lower-quality communication between clinicians and minority patients.[14-17] Ineffective communication might arise because of low health literacy, lower educational status, lack of patient self-efficacy, and other cultural and language barriers.[5] For example, one study has suggested that the language used by African Americans with asthma to describe symptoms, such as breathlessness, might differ from that used by white patients.[18] Such differences could contribute to poor communication about asthma status between patients and providers and thus result in inaccurate estimations among black patients.

To improve office-based communication between patients and clinicians, we developed the Asthma Control and Communication Instrument (ACCI), which was designed to be culturally appropriate for use with diverse populations and to be of high clinical utility for clinicians. Although recommended by national asthma guidelines[19] to assess disease status, previously developed questionnaires[20-23] were not developed or validated for use with minority populations nor were they intended to redress disparities in asthma assessment and care.

In this study we provide evidence for construct validity of the ACCI. This type of validity tests theoretic relationships between a

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Abbreviations used

ACCI: Asthma Control and Communication Instrument
ACQ: Asthma Control Questionnaire
ACT: Asthma Control Test
ATAQ: Asthma Therapy and Assessment Questionnaire
AUC: Area under the curve
m-AQLQ: Mini-Asthma Quality of Life Questionnaire
MCID: Minimal clinically important difference
PCA: Principal component analysis
PEFR: Peak expiratory flow rate
QOL: Quality of life
ROC: Receiver operating characteristic
SF-36: 36-Item Short-form Health Survey
SGRQ: St Georges Respiratory Questionnaire

measure of interest (eg, ACCI) and 1 or more related measures (eg, quality of life [QOL] and spirometry). Because there is no gold standard for assessment of asthma disease status, we used several well-accepted related measures to provide evidence for construct validity[24,25] of the ACCI by testing for hypothesized cross-sectional associations in the context of a clinical encounter in urban clinical settings. Specifically, we evaluated whether the ACCI (1) effectively measures asthma disease status, (2) distinguishes clinically important differences of disease status, (3) accurately categorizes patients with uncontrolled asthma, and (4) performs adequately in both black and white patients.

METHODS

The ACCI: A brief description

The goals for development of the ACCI were to design a clinical tool that would (1) use language appropriate for diverse populations, (2) capture information about asthma that patients find important, (3) follow clinicians' rationale in assessing disease status and incorporating information they would find useful for grading morbidity, (4) be easy to implement in office settings, and (5) provide a quick and simple method to convert survey questions into meaningful severity/control classifications to guide treatment assignment.

The ACCI is a 12-item questionnaire (see Fig E1 in this article's Online Repository at www.jacionline.org) constructed for patient self-administration by persons 12 years and older before they are seen by their clinician (eg, in the waiting room of their physician's office). For the purposes of the validation study, physicians did not have the patient-completed ACCI to aid in their assessment of the patient; however, in clinical practice we anticipate that the patient will hand the completed survey to the physician at the beginning of the clinical encounter. The items included in the ACCI were selected through the qualitative analysis of focus groups of adult and teenage minority asthmatic patients recruited through local community centers in Baltimore, Maryland, and from a patient asthma education program at Howard University (Washington, DC) and clinicians (generalist [internists, family practitioners, and pediatricians] and specialist [pulmonologists, allergists, pediatricians, and geriatricians] physicians) from the Johns Hopkins Community Physicians (Baltimore, Md), Howard University, and Charter Health Plan (a health maintenance organization locate in Washington, DC) who treat asthmatic patients.[26,27] Based on feedback from these focus groups regarding item and response selection and wording, time frames, scoring system, and graphic formatting, the final ACCI questionnaire uses 4 domains of asthma disease activity assessment (Acute Care, also labeled as "Risk" [3 items], Bother [1 item], Control [5 items], and Direction of symptoms [1 item]), 1 domain for assessment of patient adherence to prescribed anti-inflammatory asthma medications (1 item), and 1 domain specifically designed to further enhance patient-physician communication (one open-ended question that states, "Please write down anything else you would like your doctor to know about your asthma.").

The time frame for the assessment of disease status with the ACCI Acute Care, Bother, and Direction domains is "since the last clinical visit" and for the ACCI Control domain is "within the past week," except for nocturnal awakening, which was assessed over the "past two weeks." These time periods were recommended as clinically useful by physicians who participated in focus group sessions and endorsed by physicians who participated in cognitive interviews.[26,27] Based on feedback from the focus groups, the response choices to questions 1 to 11 are sequentially color coded from green (best) to yellow, orange, and red (worst) to easily alert the clinician to potential asthma problems. The ACCI is written at the fifth-grade reading level and takes approximately 5 to 7 minutes to complete.

The ACCI Control domain is the only multi-item component of the questionnaire that is scored by the clinician, according to patient responses. We provide 3 alternative scoring formats that can be used based on clinician preference. The first method, Categories, classifies patients into 4 categories ranging from mild-intermittent to severe-persistent, with mild-intermittent indicating better asthma disease status and severe-persistent indicating poorer asthma disease status. Consistent with asthma guidelines,[28] the Control category is assigned by the most severe response among the 5 ACCI control items. Patients with intermittent symptoms are considered "controlled," whereas those with persistent symptoms are considered "not controlled." The second method, Sum Score,[21] uses a summation of the 5 ACCI control items individually coded from 0 to 4 (except attack item, coded 0-3). The sum score ranges from 0 (better) to 19 (worse). The third method, Problem Index,[22] dichotomously rates each item as a control problem (yes or no), the values of which are then summed to provide a problem index ranging from 0 (no control problems) to 5 (5 control problems).

Previous versions of the ACCI were pilot tested and modified by using cognitive interviews of asthmatic patients and clinicians.[26,27] The ACCI showed excellent face and content validity and was rated by clinicians and patients as feasible and useful for periodic assessment of asthma disease status in an office-based setting.[27]

Study procedures

Between May 2005 and November 2006, subjects were recruited among adults ($\geq$17 years) in waiting rooms of one specialty-referral center (n = 50 recruited specifically for this study) and 5 primary care, community-based outpatient clinics (n = 220) from urban areas of Baltimore, Maryland (as part of an ongoing clinical trial[29] to test the effect of the ACCI on quality of asthma care delivered in primary care settings). Subjects were eligible if they (1) had self-reported physician-diagnosed asthma, (2) were presenting for an already scheduled appointment, and (3) had evidence of active asthma (recent symptoms, reliever medication use $\geq$2 times per week, or both). Subjects provided informed consent and received a small financial incentive ($30.00) for participation. This study was approved by the Western Institutional Review Board (Olympia, Wash).

The 12-item ACCI was completed by the participants before seeing their treating clinician. After the clinical encounter, interviewer-administered questionnaires were used to collect additional information on demographics (including self-report of race/ethnicity), asthma treatment, and asthma health care use. To examine concurrent validity, we administered asthma control questionnaires (the Asthma Control Questionnaire [ACQ],[20] the Asthma Therapy and Assessment Questionnaire [ATAQ],[22] and the Asthma Control Test [ACT[21]]); quality-of-life (QOL) questionnaires that assess asthma health (the Mini-Asthma Quality of Life Questionnaire [m-AQOL][30]), respiratory health (the St Georges Respiratory Questionnaire [SGRQ]),[31] and generic health (the 36-Item Short-form Health Survey [SF-36]);[32] spirometry; and specialist rating of the patient's asthma disease status.

All centers used the same model spirometer (KoKo Spirometer; Pulmonary Data Services, Lewisville, Colo) to assess pulmonary function. Percent predicted FEV_1 was calculated according to Hankinson's reference values adjusted for race/ethnicity.[33] Peak expiratory flow rate (PEFR) was also measured with the same spirometer. Standardized techniques were carried out according to American Thoracic Society recommendations.[34] Maneuvers were done without the administration of albuterol.