

REVIEW AND SELECTION OF CORE ASTHMA QUALITY MEASURES



**Centers for Disease
Control and Prevention**
National Center for
Environmental Health

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EXECUTIVE SUMMARY

There is a need for a core set of evidence-based measures that drive improved asthma outcomes. Currently, different organizations use different asthma-related quality measures in different reporting systems, resulting in a preponderance of inconsistent measures. These discrepancies create an excessive reporting burden and cause difficulty in assessing (and improving) quality of care across systems. The drive towards value-based care and alternative payment models necessitates meaningful, evidence-based quality measures that focus attention both on outcomes and processes of care that achieve those outcomes. Thus, identifying and using appropriate quality measures is a priority both to achieve the goals of CDC's National Asthma Control Program and to achieve disparities reduction, a goal of the Federal Asthma Disparities Work Group.

CDC's technical package for asthma (**EXHALE**)* contains six interventions: **E**ducation on asthma self-management, **X**-tinguishing smoking and secondhand smoke, **H**ome visits for trigger reduction and asthma self-management education, **A**chievement of guidelines-based medical management, **L**inkages and coordination of care across settings, and **E**nvironmental policies or best practices to reduce indoor, outdoor, and occupational asthma triggers. CDC's National Asthma Control Program (NACP) prioritized identifying a core set of asthma quality measures to support these interventions. These will be shared for consideration by states developing state-based measures, federal partners, and organizations that use quality measures as a first step in aligning measures across these groups

METHODS

To promote the **EXHALE** interventions and improve asthma outcomes, NACP used a multiple-step process to identify a core set of asthma measures:

1. Review the organizations working on quality measurement and their criteria for assessing individual measures and measure sets
2. Discuss with measure developers and endorsement groups current asthma measures and measures in the process of development or review
3. Identify all asthma-related measures and apply inclusion criteria for measures currently in use or in development (46 measures resulting)
4. Select and apply exclusion criteria (9 measures resulting)
5. Independently assess the 9 measures (Done by two NACP staff using criteria for individual measures)
6. Assess the measures as a set and selection of 4 core measures

* **EXHALE** contains six interventions:

- **E**ducation on asthma self-management
- **X**-tinguishing smoking and secondhand smoke
- **H**ome visits for trigger reduction and asthma self-management education
- **A**chievement of guidelines-based medical management
- **L**inkages and coordination of care across settings
- **E**nvironmental policies or best practices to reduce indoor, outdoor, and occupational asthma triggers

MEASURE CRITERIA

The following criteria were used to score individual measures:

- **Potential impact (Score 0–10):** Is there evidence that what is measured improves asthma care, improves asthma control, or reduces costs per NAEPP guidelines or studies?
- **Reliability (Score 0–5):** Is the measure well-defined? Are data specification elements precise? Are data elements repeatable?
- **Validity (Score 0–5):** Was empirical evidence provided of the validity score and/or data elements used to calculate the measure? Was a systematic assessment of face validity performed?
- **Potential to reduce disparities (Score 0–10):** Is there evidence of racial, ethnic, or SES disparities in this area covered by the measure (either in the medical literature or described by the specification)? Are there data from the measure specification and/or the medical literature on whether a disparity currently exists? How easy would it be to stratify the measure by racial/ethnic/socioeconomic status (SES) groups?
- **Collection Burden (Score 10=already an e-measure; or felt to be easily e-specified; 5=capable of being e-specified, but with some difficulty; 0=difficult to e-specify):** Can the measure be incorporated into an Electronic Health Record (EHR) or measured with administrative data (i.e., does not require chart review)?
- **Interpretation (Score 0–10):** Can the measure be easily “gamed” or manipulated to provide a better score without improving quality of care or outcomes? Are there likely to be any unintended consequences of using the measure?
- **Usability (Score 0–10):** Is the measure currently in wide use? Are the data obtainable? Do existing results for the measure indicate a gap between the current results and what is ideal (is the measure “topped out”)?

The following criteria were used for selecting a measure set:

- **Parsimony:** using the least number of measures to efficiently measure and encourage quality of care and improved patient outcomes
- **Mix:** contains a mix of measure types (process and outcome)
- **Alignment:** promotes NACP program goals and **EXHALE** interventions

RESULTS:

The package of measures that scored well on both the individual and measure set criteria are as follows:

Asthma Medication Ratio (AMR; NQF #1800).

This NQF-endorsed process measure, related to the “A” (Achievement of guidelines-based medical management) component of **EXHALE**, addresses patient safety by identifying overuse of reliever medications.

Optimal Asthma Control (HMIS #3890).

This is a composite outcome measure evaluating if patients report good asthma control on a validated test based on the age of the patient and if patients report fewer than two ED visits or one hospitalization in the measurement period. Both criteria must be met to be included in the numerator of the measure. Although not NQF-endorsed, this outcome is currently used by the Minnesota Statewide Quality Reporting and Measurement System and is a Merit-Based Incentive Payment System (MIPS) measure. Because achieving optimal control requires comprehensive asthma services, it relates to all components of **EXHALE**.

Rate of emergency department visit use for children managed for identifiable asthma (CapQUAM #1, hereafter referred to as rate of emergency department use).

This distal outcome measure is important because ED visits for asthma not only are an important outcome for asthma intrinsically, they also represent a marker of risk for future asthma exacerbations. This new measure addresses many concerns about the

denominator and about “churn” that apply to other ED measures. It was recently reviewed by NQF and not recommended for endorsement, as the measure did not meet the criteria for validity. As with HMIS #3890, it relates to all components of **EXHALE**.

Primary care connection after emergency department visits for asthma (NQF #3171).

This measure requires documentation that patients see a primary care provider and fill controller medications after an asthma ED visit. Although this measure relates only to people with asthma who have an ED visit (a subset of all people with asthma), it is currently the best measure of the “L” (Linkages and coordination of care across settings) component of **EXHALE**.

DISCUSSION

We identified four measures that, together, address prescription medication prescribing practices, care coordination, and short- and long-term asthma outcomes. These measures form a core measure set that promotes asthma care in line with elements of **EXHALE**. However, significant gaps remain in asthma measurement. Although a number of tobacco measures exist, none are specific to people with asthma. Measures of environmental best practices (the last “E” in **EXHALE**) are generally outside the domain of the health care system and not discussed here.

No current measures evaluate asthma self-management education specifically for people whose asthma is not well controlled by guidelines-based medical management alone (only one measure focuses on demonstration of inhaler use). Although a measure evaluating self-management education may increase reimbursement for this important tenet of improved asthma control, demonstrating its reliability and validity would be difficult. A measure that directly evaluates home visits for trigger reduction, particularly for patients whose asthma is not controlled by medication

management and self-management education, might be more feasible. Additionally, it may enable increased partnerships between clinicians, health plans, and public health or community partnerships, encouraging home visits and environmental remediation as indicated.

Linkages and care coordination across settings play an increasingly acknowledged role in chronic disease management. The two measures that evaluate care coordination for people with asthma, however, do not apply to all patients with asthma. A number of additional care coordination measures would be helpful in promoting linkages for patients with asthma, including coordination between the clinician and school nurse as applicable, coordination between primary and specialty clinicians, and coordination between the clinician and people providing care outside the clinical setting (e.g., community health workers and persons performing home health visits).

The Optimal Asthma Control measure is the only direct measure of asthma control, an outcome likely to be of primary concern to patients and caregivers. It is a composite measure that includes self-report of hospitalizations and ED visits, information that might be better captured through administrative data. Further work to develop a stand-alone measure of asthma control would be appropriate given the rich body of evidence documenting the relationship between asthma control and exacerbations; information from both surveys and studies indicates that asthma is well-controlled in only 50% of people with the condition. Patients with asthma and their caregivers tend to overestimate their level of control unless assessed with a standardized test. Standardized assessment of control is not yet routine in clinical practice but can be encouraged by incorporating a test of control into the EHR and by using it as a quality measure.

INTRODUCTION

Quality measurement plays a critical role in the United States healthcare system. The drive towards value-based care and alternative payment models necessitates meaningful, evidence-based quality measures that focus attention both on outcomes and processes of care that achieve those outcomes. Thus, identifying and using appropriate quality measures is a priority both to achieve the goals of CDC's National Asthma Control Program and to achieve disparities reduction, a goal of the Federal Asthma Disparities Work Group.

The National Academy of Medicine defines a core set of quality measures as follows (page 37, Vital Signs Core Metrics): "A parsimonious set of measures that is standardized, timely, available at multiple levels, and focused on issues most important to better health and healthcare, for individuals and the population—vital signs—will help drive attention to and action on those issues, reduce the need for many measures currently collected, and provide a stable anchor and reference point for improving the reliability and utility of measurement broadly."¹ Although many asthma quality measures exist, we are unaware of a set of core measures specific to asthma. A core set of asthma measures would achieve the following:

- Promote measures that, as a group, cover the most important elements of asthma care and are consistent in their outcomes and specification
- Lessen the burden of collecting data for similar asthma measures
- Be usable across multiple federal, state, and private payers to assess and promote quality of asthma care across settings in the totality of patients with asthma
- Promote outcomes of reduced ED visits and hospitalizations; reduced missed school and work days; and reduced disparities of asthma burden of disease, morbidity and mortality, improved asthma control, and improved quality of life.

We organized our review of asthma quality measures around the CDC National Asthma Control Program's **EXHALE** technical package. **EXHALE** is based on a review of the most effective asthma interventions and consists of the following elements: Education on asthma self-management, **eX**tinguish smoking and secondhand smoke, **H**ome visits for trigger reduction and asthma education, **A**chievement of guidelines-based medical management, **L**inkages and coordination of care across settings, and **E**nvironmental best practices to reduce indoor, outdoor, and occupational asthma triggers.

This review addresses individual measures corresponding to the elements of **EXHALE**, as applicable.

BACKGROUND

Many governmental and nongovernmental organizations play an important role in quality measurement. The **National Quality Strategy (NQS)**, mandated by passage of the Patient Protection and Affordable Care Act in 2010, creates an overarching framework for federal quality measurement activities.² NQS established three aims that are similar to the Institute for Healthcare Improvement's Triple Aim[®] Initiative: better individual care, healthy people and communities, and affordable care. In order to promote these aims, NQS outlined six priorities:

1. Providing safer care
2. Engaging patient and family as partners in care
3. Promoting effective communication and coordination of care
4. Promoting the most effective care and treatment practices to reduce leading causes of mortality
5. Working with communities to promote best healthy living practices
6. Making quality care more affordable by developing new healthcare delivery models

Stakeholders may use nine levers to further their alignment with the NQS priorities. For the purposes of developing a core set of asthma measures, the most relevant levers are measurement and feedback to improve healthcare; public reporting on treatment results, costs, and patient experience; payment; and health information technology.³

The **National Quality Forum (NQF)** is a nonprofit organization with a self-described mission of “lead[ing] a national collaboration to improve health and healthcare quality through measurement”.⁴ NQF does not develop quality measures but rather reviews measures for endorsement and use. Because proposed new measures undergo an extensive review process prior to endorsement, NQF endorsement is considered the gold standard for quality measurement.⁵ The NQF uses six criteria, discussed further below, for quality measurement assessment:⁶

- Importance
- Reliability
- Validity
- Feasibility (explicit specification of the numerator and denominator and availability of the data)
- Usability
- Competing or related measures

Importance is the first “must-pass” criterion considered by the NQF.⁶ To meet this criterion, the measure must have the ability to identify performance gaps in care and to lead to improved health outcomes.⁷ Important measures are measures that are relevant to stakeholders and that address high-incidence or high-prevalence diseases or

areas that are a significant burden to health, measure equitable distribution of healthcare, have potential for improvement, and are susceptible to change by activities performed within the healthcare system.⁸

Reliability and validity refer to reproducibility of results and to truthfulness in measuring what the measure is designed to measure, respectively.⁶

Feasibility concerns the ability to collect the data.⁷

Usability weighs the ability to assess improvement in quality and accountability, if the measure results can be used to improve performance, and if the benefits of the measure outweigh risks of unintended consequences to patients.^{6,7} Last, the NQF process determines whether any currently endorsed measures address the same topic and population.⁹

The **Measures Applications Partnership (MAP)** is a group consisting of 150 individuals and 90 organizations that is convened by the NQF.¹⁰ According to the MAP Strategic Plan, MAP’s chief goal is to “provide input on performance measures sets for numerous accountability applications...” (page 5); it also promotes measure alignment across HHS users as well as public and private payers.¹¹ MAP provides input to the Department of Health and Human Services on a number of federal health programs and initiatives, including the Merit-Based Incentive Payment System (MIPS), End-Stage Renal Disease Quality Incentive Program, and Home Health Quality Reporting, in part using information generated by the NQF endorsement process (where applicable). It also provides input on a core set of measures for adults in Medicaid and for children in Medicaid and CHIP. MAP measures are usually endorsed by NQF, so MAP criteria focus on how individual measures add value to a measure set for a particular program or topic, rather than exclusively on scientific merit. The MAP criteria are listed in Box 1.¹¹

**Box 1:
Measures Applications Partnership Criteria**

- NQF endorsement or meeting requirements for expedited review
- Program measure set adequately addresses each of NQS's priorities
- Program measure set adequately addresses high-impact conditions relevant to the program's intended population (for children, NQF's Measure Prioritization Advisory Committee has defined both asthma and environmental allergies as a prioritized health condition/risk; these health conditions and risks serve as guidance to MAP)
- Program measure set promotes alignment with specific program attributes, as well as alignment across programs
- Program measure set includes an appropriate mix of measure types
- Program measure set enables measurement across the person-centered episode of care
- Program measure set includes considerations for healthcare disparities
- Program measure set promotes parsimony

The **CMS Measure Development Plan** (MDP) was mandated by the passage of the 2015 Medicare Access and Children's Health Insurance Program Reauthorization Act (MACRA).¹² The Measure Development Plan was written by CMS to promote the use and development of quality measures for alternate payment models tying reimbursement to quality, rather than volume, of care. MDP criteria will also be used for the Medicare Merit-Based Incentive Payment System measures. CMS will initially have measures in its portfolio from the Physician Quality Reporting System, Value-based Modifier system, and Electronic Health Record (EHR) incentive system. CMS will then work on developing new measures that complete its portfolio by filling gaps in the current measures. MDP focuses both on the characteristics of individual

measures as well as the comprehensiveness of a measure set. MDP criteria for quality measures (found on page 22 of the MDP) are listed in Box 2:

Box 2: Measure Development Plan Criteria

- Follow patients across the continuum of care in populations with one or more chronic conditions.
- Emphasize the therapeutic relationship between the clinician, patient, and family caregiver while recognizing personal and family choice and individual goals for treatment.
- Support improved integration of physical and behavioral health for individuals with substance use and mental health conditions associated with increased risk of other chronic disease.
- Emphasize outcomes, including patient-reported outcome measures and measures of functional status; and global outcome measures and population-based measures, balanced with process measures that are proximal to and strongly tied to outcomes.
- Address patient experience, care coordination, and appropriate use (e.g., overuse and underuse).
- Promote multiple levels of accountability (e.g., individual clinicians, group practices, system level, population level).
- Include clinically relevant measures for all specialties/subspecialties and all MIPS eligible clinicians that do not currently have clinically relevant measures.
- Apply to multiple clinicians, including clinical specialists, non-physicians, and non-patient-facing professionals.
- Are adopted from other healthcare settings and are applicable to physicians and other professionals.

(more)

(Box 2: continued)

- Use data generated from EHRs and claims data, based as much as possible on existing workflows during the routine provision of clinical care.
- Incorporate broader use of additional clinical and sociodemographic data (e.g., qualified clinical data registries).
- Produce measures that are stratified by age, sex, race, ethnicity, and other available demographic variables to enable clinicians to identify and reduce disparities among vulnerable populations.
- Are suitable for public reporting on the CMS Physician Compare website.
- Account for the variation in payment models.
- Align with other models and reporting systems—including with Medicaid, other federal partners, and the private sector—and are specified for multi-payer applicability.
- Are appropriate for low-volume (particularly rural) providers.

The Measure Development Plan states that measures will be prioritized as follows: outcomes, patient experience of care, communication and care coordination, and appropriate use/resource use.¹²

In 2015 the **National Academy of Medicine (NAM)** published the document *Vital Signs: Core Metrics for Health and Health Care Progress*. The document outlined 15 core measures selected for the purpose of promoting the nation's health in areas NAM deemed highest priority.¹ Although the NAM measure set is not specific to asthma, the promulgated principles for measure selection are instructive for our purposes. NAM described six criteria for individual measure selection (Box 3) and selection of a core measure set (Box 4) (page 107):

**Box 3: National Academy of Medicine
Core Measure Individual Criteria**

- Importance for health
- Strength of linkage to progress
- Understandability of the measure
- Technical integrity
- Potential for broader system impact
- Utility at multiple levels

**Box 4. National Academy of Medicine
Measure Set Group Criteria**

- Systemic reach
- Outcomes-oriented
- Person meaningful
- Parsimonious
- Representative
- Utility at multiple levels

This review of the organizations working on quality measurement and their measure criteria reveals differences in focus but considerable overlap in criteria for measure creation and selection. Although groups use the NQF criteria of importance, reliability, validity, feasibility, and usability, they expand on the NQF criteria of considering competing or related measures by considering the characteristics and comprehensiveness of a measure set. MAP and MDP add criteria related to the reduction of health disparities. MDP and NAM emphasize the importance of measures that can be used across multiple levels of accountability (individual providers, health plans, populations, etc.). Although all advocate an appropriate mix of measure types (process, outcome and population), there is an emphasis on the need for patient-centered outcome measures. Criteria for measure sets also emphasize parsimony—using the least number of measure to efficiently measure and encourage quality of care and improved patient outcomes. Coordination of

care is an NQS priority and a criterion for MDP. To select our set of core measures, we incorporated several of these criteria into our measure review.

METHODS

Although most of the quality measures we ultimately reviewed have undergone vetting and review for endorsement by other quality organizations, we wished to develop a strategy for selecting quality measures of greatest benefit to the totality of patients with asthma. Therefore, we combined knowledge gained from National Asthma Control Program stakeholders as to their needs for asthma quality measures with knowledge we gained from discussions with quality experts and a review of quality literature. The following is a description of the methods we derived to select core asthma measures.

Preparation for the review of asthma quality measures included 1) a review of relevant literature and reports; 2) interviews with quality measurement experts at CDC, Agency for Healthcare Research and Quality (AHRQ), NQF, MAP, and National Committee for Quality Assurance (NCQA); and 3) an outline of a systematic process for the review. Our intent was to select 3–5 measures that 1) evaluated care in the clinical setting (as opposed to a geographic area), 2) covered important elements of care for a person with asthma, and 3) had detailed information and specifications.

The inclusion criteria were few and intended to identify measures having the potential for wide use and with readily available detailed specifications. Therefore, our inclusion criteria included measures found on the National Quality Measures Clearinghouse inventory, the NQF inventory, the HHS measures inventory, or measures created by the AHRQ Centers of Excellence. We first searched for relevant quality measures using the word “asthma” in order to identify measures related to the first asthma-specific components of **EXHALE**. For the linkages/care coordination measures, we searched using the terms “care coordination” and then included measures specifically pertaining to asthma.

Forty-six asthma measures met our inclusion criteria. Exclusion criteria were then applied (Figure 1).

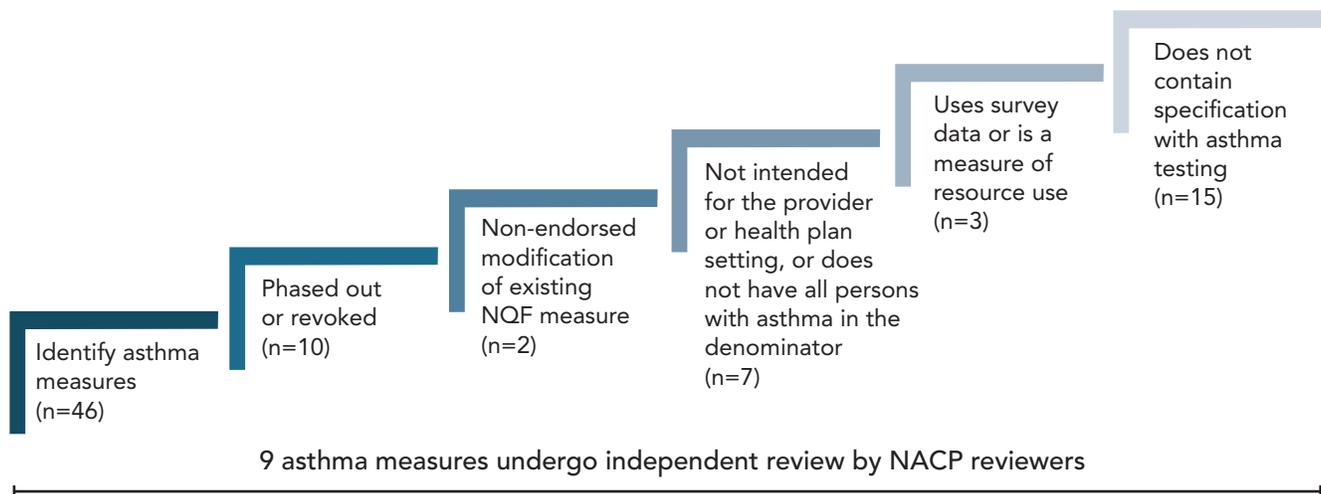
- First, measures that were phased out, discontinued, or scheduled to have endorsement revoked or phased out were removed (Criterion 1). We distinguished measures which had been reviewed by NQF but had not received endorsement from those which had endorsement removed. Measures that had not initially received endorsement were not excluded, our reasoning being that they may be good measures whose developers do not yet have the resources for further testing in order to submit the measure for NQF endorsement.
- Second, we excluded measures that were a modification of an existing or revoked NQF-endorsed measure (Criterion 2).
- Third, although we recognize the importance of measuring population- and community-level outcomes, for the purposes of this review we excluded measures not intended for the provider or health plan setting and measures where the denominator was not all persons with asthma or persons with persistent asthma (Criterion 3).
- Fourth, measures that used survey data or were measures of resource utilization were excluded (Criterion 4).
- Fifth, measures without detailed specifications containing sections on rationale, reliability and validity, and information on the numerator, denominator, exclusions, and calculations were removed from our list of measures to be reviewed (Criterion 5).

Box 6: Exclusion criteria for reviewing measure for inclusion in core measure set

- Measure that has been phased out or discontinued or is scheduled to be phased out by NQF or sponsoring organization (Exclusion criterion #1)

And/or

- Modification of NQF measure that is not NQF endorsed or widely used (Exclusion criterion #2)
- Not intended for provider or health plan setting, or does not have all persons with asthma in the denominator (Exclusion criterion #3)
- Uses survey data or is a measure of resource use (Exclusion criterion #4)
- Does not have a detailed measure specification containing measure testing (Exclusion criterion #5)



We used different exclusion criteria for care coordination measures than those used for the remainder of the asthma measures. We found few measures pertaining to both care coordination and asthma that were designed to pertain to all persons with asthma. Therefore, given that care coordination by definition often pertains to a particular care setting that is being linked to another care setting, we did not use exclusion criterion #3 for care coordination measures.

We did not find a measure exclusively pertaining to reduction of asthma disparities. However, we evaluated and scored each measure on its ability to reduce asthma disparities (discussed below). We also were unable to find an asthma-specific measure on quality of life.

ASSESSMENT OF INDIVIDUAL QUALITY MEASURES

We used a group consensus to identify and select the criteria for individual quality measure assessment by first reviewing the criteria used by NQF, MAP, and NAM to determine their applicability for selection of individual quality measures and a core set of asthma quality measures. We gave extra weight to criteria used by more than one organization (Table 1). Although we are selecting a core set of quality measures that in many cases uses measures previously endorsed by NQF, we thought it was important to consider inclusion of some of their measurement criteria in our own, given that their criteria may reinforce our goals. We also wanted to reduce the workload of persons collecting the data used for calculation of the quality measure. Therefore, we have included criteria that weigh the measure's clarity of numerator and denominator criteria and the feasibility of incorporation of the measure into an EHR.

After selecting the criteria that we thought would be most useful for our purposes and assigning a scoring system, we piloted the use of the criteria by scoring several measures. We then refined our criteria based on our experiences in the pilot. The following criteria were used to score individual measures:

- **Potential impact (Score 0–10)** Is there evidence that what is measured improves asthma care, improves asthma control, or reduces costs per NAEPP guidelines or studies?
- **Reliability (Score 0–5)** Is the measure well-defined? Are data specification elements precise? Are data elements repeatable?
- **Validity (Score 0–5)** Was empirical evidence provided of the validity score and/or data elements used to calculate the measure? Was a systematic assessment of face validity performed?

- **Potential to reduce disparities (Score 0–10)** Is there evidence of racial, ethnic, or SES disparities in this area covered by the measure (either in the medical literature or described by the specification)? Are there data from the measure specification and/or the medical literature on whether a disparity currently exists? How easy would it be to stratify the measure by racial/ethnic/socioeconomic status (SES) groups?
- **Collection Burden (Score 10=already an e-measure; or felt to be easily e-specified; 5=capable of being e-specified, but with some difficulty; 0=difficult to e-specify)** Can the measure be incorporated into an Electronic Health Record (EHR) or measured with administrative data (i.e., does not require chart review)?
- **Interpretation (Score 0–10)** Can the measure be easily “gamed” or manipulated to provide a better score without improving quality of care or outcomes? Are there likely to be any unintended consequences of using the measure?
- **Usability (Score 0–10)** Is the measure currently in wide use? Are the data obtainable? Do existing results for the measure indicate a gap between the current results and what is ideal (is the measure “topped out”)?

Two primary reviewers independently evaluated and scored each quality measure, then met to compare the scores. When necessary, a third reviewer helped to resolve disagreements.

Following the identification of individual measures for inclusion in our core set, we evaluated measures as a group. As we did with the individual measure criteria, we assessed core measure set criteria from several organizations to determine which ones could best be used to identify a core measure set. Of the criteria listed in Box 1, several MAP criteria (Box 7) pertain to selection of measures for inclusion in a core measures set.

Box 7: MAP Criteria for Core Program Measures Set

- Adequately addresses each of the NQS's priorities
- Is responsive to specific program goals and requirements
- Includes an appropriate mix of measure types
- Enables measurement of person- and family-centered services
- Includes considerations for healthcare disparities and cultural competency
- Promotes parsimony

Criteria listed in the MDP for measure promotion should also be considered during selection of measures, where their criteria don't overlap with NQF or MAP criteria. They include (Box 8):

Box 8: MDP Criteria Pertinent for Core Measures Set

- Emphasizes outcomes, including global outcome measures and population-based measures, balanced with process measures that are proximal to outcomes
- Promotes multiple levels of accountability (e.g., individual clinicians, group practices, system level, population level)
- Applies to multiple types of providers, including clinical specialists, non-physician professionals, and non-patient-facing professionals
- Uses data generated from EHRs, based as much as possible on existing provider workflows and inherently created as a by-product of providing clinical care

These criteria overlap in large part with the NAM criteria (Box 9).

Box 9. National Academy of Medicine Measure Set Group Criteria

- Systemic reach
- Outcomes-oriented
- Person meaningful
- Parsimonious
- Representative
- Utility at multiple levels

As with the individual measures, the core measure set criteria has substantial overlap. Therefore, we weighed the criteria from MAP, MDP, and NAM to determine which criteria would preserve our goals for a core measure set and include criteria from organizations with quality measurement expertise. The following criteria were selected for our core measures set (Box 10):

Box 10. Measure Criteria for Asthma Core Quality Measures Set

- Is parsimonious
- Has appropriate mix of measure types: outcomes and process measures linked to outcomes
- Addresses program goals

Parsimony is a criterion for a core measure set by MAP, MDP, and NAM. To limit burden on providers, they need a small number of asthma measures that cover important aspects of care. We planned to select a total of 3–5 core asthma quality measures. To assist in the selection of a parsimonious group of measures, we evaluated the asthma measures by **EXHALE** category. If more than one measure per category scores highly, we considered both the measure score given by each reviewer and how the measure fits into the program goals before deciding which, if any, measures should be included.

An increasing number of organizations are placing an emphasis on outcome measures. Outcome measures evaluate concepts most important to patients, rather than merely promoting a process that may or may not be associated with an outcome. We have elected to have a criterion that allows for a mix of measure types rather than exclusively favoring outcomes. We wish to promote measures that mandate guidelines-based asthma care shown to promote improved asthma outcomes; such measures may consequently make up an important part of a core asthma measures set.

Finally, we want asthma measures that address our program goals to be contained in the core set. In the background of this paper, we highlighted the elements of the **EXHALE** initiative because we wished to find quality measures that correspond to the measures of the initiative. Therefore, we evaluated the measures identified as high-scoring by our individual review for how well they match with the elements of **EXHALE**.

Based on the results of the review of individual measures, we evaluated the highest-scoring measures to determine whether they would fit into our core quality measures set.

RESULTS

After evaluating measures based on our inclusion and exclusion criteria, we obtained a total of nine asthma measures that underwent detailed review, including two care coordination measures. (See Appendix A for a detailed listing of the quality measures that met our inclusion criteria and the reason they were excluded, if applicable.) Appendix B shows the scores the two reviewers gave to each asthma measure using our selected criteria.

Three process measures pertained to asthma medications (categorized as Access to guidelines-based medical management): Pharmacologic Therapy for Persistent Asthma (NQF #47), which evaluates for the prescription of one of three categories of controller medications; Asthma Medication Ratio (NQF #1800), which evaluates the ratio of controller medication to total asthma medications, and Instruction in and Demonstration

of a New Asthma Medication Delivery Device (NQMC #10737), which is a new measure evaluating whether teaching is given following prescription of new asthma delivery devices. Pharmacologic Therapy for Persistent Asthma scored a mean of 34.5. The measure scored highly for the criteria of is there evidence of racial and ethnic disparities in the area covered by the measure. It received lower scores for linkage to improved asthma care, if the measure could be gamed, and usability. The reasoning behind the score for linkages to improved asthma care was that the measure criteria are met if the patient is prescribed only one asthma controller per measurement period, meaning that the patient could actually not be covered by a controller medication for the majority of the measurement period. The measure was considered easily gamed because it evaluates prescribing rather than whether the medication is taken by the patient. Usability received a low score because the measure appeared to be close to being topped out according to data provided by the developer, and there appeared to be little room to differentiate between high and low scorers.

The Asthma Medication Ratio scored a mean of 43. It was scored particularly highly for the criteria of linkage to improved care and usability. Reviewers commented that research studies had found improved outcomes, including reduced ED visits for asthma, in persons who had a ratio of controller medications to total asthma medications of at least 0.5. Reviewers felt the measure was a bit more difficult to game than other process measures pertaining to controller prescription because it involved the prescription of two or more medications, as opposed to just controllers. Usability was also rated highly, as this measure is a HEDIS measure with room for improvement in the measure score (51.9% for Medicaid; 61.6% for commercial payers).

Instruction in and Demonstration of a New Asthma Medication Delivery Device scored a mean of 32 with high marks for usability. However, the measure received only moderate marks for linkages to improved asthma care, as reviewers felt it set a low standard for improved asthma care. Given that the measure requires that new medications are taught

only annually, the criteria for this measure are less stringent than the recommendations found in the Expert Panel Report-3 guidelines. However, the measure scored high for usability given that the measure is not topped out.

Following the individual measure review, Asthma Medication Ratio scored the highest and will be considered for inclusion in the core measure set. Pharmacologic Therapy for Persistent Asthma also pertains to controller medication use, but it did not score as highly as the measure Asthma Medication Ratio. It will therefore not be considered for further review. Instruction in and Demonstration of a New Asthma Medication Delivery Device pertains to instruction on use of new asthma delivery devices. Although it did not score as highly as Asthma Medication Ratio, the measure covers a different aspect of asthma care. Therefore, this measure will be considered for inclusion in the core measure set.

Next, the ED and hospitalization outcome measures were evaluated. Three measures were identified as qualifying for review, all of them CapQUAM measures. The first evaluates the rate of asthma ED visits and hospitalizations for children, the second assesses distribution of ED visits and hospitalizations for identifiable asthma, and the third looks at appropriateness of ED visits and hospitalizations for identifiable asthma. Rate of Emergency Department Visit Use for Children Managed for Identifiable Asthma (hereafter referred to as Rate of Emergency Department Use) received a mean score of 49.5. Reviewers gave it high scores for its link to improved asthma care, evidence of racial or ethnic disparity in the area covered by the measure, the inability to game the measure, and the usability of the measure. Distribution of Emergency Department Visit Use for Children Managed for Identifiable Asthma, with a mean score of 23.5, was low scoring in most criteria. Reviewers did comment that the measure would assess disparities and that the developer presented data indicating disparities in the use of EDs for asthma. Reviewers also felt the measure was unlikely to be gamed. Appropriateness of Emergency Department Visit Use for Children Managed for Identifiable Asthma (hereafter referred to as Pediatric Emergency Department Appropriateness) (NQMC #9747/9748/9749/9750) was given a mean score of 21.5. Pediatric Emergency Department Appropriateness also scored highly in demonstration

of racial and ethnic disparities that could be addressed by implementation of the measure, but its complexity and stringent criteria for appropriateness lowered its score in other areas. Rate of Emergency Department Use will be considered for inclusion in the core set.

Although 12 measures met inclusion criteria for asthma measures that weren't classified as medication measures or hospitalization/ED measures, only one met criteria for review. Optimal Asthma Control (Measure HMIS #3890,) is a composite measure evaluating if the patient reported good asthma control on a test certified based on the age of the patient and if the patient had fewer than two ED visits or one hospitalization in the measurement period. Both criteria must be met to be included in the numerator of the measure. The mean score for the measure was 42.5. The measure received high scores in linkage to improved asthma care, ability to reduce disparities, and usability. The measure received a moderate score in ability to be gamed because the ED data are patient-reported rather than obtained from an EHR or medical record. Given that this measure scored highly, it will be considered for inclusion in the core measure set.

Two care coordination (Linkage) measures pertaining to asthma were reviewed: Primary Care Connection Prior to Emergency Department Visits for Children with Identifiable Asthma (NQF #3170, hereafter referred to as Primary Care Connection Prior to Emergency Department Visit), and Primary Care Connection After Emergency Department Visits for Children with Identifiable Asthma (NQF #3171, hereafter referred to as Primary Care Connection after Emergency Department Visit). Primary Care Connection Prior to Emergency Department Visit evaluates if a patient used primary care services and medications prior to an asthma ED visit or hospitalization; conversely, Primary Care Connection After Emergency Department Visit evaluates if a patient saw a primary care provider and filled controller medications after an asthma ED visit. Primary Care Connection Prior to Emergency Department Visit scored a mean of 27.5. It had high scores for usability and inability to game the measure but poor scores for the assessment of if it was likely to improve asthma care. Primary Care Connection After Emergency Department Visit

scored a mean of 34. It was scored highly on linkage to improved asthma care, inability to be gamed, and usability. Primary Care Connection After Emergency Department Visit will be considered for inclusion in the core measure set.

CORE MEASURE SET ANALYSIS

After review based on individual measure criteria, we considered five measures for inclusion in our core measure set: Asthma Medication Ratio, Instruction in and Demonstration of a New Asthma Medication Delivery Device, Rate of Emergency Department Use, Optimal Asthma Control, and Primary Care Connection After Emergency Department Visit.

Three of the measures are process measures; two are individual or composite outcome measures. Two are classified as medication measures, one is an ED/hospitalization measure, one is a care coordination measure, and the final measure was not categorized.

Our first criterion for a core measure set is parsimony. Ideally, a parsimonious core measure set would contain a maximum of 4–5 measures. Given that we are reviewing 5 measures and therefore will include a maximum of 5, we have met our criteria for parsimony. The second criterion is inclusion of a mix of measure types, as both process and outcome measures have merit in a set of core measures. When considering the second criterion in combination with the first criterion, we found four measures that seem to merit inclusion. Several peer-reviewed articles linking meeting the criteria for this measure to improved outcomes have evaluated Asthma Medication Ratio, a process measure. Primary Care Connection After Emergency Department Visit is a care coordination measure specific to asthma. Although it did not meet our original exclusion criteria used for the remainder of the asthma measures, we included it for individual measure review because of the importance of care coordination in improving asthma outcomes. Primary Care Connection After Emergency Department Visit is a new measure designed to promote connection with a physician following an ED visit for asthma, thereby ultimately promoting a reduction of recurrent ED visits for asthma. Optimal Asthma Control promotes the use of an objective assessment of short-term asthma control and a measure of long-

term control, namely ED visits and hospitalizations. We feel that this measure is particularly important, as research indicates that a formal assessment of asthma control is needed to reliably assess the patient's asthma symptoms and tailor asthma therapy; studies have shown that merely asking a patient about his or her asthma symptoms leads to an underestimation of symptom severity.^{13–15} Rate of Emergency Department Use is also a measure that would be important for inclusion in a core measures set because it promotes both an important outcome to patients and providers and an outcome that is a marker for future exacerbations.¹⁶ Therefore, this measure will provide an important modifiable outcome for patient and provider.

Instruction in and Demonstration of a New Asthma Medication Delivery Device meets fewer criteria for inclusion. It promotes a standard of care that may be less stringent than that of the EPR-3 guidelines. Consequently, this measure may not merit inclusion in a core measure set.

The final criterion for the set as a group is that the measure promotes program goals. As stated in the background, the following are the elements of the **EXHALE** approach: Education on asthma self-management, eXtinguish smoking and second hand smoke, Home visits for trigger reduction and asthma education, Achievement of guidelines-based medical management, Linkages and coordination of care across settings, and Environmental best practices to reduce indoor, outdoor, and occupational asthma triggers. Asthma Medication Ratio promotes access to guidelines-based medical management. Primary Care Connection After Emergency Department Visit promotes linkages and coordination across settings. The remainder of the measures relate to the National Asthma Control Program goals of reduced hospitalizations and ED visits, reduced mortality, reduced missed school and work because of asthma, and improved quality of life. Optimal Asthma Control and Rate of Emergency Department Use are both consistent with these goals.

After individual and core measure review, our core asthma measure set measures are Asthma Medication Ratio, Primary Care Connection After Emergency Department Visit, Optimal Asthma Control, and Rate of Emergency Department Use.

DISCUSSION

We identified four measures that, together, address processes of medication prescribing and care coordination and short- and long-term outcomes. These measures form a core measure set that promotes asthma care in line with elements of EXHALE. Although we have selected measures that will promote best practices in asthma care, critical gaps remain in asthma measurement. Our initial search revealed over 40 asthma measures, but the majority of the measures were ultimately excluded from review because we couldn't find detailed specifications on line; the setting for which the measure was designed was geographic or restricted to one setting only; or the measure was revoked from NQF endorsement. We may have missed additional asthma measures that were not in one of the asthma databases we searched; we chose these databases in order to include measures that had potential for the widest use.

We also noted gaps in the content of asthma measures. Although a number of tobacco measures exist, we have not found tobacco measures specific to persons with asthma. Tobacco measures that might be useful include measures that promote cessation of exposure to environmental tobacco smoke, measures that encourage smoking cessation in adolescents, and measures that encourage smoking cessation in adults with asthma. Gaps exist in other EXHALE tenets as well. Measures that evaluate self-management education in persons not controlled by guidelines-based medical management alone might increase reimbursement for this important tenet of improved asthma control. A measure evaluating home visits for trigger reduction, particularly for patients whose asthma is not controlled by medication management and self-management education, will again hopefully enable increased partnerships between clinicians, health plans, and public health or community partnerships to encourage home visits and environmental remediation as indicated.

Linkages and care coordination across settings play an increasingly acknowledged role in chronic disease management, and we found two measures that evaluated care coordination specifically for persons with asthma. We did not, however, find care

coordination measures that apply to all persons with asthma—the two care coordination measures reviewed pertained to persons with asthma who had been treated in the emergency department for their asthma. A number of additional care coordination measures would be helpful in promoting linkages for patients with asthma, including coordination between the clinician and school nurse as applicable, coordination between primary and specialty clinicians, and coordination between the clinician and persons providing care outside the clinical setting (e.g., community health workers, persons performing home health visits).

We found a limited number of measures pertaining to asthma outcomes. The measure evaluating ED visit rates is an important outcome both for the patient and for burden to the healthcare system. We did not find a measure that looked specifically at asthma hospitalizations that could be applied to the health plan or provider setting. Measures promoting asthma-related quality of life and symptom-free days, outcomes important to patients, might be useful.

The measures we have selected are evidence-based and consistent with EPR-3 guidelines. Several studies have shown that both children and adults with persistent asthma with a ratio of controller medications to total asthma medications dispensed of at least 0.5 are less likely to have an asthma exacerbation and less likely to visit the emergency department or be hospitalized than persons who have a ratio of less than 0.5.^{17–20} A ratio of 0.5 or greater for the asthma medication ratio has also been associated with improved asthma control.²⁰ The Asthma Medication Ratio by encouraging the use of regular controller medications for the management of asthma and discouraging excess prescription of short-acting β -agonists for asthma management, promotes guidelines-based care¹⁸ and patient safety.

The Optimal Asthma Control measure is unique in that we found no other measures directly pertaining to asthma control. However, a rich body of evidence documents the relationship between asthma control and exacerbations.^{21,22} NAEPP Guidelines also provide evidence that achievement of good asthma control reduces the risk of future asthma exacerbations; assessment of control to guide therapy is a key component of those guidelines.¹⁶ Evidence from both surveys and studies indicate

that asthma is well-controlled in only 50% of people with the condition^{23,24}, and that patients with asthma and their caregivers tend to overestimate their level of control unless assessed with a standardized test.^{14,15} Healthcare providers are thus unlikely to identify an insufficient regimen unless they conduct a standardized assessment of control. Standardized assessment of control is not yet routine in clinical practice but can be encouraged by incorporating a test of control into the EHR.

A measure of emergency department visits for asthma is important because ED visits for asthma are an important outcome for asthma intrinsically; they also represent a marker of risk for future asthma exacerbations.¹⁶ Providers and plans are also more likely to influence the rate of ED visits than other outcome measures, e.g. hospitalizations. In 2009, 8.4 ED visits per 100 persons with asthma occurred, but only 2 hospitalizations per 100 persons with asthma occurred.²⁵

CONCLUSION

Our goal in conducting this review was to use a systematic process to select a core set of asthma quality measures that are likely to be useful in 1) promoting guidelines-based asthma care, 2) reducing disparities, and 3) reducing burden of data collection and reporting. The selected measures also complement activities outlined in the **EXHALE** technical package. We hope this analysis serves to inform the process of aligning measures across reporting systems and organizations.

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APPENDIX A. ASTHMA QUALITY MEASURES INCLUDED FOR REVIEW

ASTHMA MEDICATION MEASURES

Reference #	Measure Title	Result
NQF #0036	NCQA: Use of Appropriate Medications for People With Asthma (ASM)	Not considered for further review – exclusion #1
NQF #0047	American Academy of Asthma Allergy and Immunology: Asthma: Pharmacologic Therapy for Persistent Asthma	
NQF #0143	The Joint Commission CAC-1: Relievers for Inpatient Asthma	Not considered for further review – exclusion #1
NQF #0144	The Joint Commission CAC-2: Systemic Corticosteroids for Inpatient Asthma	Not considered for further review – exclusion #1
NQF #0548	Suboptimal Asthma Control (SAC) and Absence of Controller Therapy (ACT)	Not considered for further review – exclusion #1
NQF #0620	ActiveHealth Management: Short-acting Beta Agonist Inhaler for Rescue Therapy	Not considered for further review – exclusion #1
NQF #1799	Medication Management for People with Asthma (MMA)	Not considered for further review – exclusion #1
NQF #1800	NCQA: Asthma Medication Ratio (AMR)	
NQMC #1610	HRSA Health Disparities Collaborative: Percent of patients with persistent asthma at last contact who are on anti-inflammatory medication	Not considered for further review – exclusion #2
NQMC #8021	Percentage of hospitalized patients who are discharged on an inhaled anti-inflammatory medication	Not considered for further review – exclusion #3
NQMC #9254	Percentage of patients with persistent asthma who were dispensed more than 3 canisters of a short-acting β -2 agonist inhaler during the same 90-day period (suboptimal control).	Not considered for further review – exclusion #5
NQMC #9255	Percentage of patients with asthma during the measurement period who were dispensed more than 3 canisters of short-acting β -2 agonist inhalers over a 90-day period and who did not receive controller therapy over the same 90-day period	Not considered for further review – exclusion #5
NQMC #10737	Q-METRIC: Instruction in and Demonstration of Proper Use of New Asthma Medication Delivery Device for Children with Asthma	

HOSPITALIZATION/ED MEASURES

Reference #	Measure Title	Result
NQF #0275	AHRQ: Chronic Obstructive Pulmonary Disease (COPD) or Asthma in older adults admission rate	Not considered for further review – exclusion #3
NQF #0283	AHRQ: Asthma in Younger Adults Admission Rate (PQI 15)	Not considered for further review – exclusion #3
NQF #0338	Joint Commission CAC-3: Home Management Plan of Care (HMPC) Document Given to Patient/Caregiver	Not considered for further review – exclusion #1
NQF #0728	AHRQ: Asthma Admission Rate (pediatric)	Not considered for further review – exclusion #3
NQF #1381	Alabama Medicaid Agency: Asthma emergency department visits	Not considered for further review – exclusion #1
NQF #1560	AHRQ: Relative Resource Use for People with Asthma	Not considered for further review – exclusion #4
	CAPQuaM PQMP Asthma I: Rate of emergency department visit use for children managed for identifiable asthma	
	CAPQuaM PQMP Asthma II: Distribution of emergency department visit use for children managed for identifiable asthma	
NQMC #1615	Percent of patients who have had a visit to the emergency department/urgent care office for asthma in the past six months	Not considered for further review – exclusion #5
NQMC #8022	Institute for Clinical Systems Improvement: Percent of patients discharged with asthma who are readmitted to the hospital within 30 days	Not considered for further review – exclusion #3
NQMC #8023	Institute for Clinical Systems Improvement: Percent of patients with asthma who return to the emergency department for asthma within 30 days of their last visit to the emergency department	Not considered for further review – exclusion #3
NQMC #8024	Percent of patients with an emergency department visit or inpatient admission for asthma who are discharged from the emergency department or inpatient setting with an asthma action plan	Not considered for further review – exclusion #2
NQMC #9747/9748/9749/9750	CAPQuaM PQMP Asthma V: Appropriateness of emergency department visits for children and adolescents with identifiable asthma	

OTHER ASTHMA MEASURES

Reference #	Measure Title	Result
NQF #0001	American Medical Association-Physician Consortium for Practice Improvement: Asthma assessment	Not considered for further review – exclusion #1
NQF #0025	IPRO: Management Plan for People with Asthma	Not considered for further review – exclusion #1
HMIS #1092	Centers for Disease Control and Prevention: Decrease the prevalence of current asthma among persons of all ages	Not considered for further review – exclusion #4
HMIS #3890	Minnesota Community Measurement: Optimal Asthma Control	
NQMC #1609	Asthma: percent of patients with severity assessment at last contact	Not considered for further review – exclusion #5
NQMC #1611	Asthma: Percent of patients with documented self-management goals in the past 12 months	Not considered for further review – exclusion #5
NQMC #1612	Asthma: average number of symptom-free days in previous two weeks	Not considered for further review – exclusion #5
NQMC #1614	Percent of patients evaluated for environmental triggers other than tobacco smoke either by history of exposure or allergy testing	Not considered for further review – exclusion #5
NQMC #1616	Asthma: Number of lost workdays and/or school days in the past 30 days	Not considered for further review – exclusion #5
NQMC #1617	Percent of patients with moderate to severe persistent asthma who have established a personal best peak flow	Not considered for further review – exclusion #5
NQMC #8019	Percent of patients with spirometry or peak flow at last visit related to asthma	Not considered for further review – exclusion #5
NQMC #8020	Percent of patients with assessment of asthma control using a validated questionnaire at the last visit related to asthma	Not considered for further review – exclusion #5
NQMC #8025	Institute for Clinical Systems Improvement: Percent of patients whose asthma is not controlled or have a change in medication or clinical status, who are seen by a healthcare clinician in two to six weeks	Not considered for further review – exclusion #5
NQMC #8026	Percent of patients whose asthma is controlled who are seen by a clinician every two to six months	Not considered for further review – exclusion #5
NQMC #10332	Proportion of ever-employed adults with asthma who report that their asthma was caused or made worse by exposures at work	Not considered for further review – exclusion #4
NQMC #10878	Percentages of children, ages 1–17 with persistent asthma, who, during the measurement year, presented to a the ED with an asthma exacerbation and were prescribed an inhaled corticosteroid at the time of discharge	Not considered for further review – exclusion #3
Q-METRIC #2	Documentation of Level of Asthma Control for Children	Not considered for further review – exclusion #5

CARE COORDINATION MEASURES

Reference #	Measure Title	Result
NQF #3170	CAPQuaM PQMP Asthma III: Primary care connection prior to emergency department visits for children with identifiable asthma	
NQF #3171	CAPQuaM PQMP Asthma IV: Primary care connection after emergency department visits for children with identifiable asthma	
NQMC #10412	MNCM: Percent of patients who have been educated about his or her asthma and self-management of the condition and also have a written asthma management plan present	Not considered for further review – exclusion #5

APPENDIX B. MEASURE SCORING

Measure	Reviewer	Potential Impact	Reliability	Validity	Potential to Reduce Disparities	Collection Burden	Interpretation	Usability	Total
Pharmacologic Therapy for Persistent Asthma	Reviewer 1	5	3	3	7	5	4	0	27
	Reviewer 2	6	1	3	10	10	1	5	36
Asthma Medication Ratio	Reviewer 1	8	4	4	5	5	8	10	44
	Reviewer 2	8	4	5	5	5	5	10	42
Optimal Asthma Control	Reviewer 1	10	4	3	8	0	5	7	37
	Reviewer 2	9	4	2	10	5	9	9	48
Instruction in and Demonstration of a New Asthma Medication Delivery Device	Reviewer 1	6	1	2	6	5	6	7	33
	Reviewer 2	8	1	2	5	0	5	10	31
Rate of Emergency Department Use	Reviewer 1	10	3	3	8	5	8	8	45
	Reviewer 2	7	5	4	8	10	10	10	54
Distribution of Emergency Department use	Reviewer 1	1	1	1	8	0	8	2	21
	Reviewer 2	2	1	1	10	0	10	2	26
Appropriateness of Emergency Department Use	Reviewer 1	1	3	2	7	0	3	4	20
	Reviewer 2	0	4	3	6	0	5	5	23
Primary Care Connection Prior to Emergency Department Visit	Reviewer 1	2	1	1	4	0	8	5	20
	Reviewer 2	4	2	2	6	5	8	8	35
Primary Care Connection After Emergency Department Visit	Reviewer 1	7	1	1	5	0	8	10	32
	Reviewer 2	8	3	1	3	5	8	8	36

