NATIONAL QUALITY FORUM

Measure Submission and Evaluation Worksheet 5.0

This form contains the information submitted by measure developers/stewards, organized according to NQF's measure evaluation criteria and process. The evaluation criteria, evaluation guidance documents, and a blank online submission form are available on the submitting standards web page.

NQF #: 0143 **NQF Project:** Pulmonary Project	

(for Endorsement Maintenance Review)
Original Endorsement Date: Mar 09, 2007   **Most Recent Endorsement Date:** Mar 09, 2007

BRIEF MEASURE INFORMATION

De.1 Measure Title: CAC-1: Relievers for Inpatient Asthma

Co.1.1 Measure Steward: The Joint Commission

De.2 Brief Description of Measure: Use of relievers in pediatric patients, age 2 years through 17 years, admitted for inpatient treatment of asthma. This measure is a part of a set of three nationally implemented measures that address children's asthma care (CAC-2: Systemic Corticosteroids for Inpatient Asthma, and CAC-03: Home Management Plan of Care (HMPC) Document Given to Patient/Caregiver) that are used in The Joint Commission's accreditation process.

2a1.1 Numerator Statement: Pediatric asthma inpatients who received relievers during hospitalization

2a1.4 Denominator Statement: Pediatric asthma inpatients (age 2 years through 17 years) who were discharged with a principal diagnosis of asthma.

2a1.8 Denominator Exclusions: Excluded Populations:
- Patients with age less than 2 years or 18 years or greater
- Patients who have a Length of Stay greater than 120 days
- Patients enrolled in clinical trials
- Patients with a documented Reason for Not Administering Relievers

1.1 Measure Type: Process
2a1. 25-26 Data Source: Electronic Clinical Data, Electronic Clinical Data : Electronic Health Record, Paper Records
2a1.33 Level of Analysis: Facility, Population : National

1.2-1.4 Is this measure paired with another measure? No

De.3 If included in a composite, please identify the composite measure (*title and NQF number if endorsed*):
Not applicable

STAFF NOTES (*issues or questions regarding any criteria*)

Comments on Conditions for Consideration:

Is the measure untested? Yes☐ No☐   If untested, explain how it meets criteria for consideration for time-limited endorsement:

1a. Specific national health goal/priority identified by DHHS or NPP addressed by the measure (*check De.5*):
5. Similar/related endorsed or submitted measures (*check 5.1*):
Other Criteria:

Staff Reviewer Name(s):

1. IMPACT, OPPORTUNITY, EVIDENCE - IMPORTANCE TO MEASURE AND REPORT

Importance to Measure and Report is a threshold criterion that must be met in order to recommend a measure for endorsement. All three subcriteria must be met to pass this criterion. See guidance on evidence.
Measures must be judged to be important to measure and report in order to be evaluated against the remaining criteria. (evaluation criteria)

1a. High Impact: H☐ M☐ L☐ I☐
(*The measure directly addresses a specific national health goal/priority identified by DHHS or NPP, or some other high impact aspect of healthcare.*)

De.4 **Subject/Topic Areas** (*Check all the areas that apply*):   Mental Health : Alcohol, Substance Use/Abuse, Pulmonary/Critical Care : Asthma
De.5 **Cross Cutting Areas** (*Check all the areas that apply*):   Safety : Medication Safety

1a.1 **Demonstrated High Impact Aspect of Healthcare:** Affects large numbers, A leading cause of morbidity/mortality

1a.2 **If "Other," please describe:**

1a.3 **Summary of Evidence of High Impact** (*Provide epidemiologic or resource use data*):
According to the 2006-2008 data from the Centers for Disease Control (CDC), 9.3% of the US population is composed of children suffering from asthma (CDC Health Disparities and Inequalities Report, 2011). This number has increased from the 2001-2003 statistics which reported an 8.5% current asthma prevalence in the US (www.cdc.gov). Consequently, the US healthcare system is greatly impacted by the demand to service this growing population (Brown, et al., 2004). A systematic review by Boluyt, N., et al (2007) noted that there are approximately 2 million Emergency Department (ED) visits per year related to children with acute asthma. This large reported emergency population is responsible for an annual reported 200,000 hospital admissions a year for childhood asthma in the US. This consequently represents more than $3 billion in healthcare costs (Silber JH, et al., 2003).

In 2005, 5.2% of children with asthma in the US, had at least one asthma attack in the previous year (3.8 million children). Nearly two of every three children who currently have asthma had at least one attack in the past 12 months (Akinbami, L, 2006). Although there are means to prevent attacks or exacerbations among children with asthma, unfortunately, the majority of children with asthma do not have the disease under control and still suffer from acute asthma attacks, or exacerbations of asthma (www.cdc.gov/nchs/products/pub/pubd , 2006).

Both drug categories of Short Acting Beta Antagonist (SABA) and Long Acting Beta Antagonist (LABA) are included in the CAC-1 measure definition of Reliever Medications; see Appendix C, Table 6.2. The National Heart Lung and Blood (NHLBI) provides recommendations and guidelines of care for the treatment of asthmatic patients. The NHLBI provides these updated, scientific recommendations in an Expert Panel Report (EPR), and that report states that "SABAs are the drug of choice for treating acute asthma symptoms and exacerbations and for preventing EIB (Evidence A)." (Expert Panel Report 3, Guidelines for the Diagnoses and Management of Asthma, 2007). Additionally the Panel recommends the use of LABAs for reliever therapy in patients' who are not well controlled.

1a.4 **Citations for Evidence of High Impact cited in 1a.3:** Adams R. J., Fuhlbrigge, A., Finkelstein, J A., Lozano P., Livingtson J M., Weiss, K B., and Weiss, S T. (2001). Use of Inhaled Anti-Inflammatory Medication in Children with Asthma in Managed Care Settings. Archives of Pediatrics and Adolescent Medicine, 155, 501-507.

Akinbami, L, J, (2006). The state of Childhood Asthma, United States 1980-2005:Advance Data From Vital Health Statistics, No 381.

American College of Chest Physicians (ACCP), 10th Annual ACCP Community Asthma and COPD Coalitions Symposium: A Physician's Perspective. Retrieved on November 28, 2011 from: http://www.chestnet.org/accp/perspective/10th_Asthma

Barnes, Peter, (2006). Treatment with ® - Albuteral Has No Advantage over Racemic Albuteral. American Journal of Respiratory and Critical Care Medicine: Pro/Con Editorial, Vol 174, p969-971.

Bryan, J., (2001) Ventolin Remains A Breath of Fresh Air for Asthma Suffers, After 40 Years. Pharmaceutical Journal, Vol 279; No. 7473, 404-405.

Bisgaard, H., Le Roux, P., Bjamer, D., Dymek, A., Vermueulen, J. H., and Hultquist, C. (2006). Budesonide/Formoterol Maintenance Plus Reliever Therapy: A New Strategy in Pediatric Asthma. CHEST 2006;130; 1733-1743.

Boluyt, N, Van der Lee, J. H., Moyer, V. A., Brand, P. L., and Offringa, M. (2007). State of the Evidence on Acute Asthma Management in Children: A Critical Appraisal of Systematic Reviews. Pediatrics 120; p1334-1343.

Centers for Disease Control and Prevention: Morbidity and Mortality Weekly report. Supplement/ Vol 60, Jan 14, 2011, retrieved on October 26, 2011 from: http://www.cdc.gov/mmwr/pdf/other/su6001.pdf .

Childhood Asthma Research and Education Network (CARE). Retrieved on January 9, 2012 from http://www.asthma-carenet.org/index.html .

Craven, D., Kercsmar C M., Myers, T R., O'Riordan M A., Golonka G., and Moore, S. (2001). Ipratropium bromide plus nebulized albuteraol for the treatment of hospitalized children with acute asthma. Journal of Pediatrics; 138:51-58.
Fuhlbrigge, A.L., Adams, R.J., Guilbert, T.W. Grant, E., Lozano, P., Janson, S.L., Martinez, F., Weiss, K.B., and Weiss, S.T. (2002). The Burden of Asthma in the United States : Level and Distribution Are Dependent on Interpretation of the National Asthma Education and Prevention Program Guidelines (NAEPP). American Journal of Respiratory and Critical Care Medicine. Vol 166, p 1044-1049.

Goggin, N., Macarther, C., Parkin, P C.(2001). Randomized trial of the addition of ipratropium bromide to albuterol and corticosteroid therapy in children hospitalized because of an acute asthma exacerbation. Arch Pedatr Adolesc Med; 155 (12): 1329-34.

Hermansen, M. N, Nielsen, K. G., Buchvald, F, Jespersen, J.J., Bengtsson, T., and Bisgaard, H. (2006). Acute Relief of Exercise-Induced Bronchoconstriction by Inhaled Formoterol in Children with Persistent Asthma. CHEST 129; 1203-1209.

Kim, I K., Phrampus, E., Venkataraman, S., Pitetti, R., Saville, A., Corcoran T., Gracely E., Funt, N., and Thompson, A. (2005). Helium/oxygen-driven albuterol nebulization in the treatment of children with moderate to severe asthma exacerbations: A Randomized Control Trial. Pediatrics; 116(5):1127-1133.

Lozano, P., Finkelstein, J.A., Hecht, J., Shulruff, R., Weiss, K.A. (2003). Asthma Medication Use and Disease Burden in Children in a Primary Care Population. Arch Pediatric Adolescent Medicine. Vol 157, p81-87.

Mellon, M., and Parasuraman, B. (2004). Pediatric Asthma: Improving Management to Reduce Cost of Care. Journal of Managed Care Pharmacy; Vol 10, No. 2, 130-141.

Moorman, J E., Zahran, H., Truman, B I., Molla M T., (2011). Current Asthma Prevalence-United States, 2006-2008. Morbidity and Mortality Weekly Report January 14, 2011.

National Center for Health Statistics, Centers for Disease Control and Prevention. Asthma Prevalence, Health Care Use and Mortality, 2003–2005. Available from http://www.cdc.gov/nchs/products/pubs/ pubd/hestats/asthma03-05/asthma0305.htm. Accessed November 29, 2006.

National Center for Health Statistics, Center for Disease Control and Prevention, Asthma Prevalence, Health Care Use and Mortality, 2006-2008. Available from http://www.cdc.gov/nchs/products/pub/pubd , Accessed October 27, 2011.

National Center for Heart Lung and Blood Institute (2007) National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report. United States Department of Health and Human Services, retrieved on October 28th 2011 from www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf .

National Health Interview Survey. Asthma Prevalence, Health Care Use and Mortality: United States, 2005-2009. Retrieved on Oct 27, 2011 from http://www.cdc.gov/nchs/data/nhsr/nhsr032.pdf .

National Heart Lung and Blood Institute (NHLBI). Guidelines for the Diagnosis and Management of Asthma (EPR-3). Retrieved on November 29, 2011 from: http://www.nhlbi.nih.gov/guidelines/asthma/ .

Rivera, M L., Kim, T Y., Stewart, G M., Minasyan, L., Brown, L. (2006). Albuterol nebulized in heliox in the initial ED treatment of pediatric asthma: A blinded, randomized controlled trial. American Journal Emergency Medicine;24(1):38-42.

Silber, J H., Rosenbaum, P R., Even-Shosha, O., Shabbout M., Zhang, X., Bradlow E T., and Marsh, R R. (2003). Length of Stay, Conditional Length of Stay, and Prolonged Stay in Pediatric Asthma. Health Services Research, 38: 3, 867-886.

1b. Opportunity for Improvement: H☐ M☐ L☐ I☐
(*There is a demonstrated performance gap - variability or overall less than optimal performance*)

1b.1 Briefly explain the benefits (improvements in quality) envisioned by use of this measure:
Use of relievers has been established as routine treatment for asthmatic patients since the early 1970's, Ventolin (Salbutemol) was available on the market in 1968 (Bryan, J. 2001). Recent literature supports the use of relievers or bronchodilators as the primary plan of treatment for children with acute exacerbation of asthma. Use of relievers has been shown to provide relief in asthmatic pediatric patients and is the most effective bronchodilator known (Barnes, P, 2006). A systematic review by Boluyt et al., (2006) reviewed 9 studies that supported the use of relievers as primary therapy to maintain airway patency in pediatric patients presenting with an acute exacerbation of asthma.
The use of guidelines to rapidly reduce asthma exacerbations, to treat children with an acute asthmatic attack, is imperative to the health and well being of children with asthma, and the cost of US healthcare. However, even with the publication of guidelines by the American College of Chest Physicians (ACCP), the American Academy of Pediatrics (AAP), The National Asthma Education and Prevention Program (NAEPP), Childhood Asthma Research and Education (CARE) Network, and The National Heart Lung and Blood Institute (NHLBI), who all recommend the use of relievers to gain control of acute asthma exacerbation, and reduce severity as quickly as possible, it has not been demonstrated that all hospitals are routinely using relievers in children with acute asthma. This measure assists health care organizations (HCO) to track administration of relievers in the target population, therefore decreasing incidence of morbidity and mortality related to acute exacerbation of asthma in children.
Additionally, due to the high cost of emergency care representing approximately 200,000 hospital admissions and $3 billion dollars, as well as the cost of additional treatment due to failed inappropriate care, use of recommended treatment to the pediatric asthmatic population will significantly decrease the cost of asthma care overall (Silber JH, et al., 2003).

1b.2 **Summary of Data Demonstrating Performance Gap** *(Variation or overall less than optimal performance across providers)*:
[*For Maintenance – Descriptive statistics for performance results for this measure - distribution of scores for measured entities by quartile/decile, mean, median, SD, min, max, etc.*]
As noted by Stolff (2000), mortality of children due to asthma continues today. When Stolff conducted a post mortem case review of adults and children, he found that 32% had mild-persistent or even mild-intermittent asthma prior to episode resulting in death. In 2007 the CDC conducted a mortality review for asthma, and noted an infant mortality rate of 6.75 infant deaths per 1,000 live births. Death rates rose very slightly from 2006 to 2007 by 0.7% in males and females ages 0-4 years and 5-14 years as well (Xu et al, 2007). Stolff noted the reason for these mortalities was a result of poor adherence to written NCHLB guidelines. Stolff discusses the topic that physicians believe that mild persistent or mild intermittent asthma has very little risk of mortality, and therefore physicians do not take immediate action of providing reliever therapy when patients present with mild symptoms.

Crain, et al. (1995) found that fewer than half of hospital emergency department survey respondents had heard of the NHLBI guidelines and that there was variation in the use of relievers. They noted that higher performing elements of asthma care by children's hospital emergency departments may be merely a reflection of their location, or their proximity to that of an urban public hospital.

Voluntary data collection for accreditation purposes began for this measure in 2007. Based on 17 quarters of data reported to The Joint Commission, the aggregate performance rate for CAC1a is 99.8% as of 2nd quarter 2011. Since data collection on this measure began nationally in the second quarter of 2007, aggregate performance has improved from 98.1%. Although current performance appears high, it should be noted that hospitals currently using this measure are self-selected, and therefore, presumably are more focused on improving the care delivered to asthma patients than other hospitals might be. For this reason, The Joint Commission considers that the "true" performance rate on this measure for all hospitals treating children's asthma is likely much lower.

1b.3 Citations for Data on Performance Gap: [*For Maintenance – Description of the data or sample for measure results reported in 1b.2 including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included*]

Crain, E.F., Weiss, K.B. and Fagan M.J. (1995). Pediatric Asthma Care in US Emergency Departments.: Current Practice in the Context of the National Institutes of Health Guidelines. ARCH Pediatric Adolescent Med/Vol 149 p 893-901.

Hartley, J P., Nogrady S G., Seaton A., (1978) Bronchodilator effect of delta1-tetrahydrocannabinol. British Journal of Clinical Pharmocology. Vol 5(6):523-525.

Mellon, M., and Parasuraman, B (2004). Pediatric Asthma: Improving Management to Reduce Cost of Care. Journal of Managed Care Pharmacy; vol 10, No.2, p130-140.

Stoloff, S.(2000). Current Asthma Management: The Performance Gap and Economic Consequences. The American Journal of Managed Care; Vol 6, No. 17, SUP: s918-929

Xu, J., Kochanek, K., Murphy, S., Tejada-Vera, B. (2007). National Vital Statistics Reports: Deaths: Final data for 2007. Retrieved November 17, 2011 from http://www.cdc.gov/nchs/data/nvsr/nvsr58/nvsr58_19.pdf

1b.4 Summary of Data on Disparities by Population Group: [*For Maintenance –Descriptive statistics for performance results for this measure by population group*]

For children (9.3% general prevalence), asthma prevalence was higher among Puerto Rican Hispanics (18.4%), non-Hispanic blacks (14.6%), and the multiracial (13.6%) than among non-Hispanic whites (8.2%). Asthma prevalence was higher among males (10.7%) than among females (7.8%). Among poor children, Puerto Rican children, multiracial children, and non-Hispanic black children had higher asthma prevalence (23.3%, 21.1%, and 15.8%, respectively) than poor non-Hispanic white children (10.1%) (Moorman et al., 2011).

Studies that examine poverty included analysis of poverty level, related to access to hospitals, or healthcare generally, and level of "caregivers" understanding of acute asthma exacerbation. These studies found no differing use of relievers in children. Populations who have a decreased ability to obtain insurance, or use of Medicaid, or no insurance were more likely to receive reliever therapy, during acute exacerbation of asthma due to their inability to control symptoms as home (McDaniel Paxon and Waldfogel, 2006).

Historically, asthma has been documented as more prevalent in childhood boys, when compared to childhood girls; however, equal prevalence has been reported in girls and boys in very young children. It is important to note however, that the reliability of the diagnoses of asthma in the "very young child" is not clear. Low birth weight has also been determined to be a risk factor for asthma, as well as maternal characteristics, including; Basal Metabolic Index, smoking and self reported asthma. Debate continues as to the relationship between socio economic status, low birth weight, maternal health and asthma prevalence (Mc Daniel et al., 2006).

Data reported by the National Health Interview Survey indicated that non-Hispanic Black Children were more likely to report to the Emergency Room in an acute asthmatic exacerbation and require use of reliever therapy (Mc Daniel et al., 2006).
It is not known however, if when all these factors are accounted for, if non-Hispanic black children are given more reliever therapy, when compared to the same population of other races. The study reviewed by Mc Daniel et al (2006) noted no increase association between insurance type, or lack of insurance when reviewing the high incidence of non-Hispanic black children's' ED visits with exacerbation of asthma.

1b.5 Citations for Data on Disparities Cited in 1b.4: [*For Maintenance – Description of the data or sample for measure results reported in 1b.4 including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included*]

American Academy of Pediatrics (2011). Pediatric Clinical Practice Guidelines and Policies: A Compendium of Evidence-based Research for Pediatric Practice, 11th Edition. American Academy of Pediatrics, Elk Grove Village, IL.

Center for Disease Control and Prevention: Morbidity and Mortality Weekly report. Supplement/ Vol 60, Jan 14, 2011, retrieved on October 26, 2011 from: http://www.cdc.gov/mmwr/pdf/other/su6001.pdf .

Chin, M H., Alexander-Young, M., Burnet, D. (2009). Health Care Quality-Improvement Approaches to Reducing Child Health Disparities. Pediatrics;124:S224-S236.

Elster, A., Jarosik, J., VanGeest J., Fleming M. (2003). Racial and Ethnic Disparities in Health Care for Adolescents, A Systematic

Review of the Literature. Arch Pediatrics Adolescent Medicine; 157:867-874. Retrieved on September 27, 2011 from http://archpedi.ama.assn.org/cgi/content/full/157/9/867

Gottlieb, D J., O'Connor, G T., Beiser, A S.(1995). Poverty, Race, and Medication Use Are Correlates of Asthma Rates, A Small Area Analysis in Boston. CHEST Vol 108 no. 1: 28-35.

McDaniel, M., Paxson, C .,and Waldfogel, J. (2006). Racial Disparities in Childhood Asthma in the United States: Evidence From the National Health Interview Survey, 1997-2003. Pediatrics 2006,117; e868.

Moorman, J E., Zahran, H., Truman, B I., Molla M T., (2011). Current Asthma Prevalence-United States, 2006-2008. Morbidity and Mortality Weekly Report January 14, 2011.

Smith, L A., Hatcher-Ross, J L., Wertheimer, R., Kahn, R S.(2005). Rethinking Race/Ethnicity, Income, and Childhood Asthma: Racial/Ethnic Disparities Concentrated Among the Very Poor. Public Health Reports; Mar-April, Vol 120, 109-115.

1c. Evidence (*Measure focus is a health outcome OR meets the criteria for quantity, quality, consistency of the body of evidence.*)
Is the measure focus a health outcome?   Yes☐ No☐   **If not a health outcome**, rate the body of evidence.

Quantity: H☐ M☐ L☐ I☐   Quality: H☐ M☐ L☐ I☐   Consistency: H☐ M☐ L☐ I☐

Quantity	Quality	Consistency	Does the measure pass subcriterion1c?
M-H	M-H	M-H	Yes☐
L	M-H	M	Yes☐ IF additional research unlikely to change conclusion that benefits to patients outweigh harms: otherwise **No**☐
M-H	L	M-H	Yes☐ IF potential benefits to patients clearly outweigh potential harms: otherwise **No**☐
L-M-H	L-M-H	L	No ☐

Health outcome – rationale supports relationship to at least one healthcare structure, process, intervention, or service	Does the measure pass subcriterion1c? Yes☐ IF rationale supports relationship

1c.1 Structure-Process-Outcome Relationship (*Briefly state the measure focus, e.g., health outcome, intermediate clinical outcome, process, structure; then identify the appropriate links, e.g., structure-process-health outcome; process- health outcome; intermediate clinical outcome-health outcome*):
The focus of the measure is to evaluate whether children admitted to acute care hospitals for acute exacerbation of asthma are provided guideline-recommended treatment, specifically use of relievers, to gain rapid bronchodialation and therefore reduce morbidity and mortality related to asthma.

1c.2-3 Type of Evidence (*Check all that apply*):
Clinical Practice Guideline, Other, Systematic review of body of evidence (other than within guideline development)
Selected Studies Referenced

1c.4 Directness of Evidence to the Specified Measure (*State the central topic, population, and outcomes addressed in the body of evidence and identify any differences from the measure focus and measure target population*):
This measure is consistent with the guidelines recommended by American Academy of Pediatrics and the National Heart Lung and Blood Institute. The central topic of the evidence is to describe the role of reliever therapy in the treatment of children with an acute asthmatic exacerbation, consistent with the definition of acute asthma for this measure.

The focus of both the evidence and the measure is the use of relievers, or specifically: bronchodilators, short acting beta agonist and long acting beta agonists for the appropriate therapy in acute asthma exacerbations in children. Both the evidence and the measure support the use of these specific reliever therapies.

1c.5 Quantity of Studies in the Body of Evidence (*Total number of studies, not articles*): All studies comprise the pediatric population. Of a total of 5 randomized control trials, 3 (60%) addressed the use of albuterol. Of the nonrandomized control trials 6 (75%) focus on differing SABA therapy.

Random Control Trials

QTY	Subject of the Study
1	Use of salbutamol as reliever therapy in acute severe asthma
1	Use of ipratropium bromide to albuterol and corticosteroid in acute asthma
2	Helium Oxygen driven albuterol nebulizer in moderate to severe asthma exacerbation
1	Continuous vs intermittent albuterol in severe status asthmaticus
1	Use of magnesium in ED with acute asthma
1	Use of aminophylline for severe acute asthma
1	Use of budesonide/formterol maintenance plus relieve

Non Random Control Trials

QTY	Subject of the Study
1	Sedation and acute asthmatics
1	Use of ipratropium bromide plus albuterol in acute asthma
1	Intravenous aminophylline for acute severe asthma receiving inhaled bronchodilator
2	Inhaled anticholinergic and beta agonist for reliever of acute asthma
2	Inhaled formterol for relief in exercise
1	Albuterol vs Racemic Albuterol

1c.6 Quality of Body of Evidence (*Summarize the certainty or confidence in the estimates of benefits and harms to patients across studies in the body of evidence resulting from study factors. Please address: a) study design/flaws; b) directness/indirectness of the evidence to this measure (e.g., interventions, comparisons, outcomes assessed, population included in the evidence); and c) imprecision/wide confidence intervals due to few patients or events***):** More than 24 studies were reviewed for evidence that supported the use of reliever therapy in children with acute asthma exacerbations. There was strong evidence (level A) that reveals the use of short acting beta agonist (SABA).

Studies by Craven, et al., (2001) and Goggin, et al.,(2001) support the use of ipratropium bromide, (SABA with anticholinergic therapy) in acute asthma exacerbation of children, while Kim, et al., (2005) and Rivera et al., (2006) both examined albuterol (SABA therapy) with helium/oxygen in the emergency department with children in moderate to severe asthma exacerbations.

Strong clinical evidence from Hermansen et al.,(2006) reveals a randomized, double blinded, cross over design evaluating the use of a rotation between formoterol (LABA therapy) terbutaline (beta adrenergic receptor agonist) and placebo for relief of exercise induced bronchoconstriction in children in Denmark. Results indicated that therapy was as effective as terbutaline and both drugs had rapid benefits that greatly outweighed the placebo treatment. All studies support the pharmacokinetic characteristics of SABA and LABA therapy with altering combinations of other therapy, in achieving rapid bronchodilation. Differing SABA and LABA medical regimens are not compiled into a meta-analysis. This would have provided greater support to this measure and ensure generalizability of the results.

Potential weaknesses in the body of evidence related to this measure include lack of generalizability of the study findings in multiple published studies due to population sample size, and ethical limitations of withholding therapy. Differing definitions of acute asthma exacerbation occur within the international medical community; patient reported symptoms, and measurement of lung volume and expansion differ dramatically, and clinical presentation are all individualized to each study.

1c.7 Consistency of Results across Studies *(Summarize the consistency of the magnitude and direction of the effect):* Results of systematic reviews evaluating the efficacy of beta agonist with children who have severe or moderate to severe persistent asthmatic exacerbation were consistent in findings. Studies show a weighted mean difference in the percent of predicted forced end expiratory volume in one second, (FEV1), by 9.68%-16.3% . These findings are quite consistent across hundreds of clinical trials and for this patient population, placebo and control groups considered. Although the results consistently showed benefit across studies, the confidence intervals are often wide for individual studies.

1c.8 Net Benefit *(Provide estimates of effect for benefit/outcome; identify harms addressed and estimates of effect; and net benefit - benefit over harms)*:
As stated above results of systematic reviews evaluating the efficacy of beta agonist or reliever therapy, in severe or moderate to severe persistent asthmatic exacerbation show a weighted mean difference in the percent of predicted forced end expiratory volume in one second, (FEV1), by 9.68%-16.3% in most studies. Application of asthma management control plans for emergency and inpatient hospital admission, or participation in a measure aimed at improving care such as CAC-1 reduces readmission and thus use of hospital resources aimed to improve the general pediatric asthma population by %75.

1c.9 Grading of Strength/Quality of the Body of Evidence. Has the body of evidence been graded? Yes

1c.10 If body of evidence graded, identify the entity that graded the evidence including balance of representation and any disclosures regarding bias: National Heart Lung and Blood Institute

1c.11 System Used for Grading the Body of Evidence: USPSTF

1c.12 If other, identify and describe the grading scale with definitions:

1c.13 Grade Assigned to the Body of Evidence: A

1c.14 Summary of Controversy/Contradictory Evidence: There is no documented controversy related to the use of relievers in asthmatic children during asthmatic attack.

1c.15 Citations for Evidence other than Guidelines *(Guidelines addressed below)*:
Adams R. J., Fuhlbrigge, A., Finkelstein, J A., Lozano P., Livingtson J M., Weiss, K B., and Weiss, S T. (2001). Use of Inhaled Anti-Inflammatory Medication in Children with Asthma in Managed Care Settings. Archives of Pediatrics and Adolescent Medicine, 155, 501-507.

American Academy of Pediatrics (2011). Pediatric Clinical Practice Guidelines and Policies: A Compendium of Evidence-based Research for Pediatric Practice, 11th Edition. American Academy of Pediatrics, Elk Grove Village, IL.

Akinbami, L, J, (2006). The state of Childhood Asthma, United States 1980-2005:Advance Data From Vital Health Statistics, No 381.

Bryan, J., (2001) Ventolin Remains A Breath of Fresh Air for Asthma Suffers, After 40 Years. Pharmaceutical Journal, Vol 279; No. 7473, 404-405.

Bisgaard, H., Le Roux, P., Bjamer, D., Dymek, A., Vermueulen, J. H., and Hultquist, C. (2006). Budesonide/Formoterol Maintenance Plus Reliever Therapy: A New Strategy in Pediatric Asthma. CHEST 2006;130; 1733-1743.

Boluyt, N, Van der Lee, J. H., Moyer, V. A., Brand, P. L., and Offringa, M. (2007). State of the Evidence on Acute Asthma Management in Children: A Critical Appraisal of Systematic Reviews. Pediatrics 120; p1334-1343.

Center for Disease Control http://www.cdc.gov/asthma/children.htm

Center for Disease Control and Prevention: Morbidity and Mortality Weekly report. Supplement/ Vol 60, Jan 14, 2011, retrieved on October 26, 2011 from: http://www.cdc.gov/mmwr/pdf/other/su6001.pdf .

Chin, M H., Alexander-Young, M., Burnet, D. (2009). Health Care Quality-Improvement Approaches to Reducing Child Health Disparities. Pediatrics;124:S224-S236.

Craven, D., Kercsmar C M., Myers, T R., O'Riordan M A., Golonka G., and Moore, S. (2001). Ipratropium bromide plus nebulized albuteraol for the treatment of hospitalized children with acute asthma. Journal of Pediatrics; 138:51-58.

Elster, A., Jarosik, J., VanGeest J., Fleming M. (2003). Racial and Ethnic Disparities in Health Care for Adolescents, A Systematic Review of the Literature. Arch Pediatrics Adolescent Medicine; 157:867-874. Retrieved on September 27, 2011 from http://archpedi.ama.assn.org/cgi/content/full/157/9/867

Goggin, N., Macarther, C., Parkin, P C.(2001). Randomized trial of the addition of ipratropium bromide to albuterol and corticosteroid therapy in children hospitalized because of an acute asthma exacerbation. Arch Pedatr Adolesc Med; 155 (12): 1329-34.

Gottlieb, D J., O'Connor, G T., Beiser, A S.(1995). Poverty, Race, and Medication Use Are Correlates of Asthma Rates, A Small Area Analysis in Boston. CHEST Vol 108 no. 1: 28-35.

Hermansen, M. N, Nielsen, K. G., Buchvald, F, Jespersen, J.J., Bengtsson, T., and Bisgaard, H. (2006). Acute Relief of Exercise-Induced Bronchoconstriction by Inhaled Formoterol in Children with Persistent Asthma. CHEST 129; 1203-1209.

Kim, I K., Phrampus, E., Venkataraman, S., Pitetti, R., Saville, A., Corcoran T., Gracely E., Funt, N., and Thompson, A. (2005). Helium/oxygen-driven albuterol nebulization in the treatment of children with moderate to sever asthma exacerbations: A Randomized Control Trial. Pediatrics; 116(5):1127-1133.

McDaniel, M., Paxson, C .,and Waldfogel, J. (2006). Racial Disparities in Childhood Asthma in the United States: Evidence From the National Health Interview Survey, 1997-2003. Pediatrics 2006,117; e868.

Mellon, M., and Parasuraman, B. (2004). Pediatric Asthma: Improving Management to Reduce Cost of Care. Journal of Managed Care Pharmacy; Vol 10, No. 2, 130-141.

Moorman, J E., Zahran, H., Truman, B I., Molla M T., (2011). Current Asthma Prevalence-United States, 2006-2008. Morbidity and Mortality Weekly Report January 14, 2011.

National Center for Health Statistics, Centers for Disease Control and Prevention. Asthma Prevalence, Health Care Use and Mortality, 2003–2005. Available from http://www.cdc.gov/nchs/products/pubs/ pubd/hestats/asthma03-05/asthma0305.htm Accessed November 29, 2006.

National Center for Health Statistics, Center for Disease Control and Prevention, Asthma Prevalence, Health Care Use and Mortality, 2006-2008. Available from http://www.cdc.gov/nchs/products/pub/pubd , Accessed October 27, 2011.

National Center for Heart Lung and Blood Institute (2007) National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report. United States Department of Health and Human Services, retrieved on October 28th 2011 from www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf .

National Health Interview Survey. Asthma Prevalence, Health Care Use and Mortality: United States, 2005-2009. Retrieved on Oct

27, 2011 from http://www.cdc.gov/nchs/data/nhsr/nhsr032.pdf .

Rivera, M L., Kim, T Y., Stewart, G M., Minasyan, L., Brown, L. (2006). Albuterol nebulized in heliox in the initial ED treatment of pediatric asthma: A blinded, randomized controlled trial. American Journal Emergency Medicine;24(1):38-42.

Silber, J H., Rosenbaum, P R., Even-Shosha, O., Shabbout M., Zhang, X., Bradlow E T., and Marsh, R R. (2003). Length of Stay, Conditional Length of Stay, and Prolonged Stay in Pediatric Asthma. Health Services Research, 38: 3, 867-886.

Smith, L A., Hatcher-Ross, J L., Wertheimer, R., Kahn, R S.(2005). Rethinking Race/Ethnicity, Income, and Childhood Asthma: Racial/Ethnic Disparities Concentrated Among the Very Poor. Public Health Reports; Mar-April, Vol 120, 109-115.

1c.16 Quote verbatim, <u>the specific guideline recommendation</u> *(Including guideline # and/or page #)*:
The Expert Panel recommends the use of SABA as the most effective medication for
relieving acute bronchoconstriction; SABAs have few negative cardiovascular effects
(Evidence A). Section 3. Component 4. Page 236

1c.17 **Clinical Practice Guideline Citation:** National Center for Heart Lung and Blood Institute (2007) National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma Full Report. United States Department of Health and Human Services.

1c.18 **National Guideline Clearinghouse or other URL:** www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf .

1c.19 **Grading of Strength of Guideline Recommendation.** Has the recommendation been graded? Yes

1c.20 **If guideline recommendation graded, identify the entity that graded the evidence including balance of representation and any disclosures regarding bias:** National Heart Lung and Blood Institute

1c.21 **System Used for Grading the Strength of Guideline Recommendation:** USPSTF

1c.22 **If other, identify and describe the grading scale with definitions:**

1c.23 **Grade Assigned to the Recommendation:** A

1c.24 **Rationale for Using this Guideline Over Others:** The National Heart, Lung, and Blood Institute (NHLBI) provides global leadership for research to promote the prevention and treatment of heart, lung, and blood diseases and enhance the health of all individuals. NHLBI reviews are used in deliberation of other guideline establishment, including American Academy of Pediatrics. Practice Bulletins provide pulmonologists and pediatricians with current information on established techniques and clinical management guidelines. The NHLBI continuously surveys the field for advances to be incorporated in this series and monitors existing recommendations to ensure they are current.

Based on the NQF descriptions for rating the evidence, what was the <u>developer's assessment</u> of the quantity, quality, and consistency of the body of evidence?
1c.25 Quantity: High   **1c.26** Quality: High **1c.27** Consistency: High

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Was the threshold criterion, *Importance to Measure and Report*, met?
(*1a & 1b must be rated moderate or high and 1c yes*)   Yes ☐ No ☐
Provide rationale based on specific subcriteria:

For a new measure if the Committee votes NO, then STOP.
For a measure undergoing endorsement maintenance, if the Committee votes NO because of 1b. (no opportunity for improvement), it may be considered for continued endorsement and all criteria need to be evaluated.

2. RELIABILITY & VALIDITY - SCIENTIFIC ACCEPTABILITY OF MEASURE PROPERTIES

Extent to which the measure, <u>as specified</u>, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. (<u>evaluation criteria</u>)

Measure testing must demonstrate adequate reliability and validity in order to be recommended for endorsement. Testing may be conducted for data elements and/or the computed measure score. Testing information and results should be entered in the appropriate field. Supplemental materials may be referenced or attached in item 2.1. See <u>guidance on measure testing</u>.

S.1 Measure Web Page *(In the future, NQF will require measure stewards to provide a URL link to a web page where current detailed specifications can be obtained)*. Do you have a web page where current detailed specifications for <u>this</u> measure can be obtained? Yes

S.2 If yes, provide web page URL:
http://www.jointcommission.org/specifications_manual_for_national_hospital_inpatient_quality_measures/

2a. RELIABILITY. Precise Specifications and Reliability Testing: H☐ M☐ L☐ I☐

2a1. Precise Measure Specifications. (*The measure specifications precise and unambiguous.*)

2a1.1 Numerator Statement *(Brief, narrative description of the measure focus or what is being measured about the target population, e.g., cases from the target population with the target process, condition, event, or outcome)*:
Pediatric asthma inpatients who received relievers during hospitalization

2a1.2 Numerator Time Window *(The time period in which the target process, condition, event, or outcome is eligible for inclusion)*:
Episode of Care

2a1.3 Numerator Details *(All information required to identify and calculate the cases from the target population with the target process, condition, event, or outcome such as definitions, codes with descriptors, and/or specific data collection items/responses)*:
One data element is used to calculate the numerator:
 Relievers Administered. This data element is defined as: Documentation that the patient received reliever medication(s) for asthma exacerbation during this hospitalization. Inpatient hospitalization includes the time from arrival to the emergency department (ED) or observation area until discharge from the inpatient setting.

2a1.4 Denominator Statement *(Brief, narrative description of the target population being measured)*:
Pediatric asthma inpatients (age 2 years through 17 years) who were discharged with a principal diagnosis of asthma.

2a1.5 Target Population Category *(Check all the populations for which the measure is specified and tested if any)*: Children's Health

2a1.6 Denominator Time Window *(The time period in which cases are eligible for inclusion)*:
Episode of Care

2a1.7 Denominator Details (*All information required to identify and calculate the target population/denominator such as definitions, codes with descriptors, and/or specific data collection items/responses)*:
Six Data Elements are used to calculate the denominator:
•   Admission Date
The month, day, and year of admission to acute inpatient care.
•   Birthdate
The month, day, and year the patient was born.
•   Clinical Trial
Documentation that during this hospital stay the patient was enrolled in a clinical trial in which patients with the same condition as the measure set were being studied.
•   Reason for Not Administering Relievers
 Reasons for not administering relievers during this hospitalization:
o   Allergy to relievers
o   Other reasons documented by physician/APN/PA or pharmacist

• Discharge Date
The month, day, and year the patient was discharged from acute care, left against medical advice, or expired during this stay.
• ICD-9-CM Principal Diagnosis Code for asthma as defined in Appendix A. Table 6.1 below

Table 6.1 Asthma
Code   -Shortened Description
493.00   -EXTRINSIC ASTHMA NOS
493.01   -EXT ASTHMA W STATUS ASTH
493.02   -EXT ASTHMA W(ACUTE) EXAC
493.10   -INTRINSIC ASTHMA NOS
493.11   -INT ASTHMA W STATUS ASTH
493.12   -INT ASTHMA W (AC) EXAC
493.81   -EXERCSE IND BRONCHOSPASM
493.82   -COUGH VARIANT ASTHMA
493.90   -ASTHMA NOS
493.91   -ASTHMA W STATUS ASTHMAT
493.92   -ASTHMA NOS W (AC) EXAC

2a1.8 Denominator Exclusions *(Brief narrative description of exclusions from the target population)*:
Excluded Populations:
• Patients with age less than 2 years or 18 years or greater
• Patients who have a Length of Stay greater than 120 days
• Patients enrolled in clinical trials
• Patients with a documented Reason for Not Administering Relievers

2a1.9 Denominator Exclusion Details *(All information required to identify and calculate exclusions from the denominator such as definitions, codes with descriptors, and/or specific data collection items/responses)*:
• The patient age in years is equal to the Admission Date minus the Birthdate. The month and day portion of the admission date and birthdate are used to yield the most accurate age.

• Length of stay (LOS) in days is equal to the Discharge Date minus the Admission Date. If the LOS is greater than 120 days, the patient is excluded.

• Patients are excluded if "Yes" is selected for Clinical Trial.

• Reasons for not administering relievers during this hospitalization: Acceptable reasons include allergy to relievers, and other reasons documented by physician/APN/PA or pharmacist

2a1.10 Stratification Details/Variables *(All information required to stratify the measure results including the stratification variables, codes with descriptors, definitions, and/or specific data collection items/responses)*:
This measure is stratified by age as noted in the following table:

CAC-1a Relievers for Inpatient Asthma (age 2 years through 17 years) - Overall Rate
CAC-1b Relievers for Inpatient Asthma (age 2 years through 4 years)
CAC-1c Relievers for Inpatient Asthma (age 5 years through 12 years)
CAC-1d Relievers for Inpatient Asthma (age 13 years through 17 years)

2a1.11 Risk Adjustment Type *(Select type. Provide specifications for risk stratification in 2a1.10 and for statistical model in 2a1.13)*: No risk adjustment or risk stratification   **2a1.12 If "Other," please describe:**

2a1.13 Statistical Risk Model and Variables *(Name the statistical method - e.g., logistic regression and list all the risk factor variables. Note - risk model development should be addressed in 2b4.)*:
Not Applicable

2a1.14-16 Detailed Risk Model Available at Web page URL (or attachment). Include coefficients, equations, codes with descriptors, definitions, and/or specific data collection items/responses. Attach documents only if they are not available on a webpage and keep attached file to 5 MB or less. NQF strongly prefers you make documents available at a Web page URL. Please supply login/password if needed**:**

2a1.17-18. Type of Score:

2a1.19 Interpretation of Score *(Classifies interpretation of score according to whether better quality is associated with a higher score, a lower score, a score falling within a defined interval, or a passing score)***:**

2a1.20 Calculation Algorithm/Measure Logic*(Describe the calculation of the measure score as an ordered sequence of steps including identifying the target population; exclusions; cases meeting the target process, condition, event, or outcome; aggregating data; risk adjustment; etc.)***:**
1.   Start processing. Run cases that are included in the CAC Initial Patient Population and pass the edits defined in the Transmission Data Processing Flow: Clinical through this measure.

2.   Check Clinical Trial
a.   If Clinical Trial is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Proceed to step 5 and check the Stratified Measures for Overall Rate (CAC-1a).
b.   If Clinical Trial equals Yes, the case will proceed to a Measure Category Assignment of B and will not be in the measure population. Proceed to step 5 and check the Stratified Measures for Overall Rate (CAC-1a).
c.   If Clinical Trial equals No, continue processing and proceed to Relievers Administered.

3.   Check Relievers Administered
a.   If Relievers Administered is missing, the case will proceed to a Measure Category Assignment of X for Overall Rate (CAC-1a) and will be rejected. Proceed to step 5 and check the Stratified Measures for Overall Rate (CAC-1a).
b.   If Relievers Administered equals Yes, the case will proceed to a Measure Category Assignment of E and will be in the Numerator Population. Proceed to step 5 and check the Stratified Measures for Overall Rate (CAC-1a).
c.   If Relievers Administered equals No, continue processing and proceed to Reason for Not Administering Relievers.

4.   Check Reason for Not Administering Relievers
a.   If Reason for Not Administering Relievers is missing, the case will proceed to a Measure Category Assignment of X for Overall Rate (CAC-1a) and will be rejected. Proceed to step 5 and check the Stratified Measures for Overall Rate (CAC-1a).
b.   If Reason for Not Administering Relievers equals Yes, the case will proceed to a Measure Category Assignment of B for Overall Rate (CAC-1a) and will not be in the measure population. Proceed to step 5 and check the Stratified Measures for Overall Rate (CAC-1a).
c.   If Reason for Not Administering Relievers equals No, the case will proceed to a Measure Category Assignment of D for Overall Rate (CAC-1a) and will be in the Measure Population. Proceed to step 5 and check the Stratified Measures for Overall Rate (CAC-1a).

5.   Continue processing for the Stratified Measures. Note: Initialize the Measure Category Assignment for all Strata Measure to equal 'B.' Do not change the Measure Category Assignment that was already calculated for the overall rate CAC-1a). The rest of the algorithm will reset the appropriate Measure Category Assignment to be equal to the overall rate´s (CAC-1a) Measure Category Assignment.

6.   Check Overall Rate Category Assignment
a.   If the Overall Rate Category Assignment is equal to B or X, keep Measure Category Assignment for the strata measures equal B, not in the Measure Population. Stop processing.
b.   If the Overall Rate Category Assignment is equal to D or E, continue processing and check the Patient Age. Note: The Patient Age is calculated from Admission Date minus Birthdate as part of the ICD Population logic.

7.   Check the Patient Age
a.   If the Patient Age is greater than or equal to 2 years and less than 5 years for Stratified Measure CAC-1b, set the Measure Category Assignment for measure CAC-1b to equal the Measure Category Assignment for measure CAC-1a. Stop processing.
b.   If the Patient Age is greater than or equal to 5 years and less than 13 years for Stratified Measure CAC-1c, set the Measure Category Assignment for measure CAC-1c to equal the Measure Category Assignment for measure CAC-1a. Stop processing.
c.   If the Patient Age is greater than or equal to 13 years and less than 18 years for Stratified Measure CAC-1d, set the Measure Category Assignment for measure CAC-1d to equal the Measure Category Assignment for measure CAC-1a. Stop processing.

2a1.21-23 Calculation Algorithm/Measure Logic Diagram URL or attachment:
Attachment
2ze_CAC1[1].pdf

2a1.24 Sampling (Survey) Methodology. If measure is based on a sample (or survey), provide instructions for obtaining the sample, conducting the survey and guidance on minimum sample size (response rate):
Hospitals that choose to sample have the option of sampling quarterly or sampling monthly. A hospital may choose to use a larger sample size than is required. Hospitals whose Initial Patient Population size is less than the minimum number of cases per quarter/month for the stratum cannot sample that stratum.
Regardless of the option used, hospital samples must be monitored to ensure that sampling procedures consistently produce statistically valid and useful data. Due to exclusions, hospitals selecting sample cases MUST submit AT LEAST the minimum required sample size.

Quarterly Sampling
Hospitals selecting sample cases for this measure must ensure that each individual stratum's population and quarterly sample size meets the following conditions:
Select within each of the three individual measure strata. Cases are placed into the appropriate stratum based upon the patient's age.

Quarterly Sample Size
Based on Initial Patient Population Size for the CAC Measure Set
Hospital's Measure

Average Quarterly Stratum Initial Patient Population Size "N"	Minimum Required Stratum Sample Size "n"
= 971	195
196-970	20% of Initial Patient Population size
39-195	39
< 39	No sampling;100% Initial Patient population required

Monthly Sampling
Hospitals selecting sample cases for this set must ensure that each individual stratum population and monthly sample size meets the following conditions:

Select within each of the three individual measure strata. Cases are placed into the appropriate stratum based upon the patient's age.

Monthly Sample Size
Based on Initial Patient Population Size for the CAC Measure Set

Average Monthly Stratum Initial Patient Population Size "N"	Minimum Required Stratum Sample Size "n"
= 321	65
66-320	20% of Initial Patient Population size
13-65	13
<13	No sampling; 100% initial patient pop

2a1.25 Data Source *(Check all the sources for which the measure is specified and tested)*. If other, please describe:
Electronic Clinical Data, Electronic Clinical Data : Electronic Health Record, Paper Records

2a1.26 Data Source/Data Collection Instrument (*Identify the specific data source/data collection instrument, e.g. name of database, clinical registry, collection instrument, etc.*): Each data element in the data dictionary includes suggested data sources. The data are collected using contracted Performance Measurement Systems (vendors) that develop data collection tools based on the measure specifications. The tools are verified and tested by Joint Commission staff to confirm the accuracy and conformance of the data collection tool with the measure specifications. The vendor may not offer the measure set to hospitals until verification has been passed.

2a1.27-29 Data Source/data Collection Instrument Reference Web Page URL or Attachment:

2a1.30-32 Data Dictionary/Code Table Web Page URL or Attachment:

2a1.33 Level of Analysis (*Check the levels of analysis for which the measure is specified and tested)*: Facility, Population : National

2a1.34-35 Care Setting *(Check all the settings for which the measure is specified and tested)*: Hospital/Acute Care Facility

2a2. Reliability Testing. (*Reliability testing was conducted with appropriate method, scope, and adequate demonstration of reliability.*)

2a2.1 Data/Sample *(Description of the data or sample including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included)*:
This CAC measure has been in national use since the 2nd quarter of 2007 by hospitals who volunteer to use this measure. Demographics of organizations collecting and reporting data on these measures is as follows:

170 Healthcare organizations representing various types, locations and sizes.

17 For Profit, 125 Not for Profit, 10 Military Facilities 3 County Facilities, 7 State Facilities and 8 other

States represented in this data collection effort include: AK, AL, AR, AZ, CA, CO, CT, DC, DE, FL, GA, HI, ID, IL, IN, KS, KY, LA, MA, MD, MI, MN, MO, MS, MT, NC, NE, NJ, NM, NV, NY, OH, OK, OR, PA, PR, SC, SD, TN, TX, UT, VA, WA, WI, WV.

15 Performance Measurement Systems- are used for data transmission to The Joint Commission.

2a2.2 Analytic Method *(Describe method of reliability testing & rationale)*:
At the time this measure was originally tested, extensive test of measure reliability were conducted. Pilot testing of this measure was conducted in 2005. It consisted of a five month data collection period using both concurrent and retrospective approaches with data transmission. Data were abstracted retrospectively from a randomly selected sample of patient records for July, August and

September of 2004. Data were concurrently abstracted from a random sample of records for March and April 2005. The objectives of pilot testing were to evaluate reliability of individual data elements, assess data collection effort and identification of potential measure enhancements.

Currently, hospitals are supported in their data collection and reporting efforts by fifteen contracted performance measurement system (PMS) vendors. It is a contractual requirement of Joint Commission listed vendors that the quality and reliability of data submitted to them by contracted health care organizations must be monitored on a quarterly basis. In addition, The Joint Commission analyzes these data by running 17 quality tests on the data submitted into ORYX. (ORYX is the term used by The Joint Commission to describe the component of the hospital accreditation program which requires data collection and reporting on standardized national performance measures). The following is a list of the major tests done on the submitted ORYX data:
- 	Transmission of complete data
- 	Usage of individual core measure data received: To understand if the HCO provides the relevant service to treat the relevant population
- 	Investigation of aberrant data points
- 	Verification of patient population and sample size
- 	Identification of missing data elements
- 	Validation of the accuracy of target outliers
- 	Data integrity
- 	Data corrections

Data Element Agreement Rate:
Inter-rater reliability testing methodology utilized by contracted performance measure system vendors as outlined is as follows:
- 	All clinical data elements and all editable demographic elements are scored.
- 	All measure data are reabstracted with originally abstracted data having been blinded so that the reabstraction is not biased.
- 	Reabstracted data are compared with originally abstracted data on a data element by data element basis. A data element agreement rate is calculated. Clinical and demographic data are scored separately, and an overall agreement rate is computed.

2a2.3 Testing Results *(Reliability statistics, assessment of adequacy in the context of norms for the test conducted)*:
Data agreement results reported to The Joint Commission for the time period for Q1 and Q2 of 2011 have shown an agreement rate of 100% in the data elements used to calculate the measure rate for CAC-1. This reflects the findings of 87 hospitals comprising of 2,292 records.

2b. VALIDITY. Validity, Testing, <u>including all Threats to Validity</u>:   H ☐ M ☐ L ☐ I ☐

2b1.1 Describe how the measure specifications *(measure focus, target population, and exclusions)* **are consistent with the evidence cited in support of the measure focus (***criterion 1c***) and identify any differences from the evidence:**
This measure focuses on the treatment regimen of reliever therapy used to reduce bronchial constriction in inpatient hospitalized pediatric patients. The literature supports the use of reliever therapy listed on Appendix C, Table 6.2. to reduce bronchial inflammation, constriction and decrease morbidity and mortality of the pediatric asthmatic population. The measure specifications are intended to assist health care organizations using this measure to ensure that treatment recommended by the National Heart Lung and Blood Institute is consistently followed in their inpatient populations. Reporting children's asthma care measures also enables hospitals that do not generally treat adult patients to report quality data on Hospital Compare.

2b2. Validity Testing. (*Validity testing was conducted with appropriate method, scope, and adequate demonstration of validity.)*

2b2.1 Data/Sample *(Description of the data or sample including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included)*:
The CAC measure has been in national use since the 2nd quarter of 2007. Demographics of organizations collecting and reporting data on these measures is as described above.

2b2.2 Analytic Method *(Describe method of validity testing and rationale; if face validity, describe systematic assessment)*:
At the time this measure was originally tested measure validity was assessed via survey and focus groups of hospitals participating in the pilot test. All measure specifications, including population identification, numerator and denominator statements, and data elements and their definitions were found to be understandable, retrievable, and relevant.
Since the measure has been in national use, continued face validity of the measure has been determined through analysis of feedback from measure users. The Joint Commission provides a web-based application with which measure users can provide

feedback regarding appropriateness of measure specifications, request clarification of specifications, and/or provide other comments pertinent to the measure.   This feedback is systematically continually reviewed in order to identify trends and to identify areas of the measure specifications that require clarification or revision. Additionally, Joint Commission staff continually monitors the national literature and environment in order to assess continued validity of this measure.

2b2.3 Testing Results *(Statistical results, assessment of adequacy in the context of norms for the test conducted; if face validity, describe results of systematic assessment)*:
Analysis of feedback obtained via our automated feedback system reveals 403 questions submitted since this measure was implemented in 2007. Of that number, 25 questions were specific to changes addressed the in the CAC-1 measure. Predominant themes of the submitted questions consisted of identification of the population selection and coding questions. Clarification of data elements was necessary as well for data elements: Reason for Not Administering Relievers and Relievers Administered and the accompanying table.
In response to these issues, small adjustments have been made to The National Hospital Inpatient Quality Measures Specification Manual to clarify Measure Information Forms, Appendices and Table information, data sources, and notes for abstraction. These were added to reduce false inclusions, and to clarify items such as detection of unknown allergies to relievers.

POTENTIAL THREATS TO VALIDITY. (*All potential threats to validity were appropriately tested with adequate results.*)

2b3. Measure Exclusions. (*Exclusions were supported by the clinical evidence in 1c or appropriately tested with results demonstrating the need to specify them.*)

2b3.1 Data/Sample for analysis of exclusions *(Description of the data or sample including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included)*:
The CAC measure has been in national use since the 2nd quarter of 2007. Demographics of organizations collecting and reporting data on these measures is as reported previously.

2b3.2 Analytic Method (*Describe type of analysis and rationale for examining exclusions, including exclusion related to patient preference)*:
Measure exclusions that were not derived directly from the evidence are presented below. Please note that these are population exclusions that are necessary to ensure consistency in all measures in this 3 measure set.
These exclusions were analyzed for frequency of occurrence. An issue that is of great concern to users of this measure is that due to the presence of exceptions to the measure, attainment of a 100% measure rate is not possible. Because of the role of this measure in the current Joint Commission accreditation process and the role it is anticipated to play in the determination of value based purchasing incentives, this is especially troubling to measure users.   This concern is the basis for a number of the non-evidence-based exclusions to these measures.
• 	Patients who have a Length of Stay greater than 120 days
• 	Patients enrolled in clinical trials

2b3.3 Results *(Provide statistical results for analysis of exclusions, e.g., frequency, variability, sensitivity analyses):*
N=88,490

• 	Patients who have a Length of Stay greater than 120 days= 0%
• 	Patients enrolled in clinical trials= 0.16%

2b4. Risk Adjustment Strategy. (*For outcome measures, adjustment for differences in case mix (severity) across measured entities was appropriately tested with adequate results.*)

2b4.1 Data/Sample *(Description of the data or sample including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included)*:
None

2b4.2 Analytic Method (*Describe methods and rationale for development and testing of risk model or risk stratification including selection of factors/variables)*:
None

2b4.3 Testing Results *(Statistical risk model: Provide quantitative assessment of relative contribution of model risk factors; risk*

model performance metrics including cross-validation discrimination and calibration statistics, calibration curve and risk decile plot, and assessment of adequacy in the context of norms for risk models. <u>Risk stratification</u>: Provide quantitative assessment of relationship of risk factors to the outcome and differences in outcomes among the strata):
None

2b4.4 If outcome or resource use measure is not risk adjusted, provide rationale and analyses to justify lack of adjustment: This is a process measure.

2b5. Identification of Meaningful Differences in Performance. (*The performance measure scores were appropriately analyzed and discriminated meaningful differences in quality.*)

2b5.1 Data/Sample *(Describe the data or sample including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included)*:
The CAC measure has been in national use since the 2nd quarter of 2007. Demographics of organizations collecting and reporting data on these measures is as described previously.

2b5.2 Analytic Method *(Describe methods and rationale to identify statistically significant and practically/meaningfully differences in performance)*:
The method used to analyze meaningful differences in performance at The Joint Commission is Target Analysis. The object of target analysis is to compare a health care organization's data against a comparative norm for the purpose of evaluating performance improvement opportunities. When an organization's performance level is statistically significantly different from a comparative norm, it is considered a statistical deviation. A statistical deviation may be desirable or undesirable depending on the "direction of improvement" of the measure.
There are two components to the target analysis methodology used at The Joint Commission. Given the national average for a performance measure, a target range is constructed. Using generalized linear mixed models methodology (also known as hierarchical models), a predicted estimate of an HCO's performance, with a corresponding 95% confidence interval, is generated. This confidence interval is compared to the target range, to determine the HCOs' rating. The estimate of the organization's true performance is based on both the data from that organization and on data from the entire set of reporting organizations.

2b5.3 Results *(Provide measure performance results/scores, e.g., distribution by quartile, mean, median, SD, etc.; identification of statistically significant and meaningfully differences in performance)*:
Year: 2007 No:157, Mean:0.99282, SD: 0.03208
10th Percentile=0.98819
25th Percentile=1.0
50th Percentile=1.0
75th Percentile=1.0
90th Percentile=1.0

Year 2008: No:232, Mean:099706, SD: 0.02276
10th Percentile= 0.99624
25th Percentile= 1.0
50th Percentile= 1.0
75th Percentile= 1.0
90th Percentile= 1.0

2009 Aggregate Data:
Scores on this measure: N=217
Mean =0. 99933, SD= 0.00403
10th Percentile=1.0
25th Percentile= 1.0
50th Percentile= 1.0
75th Percentile= 1.0
90th Percentile= 1.0

2010 Aggregate Data:
Scores on this measure: N=212
Mean 0.99952=, SD= 0.00303
10th Percentile=1.0
25th Percentile= 1.0
50th Percentile= 1.0
75th Percentile= 1.0
90th Percentile= 1.0

2011
Scores on this measure: N=201
Mean =0.99925, SD= 0.00663
10th Percentile=1.0
25th Percentile= 1.0
50th Percentile= 1.0
75th Percentile= 1.0
90th Percentile= 1.0

2b6. Comparability of Multiple Data Sources/Methods. (*If specified for more than one data source, the various approaches result in comparable scores.*)

2b6.1 Data/Sample (*Describe the data or sample including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included*):
Multiple Data Sources are not used for this measure

2b6.2 Analytic Method (*Describe methods and rationale for testing comparability of scores produced by the different data sources specified in the measure*):
Not Applicable

2b6.3 Testing Results (*Provide statistical results, e.g., correlation statistics, comparison of rankings; assessment of adequacy in the context of norms for the test conducted*):
Not Applicable

2c. Disparities in Care: H☐ M☐ L☐ I ☐ NA☐ (*If applicable, the measure specifications allow identification of disparities.*)

2c.1 If measure is stratified for disparities, provide stratified results (*Scores by stratified categories/cohorts*): No Stratification

2c.2 If disparities have been reported/identified (e.g., in 1b), but measure is not specified to detect disparities, please explain:
Although a rise in children's asthma is present for all racial groups with the highest increase in African Americans and Hispanic Americans, there are no plans to stratify this measure. The Joint Commission does not currently capture date elements for race or ethnicity because these data elements have not been shown to be reliably collectable due to the fact that no national standardized definitions exist for these data elements. Also, not all hospitals collect race and ethnicity. In the future, it may be feasible for The Joint Commission to explore how race and ethnicity and other relevant disparity data, might be collected reliably in the future. The measure is currently stratified by age groups capturing advanced maternal age. The data from the different age groups are used in the direct standardization model applied to each hospital's rate.

2.1-2.3 Supplemental Testing Methodology Information:

Steering Committee: Overall, was the criterion, *Scientific Acceptability of Measure Properties*, met?
(***Reliability and Validity must be rated moderate or high***) Yes☐ No☐
Provide rationale based on specific subcriteria:

If the Committee votes No, STOP

3. USABILITY

Extent to which intended audiences (e.g., consumers, purchasers, providers, policy makers) can understand the results of the measure and are likely to find them useful for decision making. (**evaluation criteria**)

C.1 **Intended Purpose/ Use** *(Check all the purposes and/or uses for which the measure is intended)*:   Public Reporting, Quality Improvement (Internal to the specific organization)

3.1 **Current Use** *(Check all that apply; for any that are checked, provide the specific program information in the following questions)*:   Public Reporting, Regulatory and Accreditation Programs, Quality Improvement with Benchmarking (external benchmarking to multiple organizations), Quality Improvement (Internal to the specific organization)

3a. Usefulness for Public Reporting: H☐ M☐ L☐ I☐
(*The measure is meaningful, understandable and useful for public reporting.*)

3a.1. **Use in Public Reporting - disclosure of performance results to the public at large** *(If used in a public reporting program, provide name of program(s), locations, Web page URL(s)).* If not publicly reported in a national or community program, state the reason AND plans to achieve public reporting, potential reporting programs or commitments, and timeline, e.g., within 3 years of endorsement: [*For Maintenance – If not publicly reported, describe progress made toward achieving disclosure of performance results to the public at large and expected date for public reporting; provide rationale why continued endorsement should be considered.*]
The Joint Commission has a longstanding commitment to providing meaningful information about the comparative performance of accredited organizations to the public. The Quality Check® Web site, www.qualitycheck.org, launched in 2004, fulfills this commitment. Among other things, Quality Check allows consumers to view or download free hospital performance measure results.   Measure rates for CAC-1 and all the CAC measures are included in the hospital performance measure results.

These are the only measures related to children that CMS reports on their public reporting site Hospital Compare (www.hospitalcompare.hhs.gov/). The Joint Commission provides this information to CMS.

3a.2. **Provide a rationale for why the measure performance results are meaningful, understandable, and useful for public reporting**. If usefulness was demonstrated (e.g., focus group, cognitive testing), describe the data, method, and results: All measure specifications (e.g., numerator, denominator, exclusions, data elements and measure calculation algorithms) are standardized in order to produce consistent measure results. Specifications are updated biannually based on feedback from measure users, as well as technical advisory member recommendations and updated clinical practice guidelines. Data are collected using data collection tools that have been verified by The Joint Commission to accurately collect measure data elements and compute measure assignment categories according to the measure specifications.   Quarterly data reported to The Joint Commission are subject to a number of data quality tests to ensure the accuracy of the data. The measure rate is computed using a standardized measure calculation algorithm that is Section 508 compliant so the information is understandable to the general public.

The Joint Commission provides an opportunity for abstractors and other measure users to submit questions and feedback about the measure specifications via an on-line website. As discussed previously, this information is used to evaluate the need for revisions and provide abstractors with a database. Measure updates and issues about the measures are presented and discussed at an annual performance measurement system vendor conference. These activities support the Joint Commission's effort to provide results that are useable, understandable and useful for public reporting.

3.2 **Use for other Accountability Functions (payment, certification, accreditation).** If used in a public accountability program, provide name of program(s), locations, Web page URL(s): The Joint Commission is a national (and international) accreditor of hospitals and other healthcare organizations. This measure set is one of 13 available measure sets from which hospitals can select to meet The Joint Commission´s ORYX accreditation program requirement for data collection and reporting. Additional information located at: http://www.jointcommission.org/facts_about_oryx_for_hospitals/ . This measure is being considered by CMS for inclusion in the Medicare and Medicaid EHR Incentive Program for Hospitals and CAHs. The Department of Health and Human Services included this measure as part of the Measure Applications Partnership (MAP) Pre-Rulemaking review. In January 2012 the MAP was convened and supported this measure for inclusion in the associated federal program during the next rule making

cycle for that program.

3b. Usefulness for Quality Improvement: H☐ M☐ L☐ I☐
(*The measure is meaningful, understandable and useful for quality improvement.*)

3b.1. Use in QI. If used in quality improvement program, provide name of program(s), locations, Web page URL(s):
[*For Maintenance – If not used for QI, indicate the reasons and describe progress toward using performance results for improvement*].
While The Joint Commission developed this measure for and uses results from this measure in its accreditation activities, the measure is also intended for use in internal quality improvement by accredited organizations.

3b.2. Provide rationale for why the measure performance results are meaningful, understandable, and useful for quality improvement. If usefulness was demonstrated *(e.g., QI initiative),* describe the data, method and results:
From an accreditation perspective, measure results have proven useful in that they are used in the Priority Focus Process, which helps to focus accreditation survey activities toward areas of greatest need. From the hospital quality improvement perspective, measure rates are included in the Joint Commission's Strategic Surveillance System (S3) product, which is made available at no charge to accredited organizations and is used by them to identify gaps in the care they provide relative to other measure users. Aggregate measure results have improved over time, indicating that they are being used by hospitals to identify and address areas in need of improvement. The Joint Commission has been developing a multifaceted initiative to help hospitals improve their performance on measures, with the ultimate goal of improving patient outcomes. For example, the Joint Commission has recently developed a new standard that integrates performance expectations on accountability measures into the accreditation standards.

Overall, to what extent was the criterion, *Usability*, met? H☐ M☐ L☐ I☐
Provide rationale based on specific subcriteria:

4. FEASIBILITY

Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (**evaluation criteria**)

4a. Data Generated as a Byproduct of Care Processes: H☐ M☐ L☐ I☐

4a.1-2 How are the data elements needed to compute measure scores generated? *(Check all that apply).*
Data used in the measure are:
generated by and used by healthcare personnel during the provision of care, e.g., blood pressure, lab value, medical condition, Coded by someone other than person obtaining original information (e.g., DRG, ICD-9 codes on claims), Abstracted from a record by someone other than person obtaining original information (e.g., chart abstraction for quality measure or registry), Other
Data elements such as admission date or discharge date may be generated by administrative data.

4b. Electronic Sources: H☐ M☐ L☐ I☐

4b.1 Are the data elements needed for the measure as specified available electronically *(Elements that are needed to compute measure scores are in defined, computer-readable fields)*: Some data elements are in electronic sources

4b.2 If ALL data elements are not from electronic sources, specify a credible, near-term path to electronic capture, OR provide a rationale for using other than electronic sources: The Joint Commission is in the process of preparing for conversion to eMeasure specifications beginning in the 4th quarter 2011 for the CAC measure set.

4c. Susceptibility to Inaccuracies, Errors, or Unintended Consequences: H☐ M☐ L☐ I☐

4c.1 Identify susceptibility to inaccuracies, errors, or unintended consequences of the measurement identified during testing and/or operational use and strategies to prevent, minimize, or detect. If audited, provide results:
When the Children's Asthma Care (CAC) measures were first published in the aligned Specifications Manual for National Hospital Quality Measures, minor updates were made to the measure information forms and data elements in the Data Dictionary to provide that the verbiage for CAC was consistent with all of the other aligned measure sets and concordant with current General Abstraction Guidelines in the specifications manual.

Based upon input from the measure users, the Measure Information Form was updated. The Numerator-Included Populations was

restated to clarify the time frame for administration of relievers.

The former data element Contraindications to Relievers was changed to: Reasons for not Administering Relievers. This was done as part of the greater initiative to address "contraindication" data elements across other measure sets in the aligned Specifications Manual for National Hospital Quality Measures. As part of this process, the updated data element was revised to provide additional clarity for data abstraction based upon input from the measure users.

The medication table for relievers is reviewed with every specifications manual publication. The table is updated via consultation with a PharmD member of the asthma advisory panel to insure that the most current list of relievers available is provided at the time of publication. Selected References were updated to reflect current guidelines. To the best of our knowledge, there have been no reports of unintended consequences.

4d. Data Collection Strategy/Implementation: H☐ M☐ L☐ I☐

A.2 Please check if either of the following apply (*regarding proprietary measures*):

4d.1 Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data, missing data, timing and frequency of data collection, sampling, patient confidentiality, time and cost of data collection, other feasibility/implementation issues (*e.g., fees for use of proprietary measures*):

Hospitals using this performance measure generally collect measure data via manual review of the paper medical record. Collected data are submitted to The Joint Commission on a quarterly basis, by way of contracted performance measurement system vendors, as described previously. Specifications for this measure are freely available to anyone who wishes to use the measure. Feedback from hospitals using this measure indicates that required data elements are generally available in the medical record, and measure specifications are robust and easy to understand. As described above, as feedback from measure users has indicated the need for clarification or revision of measure specifications, this has taken place.

Overall, to what extent was the criterion, *Feasibility*, met? H☐ M☐ L☐ I☐
Provide rationale based on specific subcriteria:

OVERALL SUITABILITY FOR ENDORSEMENT

Does the measure meet all the NQF criteria for endorsement? Yes☐ No☐
Rationale:

If the Committee votes No, STOP.
If the Committee votes Yes, the final recommendation is contingent on comparison to related and competing measures.

5. COMPARISON TO RELATED AND COMPETING MEASURES

If a measure meets the above criteria and there are endorsed or new related measures (either the same measure focus or the same target population) or competing measures (both the same measure focus and the same target population), the measures are compared to address harmonization and/or selection of the best measure before a final recommendation is made.

5.1 If there are related measures (*either same measure focus or target population)* or competing measures *(both the same measure focus and same target population*), **list the NQF # and title of all related and/or competing measures:**
0001 : Asthma assessment
0025 : Management plan for people with asthma
0036 : Use of appropriate medications for people with asthma
0047 : Asthma: Pharmacologic Therapy for Persistent Asthma
0283 : Adult asthma (PQI 15)
0548 : Suboptimal Asthma Control (SAC) and Absence of Controller Therapy (ACT)
0620 : Asthma - Short-Acting Beta Agonist Inhaler for Rescue Therapy

5a. Harmonization

5a.1 If this measure has EITHER the same measure focus OR the same target population as NQF-endorsed measure(s):
Are the measure specifications completely harmonized? No

5a.2 If the measure specifications are not completely harmonized, identify the differences, rationale, and impact on interpretability and data collection burden:

The Joint Commission measures in the Children's Asthma Care measure set specifically focus on acute asthma care for the inpatient pediatric population, targeting children ages 2 – 17.   None of the above measures apply to the inpatient pediatric population, the above measures focus on ambulatory care. The population of the above measures is variable, ranging in the following targeted age groups: 5 – 40, 5 - 56, 18 and older, 5 - 50

5b. Competing Measure(s)

5b.1 If this measure has both the same measure focus and the same target population as NQF-endorsed measure(s): Describe why this measure is superior to competing measures *(e.g., a more valid or efficient way to measure quality);* OR provide a rationale for the additive value of endorsing an additional measure. *(Provide analyses when possible)*:

CONTACT INFORMATION

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Co.6 Additional organizations that sponsored/participated in measure development:

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Ad.1 Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development.
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Ad.2 If adapted, provide title of original measure, NQF # if endorsed, and measure steward. Briefly describe the reasons for adapting the original measure and any work with the original measure steward:

Measure Developer/Steward Updates and Ongoing Maintenance
Ad.3 Year the measure was first released: 2007
Ad.4 Month and Year of most recent revision: 01
Ad.5 What is your frequency for review/update of this measure? Biannually
Ad.6 When is the next scheduled review/update for this measure? 07, 2012

Ad.7 Copyright statement: The Specifications Manual for National Hospital Inpatient Quality Measures (Specifications Manual) version 4.0, January, 2012 is the result of the collaborative efforts of the Centers for Medicare & Medicaid Services (CMS) and The Joint Commission to publish a uniform set of national hospital quality measures. A primary objective of this collaborative effort is to promote and enhance the utility of these measures for all hospitals.

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Ad.8 Disclaimers: none

Ad.9 Additional Information/Comments: The Month and Year of the Most Recent Revision is Jan 2012. ICD 9- ICD10 Crosswalk included via email.

Date of Submission (*MM/DD/YY*): 10/18/2011

NQF-ENDORSED VOLUNTARY CONSENSUS STANDARDS FOR HOSPITAL CARE

Measure Information Form
Collected For: The Joint Commission Only

Measure Set: Children's Asthma Care (CAC)

Set Measure ID#: CAC-1

Set Measure ID#	Performance Measure Name
CAC-1a	Relievers for Inpatient Asthma (age 2 years **through** 17 years) - Overall Rate
CAC-1b	Relievers for Inpatient Asthma (age 2 years **through** 4 years)
CAC-1c	Relievers for Inpatient Asthma (age 5 years **through** 12 years)
CAC-1d	Relievers for Inpatient Asthma (age 13 years **through** 17 years)

Performance Measure Name: Relievers for Inpatient Asthma

Description: Use of relievers in pediatric patients admitted for inpatient treatment of asthma

Rationale: Asthma is the most common chronic disease in children and a major cause of morbidity and increased health care expenditures nationally (Adams, et al., 2001). For children, asthma is one of the most frequent reasons for admission to hospitals (McCormick, et al., 1999). Silber, et al. (2003) noted that there are approximately 200,000 admissions for childhood asthma in the United States annually, representing more than $3 billion dollars in healthcare costs. Under-treatment and/or inappropriate treatment of asthma are recognized as major contributors to asthma morbidity and mortality. Guidelines for the diagnosis and management of asthma in children developed by the National Asthma Education and Prevention Program (NAEPP) of the National Heart, Lung and Blood Institute (NHLBI), as well as by the American Academy of Pediatrics (AAP), recommend the use of relievers to gain control of acute asthma exacerbation and reduce severity as quickly as possible, with step down medication to the least medication necessary to maintain control. However, there is evidence that these guidelines are not followed uniformly. For example, Crain, et al. (1995) found that fewer than half of hospital emergency department survey respondents had heard of the NHLBI guidelines and that there was variation in the use of relievers. Administration of appropriate medication therapy is under the direct control of the care provider.

Type of Measure: Process

Improvement Noted As: An increase in the rate

Numerator Statement: Pediatric asthma inpatients who received relievers during hospitalization.

Included Populations:
Patients who were administered relievers during this hospitalization.

Excluded Populations: None

Data Elements:
Relievers Administered

Denominator Statement: Pediatric asthma inpatients (age 2 years through 17 years) who were discharged with a principal diagnosis of asthma.

Included Populations: Discharges with:
- An *ICD-9-CM Principal Diagnosis Code* of asthma (as defined in Appendix A, Table 6.1)
- An age of 2 through 17 years

Excluded Populations:
- Patients with age less than 2 years or 18 years or greater
- Patients who have a Length of Stay greater than 120 days
- Patients enrolled in clinical trials
- Patients with a documented *Reason for Not Administering Relievers*

Data Elements:
- *Admission Date*
- *Birthdate*
- *Clinical Trial*
- *Reason for Not Administering Relievers*
- *Discharge Date*
- *ICD-9-CM Principal Diagnosis Code*

Risk Adjustment: No

Data Collection Approach: Retrospective, data sources for required data elements include administrative data and medical records.

Data Accuracy: Variation may exist in the assignment of ICD-9-CM codes; therefore, coding practices may require evaluation to ensure consistency.

Measure Analysis Suggestions: Based on these data, healthcare organizations would be able to determine the overall percentage of pediatric asthma inpatients that do not receive appropriate quick relief or rescue treatment. This measure provides opportunity to assess differences, if any, in treatment modality for the different age groups.

Sampling: Yes, please refer to the measure set specific sampling requirements and for additional information see the Population and Sampling Section

Data Reported As: Aggregate rate generated from count data reported as a proportion

Selected References:

- Adams RJ, Fuhlbrigge A, Finkelstein JA, Lozano P, Livingston JM, Weiss KB, and Weiss ST (2001). Use of Inhaled Anti-inflammatory Medication in Children with Asthma in Managed Care Settings. *Archives of Pediatrics and Adolescent Medicine*, 155, 501-507.
- Asthma Management Model System, http://www.nhlbi.nih.gov.
- Carroll W., Lenney W, Drug therapy in the management of acute asthma. Arch Dis Child Educ Pract Ed 2007; 92:ep82-ep86.
- Clinical Practice Guidelines of the American Academy of Pediatrics: A Compendium of Evidence-Based Research for Pediatric Practice. American Academy of Pediatrics, 1999.
- Crain EF, Weiss KB and Fagan MJ (1995). Pediatric Asthma Care in U.S. Emergency Departments. *Archives of Pediatric and Adolescent Medicine*. 149, 893-901.
- Gross KM, Ponte CD (1998). New Strategies in the Medical Management of Asthma. *American Family Physician*. 58:1.
- McCormick MC, Kass B, Elixhauser A, Thompson J and Simpson L (2000). Annual Report on Access to and Utilization of Health Care for Children and Youth in the United States – 1999. *Pediatrics*, 105:1, 219-230.
- National Asthma Education and Prevention Program, http://www.nhlbi.nih.gov
- National Institutes of Health, National Heart, Lung, and Blood Institute. National Asthma Education and Prevention Program. Expert panel report 3: guidelines for the diagnosis and management of asthma, National Institutes of Health, Bethesda (2007) NIH publication no. 07-4051.
- Silber JH, Rosenbaum PR, Even-Shoshan O, Shabbout M, Zhang X, Bradlow ET, and Marsh RR (2003). Length of Stay, Conditional Length of Stay, and Prolonged Stay in Pediatric Asthma. *Health Services Research*, 38: 3, 867-886.
- Stanley J. Szefler MD, Advances in pediatric asthma in 2009: Gaining control of childhood asthma. Journal of Allergy and Clinical Immunology Volume 125, Issue 1, January 2010, Pages 69-78.

CAC-1: Relievers for Inpatient Asthma by AAP Age Groups.

Numerator: Pediatric asthma inpatients who received relievers during hospitalization

Denominator: Pediatric asthma inpatients (age 2 years through 17 years) who were discharged with a principal diagnosis of asthma

Variable Key:
Patient Age

START

Run cases that are included in the CAC Initial Patient Population and pass the edits defined in the **Transmission Data Processing Flow: Clinical** through this measure.

Clinical Trial

Missing → CAC-1 X

= Y → CAC-1 B

= N → CAC-1 H
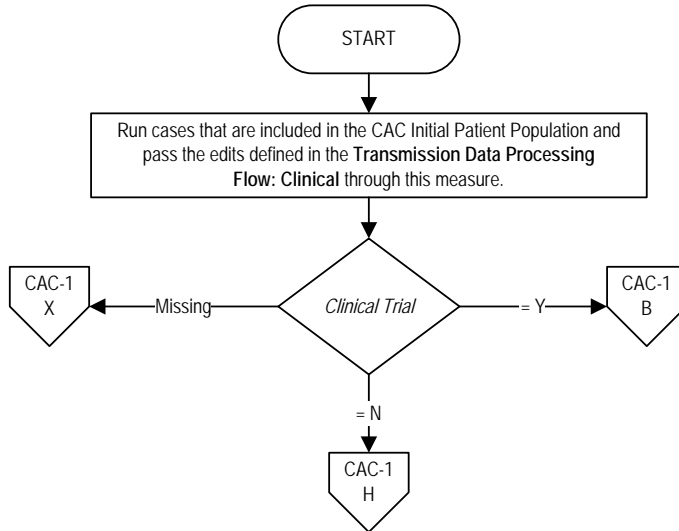
Stratification Table:

Set#	Stratified By Age
CAC-1a	Overall Rate
CAC-1b	2-4
CAC-1c	5-12
CAC-1d	13-17

Each case will be stratified according to the age

CAC-1
H

For Overall
Rate
(CAC-1a)

Missing ——— *Relievers Administered* ——— = Y ———→ In Numerator Population E

= N

CAC-1
X

For Overall
Rate
(CAC-1a)

CAC-1
B

For Overall
Rate
(CAC-1a)

X Case Will Be Rejected ←——— Missing ——— *Reason for Not Administering Relievers* ——— = Y ———→ Not In Measure Population B

= N

In Measure Population D

For Overall
Rate
(CAC-1a)

CAC-1
I

```
                          ┌─────────┐
                          │  CAC-1  │
                          │    I    │
                          └────┬────┘
                               │
                               ▼
                    ┌──────────────────────┐    ┌────────────────────────────────────────┐
                    │  ┌────────────────┐  │    │ Note: Initialize Measure Category      │
                    │  │    B           │  │    │ Assignment for all Strata Measure to 'B'│
                    │  │ Not In Measure │  │    │ Do not change the 'Measure Category      │
                    │  │  Population    │  │    │ Assignment' that was already calculated  │
                    │  └────────────────┘  │    │ for the Overall Rate CAC-1a              │
                    └──────────┬───────────┘    └────────────────────────────────────────┘
                               │
                               ▼
                        ╱◇◇◇◇◇◇◇◇◇╲
                      ◇ Overall Rate  ◇         =B or X              ┌───────────────────────┐
                     ◇   Category      ◇──────────────────────────▶ │ Keep Measure Category  │
                      ◇ Assignment    ◇                             │ Assignment for the     │
                        ╲◇◇◇◇◇◇◇◇◇╱                                 │ Strata Measures = 'B'  │
                               │                                    └───────────┬───────────┘
  ┌──────────────────────┐    │ = D or E                                        │
  │ The Patient Age is    │   │                                                 │
  │ calculated from       │   ▼                                                 │
  │ Admission Date –       │ ╱◇◇◇◇◇◇╲                                            │
  │ Birthdate as part of   ◇          ◇   >=13 and                              │
  │ the ICD Population     ◇ Patient Age ◇── < 18 ──┐                           │
  │ logic                 │ ╲◇◇◇◇◇◇╱                │                           │
  └──────────────────────┘   │                      │                           │
     >=2 and < 5            >=5 and < 13            For Stratified               │
        │                     │                     Measure CAC-1d              │
   For Stratified         For Stratified            │                           │
   Measure CAC-1b         Measure CAC-1c            ▼                           │
        │                     │             ┌──────────────────┐                │
        ▼                     ▼             │ Set Measure       │                │
  ┌──────────────┐    ┌──────────────┐      │ Category          │                │
  │ Set Measure  │    │ Set Measure  │      │ Assignment for    │                │
  │ Category     │    │ Category     │      │ Measure'CAC-1d' = │                │
  │ Assignment   │    │ Assignment   │      │ Measure Category  │                │
  │ for Measure  │    │ for Measure  │      │ Assignment for    │                │
  │ 'CAC-1b' =   │    │ 'CAC-1c' =   │      │ Measure 'CAC-1a'  │                │
  │ Measure      │    │ Measure      │      └────────┬─────────┘                │
  │ Category     │    │ Category     │               │                           │
  │ Assignment   │    │ Assignment   │               │                           │
  │ for Measure  │    │ for Measure  │               │                           │
  │ 'CAC-1a'     │    │ 'CAC-1a'     │               │                           │
  └──────┬───────┘    └──────┬───────┘               │                           │
         │                    │                       │                           │
         └──────────┐         │         ┌─────────────┘                           │
                    │         │         │                                         │
                    ▼         ▼         ▼                                         │
                  ╭─────────────────────╮                                        │
                  │        Stop         │◀───────────────────────────────────────┘
                  ╰─────────────────────╯
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Children's Asthma Care-1: Relievers for Inpatient Asthma

Numerator: Pediatric asthma inpatients who received relievers during hospitalization.

Denominator: Pediatric asthma inpatients (age 2 years through 17 years) who were discharged with a principal diagnosis of asthma.
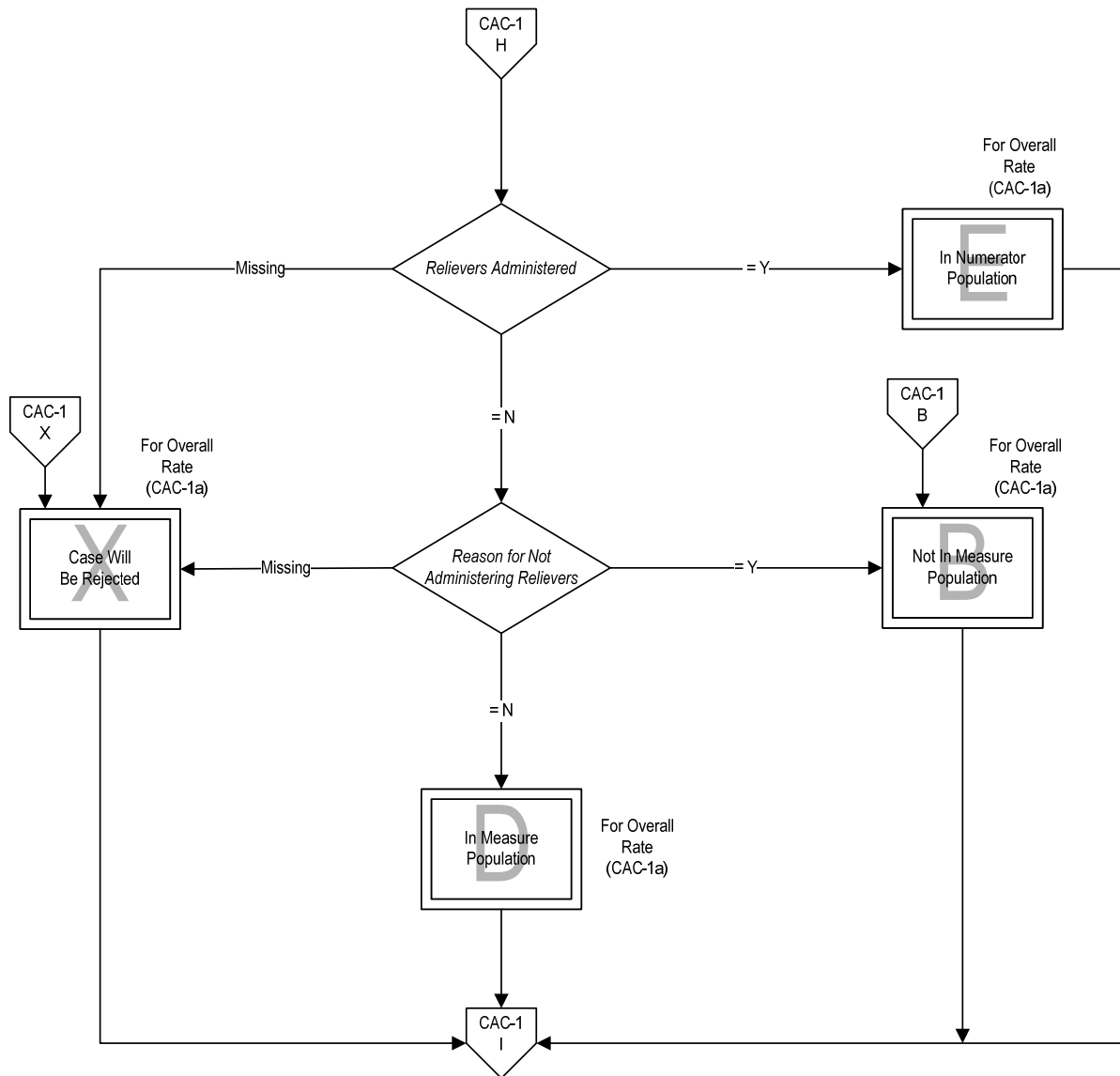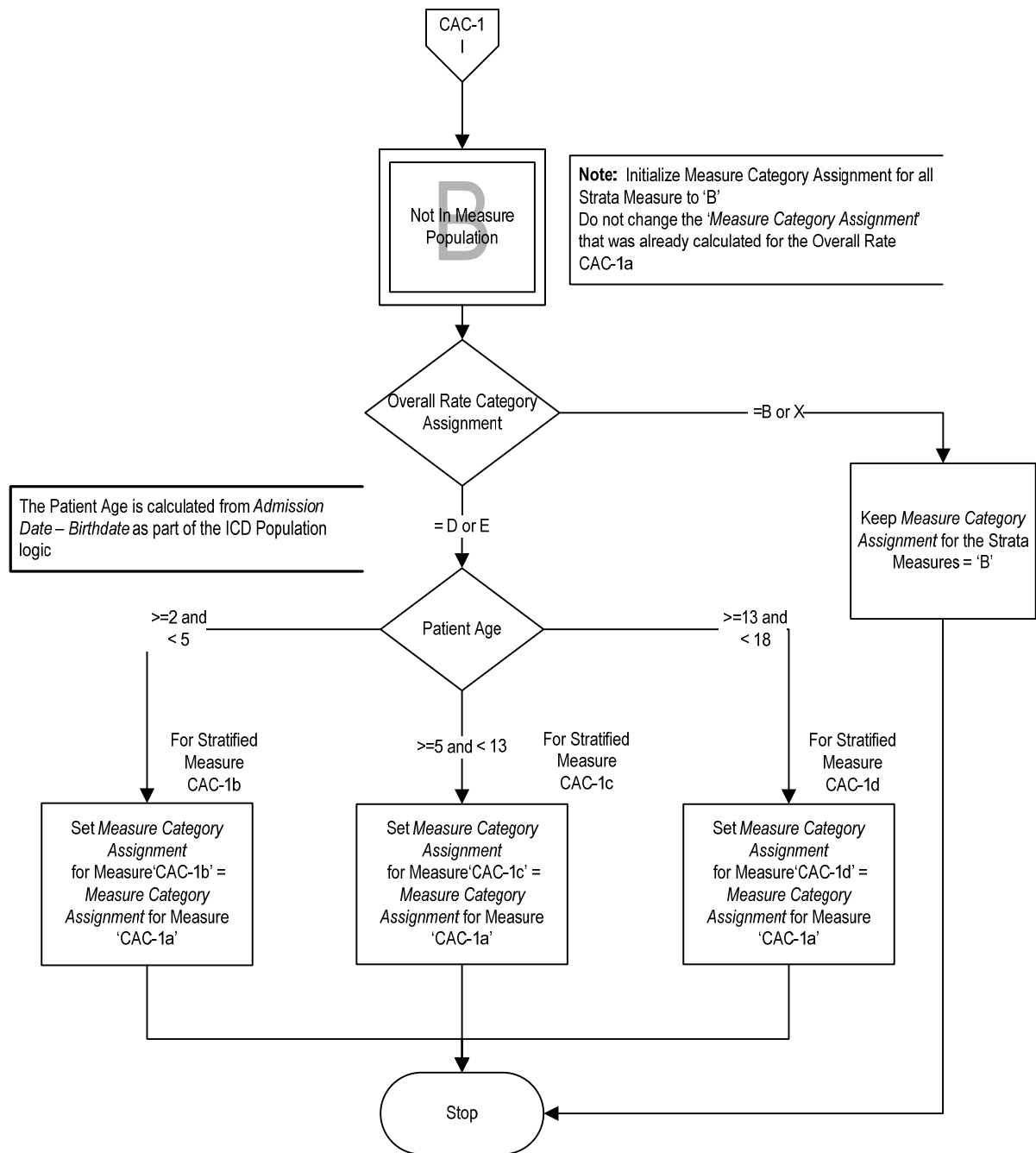
Variable Key: Patient Age

Stratification Table:
The Stratification Table includes the Set Number, Stratified By, and the Age Strata (Allowable Value). The Age Strata refers to Patient Age which is calculated by the data element Admission Date minus the data element Birthdate. Each case will be stratified according to the patient age, after the Category Assignments are completed and the overall rate is calculated.

Set Number	Stratified By	Age Strata
CAC-1a	Overall Rate	No allowable value exists for the overall rate. It includes all patients greater than or equal to 2 years and less than 18 years.
CAC-1b	Age 2 years through 4 years	A Patient Age *(Admission Date* minus *Birthdate)* greater than or equal to 2 years and less than 5 years.
CAC-1c	Age 5 years through 12 years	A Patient Age *(Admission Date* minus *Birthdate)* greater than or equal to 5 years and less than 13 years.
CAC-1d	Age 13 years through 17 years	A Patient Age *(Admission Date* minus *Birthdate)* greater than or equal to 13 years and less than 18 years.

1. Start processing. Run cases that are included in the CAC Initial Patient Population and pass the edits defined in the Transmission Data Processing Flow: Clinical through this measure.

2. Check Clinical Trial
    a. If Clinical Trial is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Proceed to step 5 and check the Stratified Measures for Overall Rate (CAC-1a).
    b. If Clinical Trial equals Yes, the case will proceed to a Measure Category Assignment of B and will not be in the measure population. Proceed to step 5 and check the Stratified Measures for Overall Rate (CAC-1a).
    c. If Clinical Trial equals No, continue processing and proceed to Relievers Administered.

3. Check Relievers Administered
    a. If Relievers Administered is missing, the case will proceed to a Measure Category Assignment of X for Overall Rate (CAC-1a) and will be rejected.

Proceed to step 5 and check the Stratified Measures for Overall Rate (CAC-1a).

b.   If Relievers Administered equals Yes, the case will proceed to a Measure Category Assignment of E and will be in the Numerator Population. Proceed to step 5 and check the Stratified Measures for Overall Rate (CAC-1a).

c.   If Relievers Administered equals No, continue processing and proceed to Reason for Not Administering Relievers.

4.   Check Reason for Not Administering Relievers
a.   If Reason for Not Administering Relievers is missing, the case will proceed to a Measure Category Assignment of X for Overall Rate (CAC-1a) and will be rejected. Proceed to step 5 and check the Stratified Measures for Overall Rate (CAC-1a).

b.   If Reason for Not Administering Relievers equals Yes, the case will proceed to a Measure Category Assignment of B for Overall Rate (CAC-1a) and will not be in the measure population. Proceed to step 5 and check the Stratified Measures for Overall Rate (CAC-1a).

c.   If Reason for Not Administering Relievers equals No, the case will proceed to a Measure Category Assignment of D for Overall Rate (CAC-1a) and will be in the Measure Population. Proceed to step 5 and check the Stratified Measures for Overall Rate (CAC-1a).

5.   Continue processing for the Stratified Measures. Note: Initialize the Measure Category Assignment for all Strata Measure to equal 'B.' Do not change the Measure Category Assignment that was already calculated for the overall rate CAC-1a). The rest of the algorithm will reset the appropriate Measure Category Assignment to be equal to the overall rate's (CAC-1a) Measure Category Assignment.

6.   Check Overall Rate Category Assignment
a.   If the Overall Rate Category Assignment is equal to B or X, keep Measure Category Assignment for the strata measures equal B, not in the Measure Population. Stop processing.

b.   If the Overall Rate Category Assignment is equal to D or E, continue processing and check the Patient Age. Note: The Patient Age is calculated from Admission Date minus Birthdate as part of the ICD Population logic.

7.   Check the Patient Age
a.   If the Patient Age is greater than or equal to 2 years and less than 5 years for Stratified Measure CAC-1b, set the Measure Category Assignment for measure CAC-1b to equal the Measure Category Assignment for measure CAC-1a. Stop processing.

b.   If the Patient Age is greater than or equal to 5 years and less than 13 years for Stratified Measure CAC-1c, set the Measure Category Assignment for measure CAC-1c to equal the Measure Category Assignment for measure CAC-1a. Stop processing.

c.   If the Patient Age is greater than or equal to 13 years and less than 18 years for Stratified Measure CAC-1d, set the Measure Category Assignment for measure CAC-1d to equal the Measure Category Assignment for measure CAC-1a. Stop processing.