



Does the Treatment of Asthma and Allergic Rhinitis Decrease the Likelihood of an Obstructive Sleep Apnea Work-up and Treatment?

Pushpom James*, Steven Daoud, Seleshi Demissie, Raisa Saab and Philip Roth

Department of Pediatrics, Staten Island University Hospital Northwell Health, Staten Island, New York, USA

*Corresponding Author: Pushpom James, Department of Pediatrics, Staten Island University Hospital Northwell Health, Staten Island, New York, USA.

DOI: [10.31080/ASPE.2022.05.0546](https://doi.org/10.31080/ASPE.2022.05.0546)

Received: June 15, 2022

Published: July 27, 2022

© All rights are reserved by Pushpom James, et al.

Abstract

Introduction: Obstructive sleep apnea hypopnea syndrome (OSAHS) is an independent risk factor for asthma exacerbations [1]. Since there is an overlap in symptoms between OSAHS and bronchial asthma, with good control of a patient's asthma and allergic/non-allergic rhinitis, there should be fewer patients warranting work-up and treatment of obstructive sleep apnea.

Methodology: The goal was to determine the change on the sleep related breathing disorder scale (SRBD) once a patient's asthma and allergic/non-allergic rhinitis had been controlled [2]. Two questionnaires were administered on patient's first visit, the SRBD scale and depending on age, the Asthma Control Test (ACT) or Childhood ACT. These questionnaires were readministered on a subsequent visit once their asthma and allergic rhinitis were controlled [3].

Results: A total of 68 patients were recruited. 40 completed 2 visits according to protocol. Of these, 28, that is 70% of patients showed improvement on the SRBD scale once their asthma and allergic/non-allergic rhinitis were controlled.

Conclusion: By controlling a patient's asthma and allergic/non-allergic rhinitis, we can increase the specificity of the SRBD scale in asthmatics. This may improve screening for pediatric obstructive sleep apnea in children with asthma with more appropriate usage of diagnostic tools such as polysomnography and perhaps decrease the use of unnecessary treatments and surgeries, such as, tonsillectomy and adenoidectomy.

Keywords: Asthma; Pediatric Pulmonology; Obstructive Sleep Apnea Hypopnea Syndrome; Pediatric Sleep Questionnaire; Asthma Control Test; Otolaryngology

Abbreviations

OSAHS: Obstructive Sleep Apnea Hypopnea Syndrome; SRBD: Sleep Related Breathing Disorder Scale; PSQ: Pediatric Sleep Questionnaire; ACT: Asthma Control Test; ADHD: Attention Deficit Hyperactivity Disorder

Introduction

Prevalence of obstructive sleep apnea is an independent risk factor for asthma exacerbations. OSAHS could result in neuromechanical reflex bronchoconstriction, trigger gastroesophageal reflux, and result in local and systemic inflammation which could all result in deterioration of asthma control in patients with con-

comitant obstructive sleep apnea. Airway angiogenesis induced by vascular endothelial growth factor, and OSAHS induced weight gain could be further linking these two disorders. Leptin resistance in OSAHS could increase parasympathetic tone and result in bronchoconstriction. The proinflammatory effects of leptin could promote airway inflammation [4]. Several studies have confirmed that asthmatic patients are more likely to develop symptoms of obstructive sleep apnea [5]. Nasal obstruction due to allergic/non-allergic rhinitis, a decrease in airway diameter with an increase in airway collapsibility in asthmatics would promote development of OSAHS [1].

An article by Ehsan, et al. in Pediatric Pulmonology demonstrated that the sensitivity of the Pediatric Sleep Questionnaire (PSQ) is

reasonable in asthmatic children and comparable to previous studies in the general pediatric population, but the specificity is low [6].

Parents are likely to answer “Yes” to many of the questions, when their child has symptoms of asthma and allergic/non-allergic rhinitis that are not well controlled. A child with asthma may be nasally congested due to allergic rhinitis or sinusitis. This may result in mouth breathing, greater negative pressure being generated behind the uvula and soft palate, and cause structures to vibrate. In a child with smaller airway dimensions, this may result in snoring [7]. Furthermore, episodes of nocturnal asthma, coughing, wheezing, chest tightness, and shortness of breath result in sleep disruption, restless sleep, and heavy breathing. With poor sleep, subclinical performance in academics could be a manifestation of asthma as opposed to OSAHS.

Ultimately, the benefit of using the SRBD scale as a diagnostic tool for obstructive sleep apnea (OSA) in asthmatics is limited due to the overlap in symptoms between asthma and OSAHS. Yet with improved control of a patient’s asthma and allergic/non-allergic rhinitis symptoms, it will be easier to determine which patients truly require further evaluation and treatment for OSAHS.

Materials and Methods

This was a prospective cohort study of pediatric patients with persistent asthma who had symptoms suggestive of OSAHS. This was conducted at the Cohen Children’s Northwell Health Physician Partners Pediatric Specialists at Hylan Boulevard. The Institutional Review Board of Northwell Health approved this study. Patients between the ages 4 to 18 presenting for evaluation and management of asthma seen in the outpatient setting were screened by the principal investigator. If a patient was already being treated for asthma, or if they had symptoms suggestive of intermittent asthma, they were excluded from the study. If the SRBD scale was administered and findings were not suggestive of OSA, these patients were also excluded. Patients were further excluded at the discretion of the principal investigator, if it was deemed their symptoms warranted an immediate overnight polysomnogram.

Ultimately, patients with poorly controlled asthma based on the questionnaire equating to a score of 19 or less on the (ACT) or the Childhood ACT, and a score of 0.33 or greater on the SRBD scale were selected to participate. This prospective study posed no more than minimal risk to subjects as they received standard of care treatment.

All subjects were consented and assented as appropriate before they were enrolled in the study. Assent was obtained from subjects between 7-18 years of age. On the first and second visit, patients were provided the standard of care including a complete history, physical examination and appropriate diagnostic testing. The SRBD scale and the ACT or Childhood ACT for children younger than 12 years were administered. The SRBD scale and the ACT or Childhood ACT were re-administered when they returned for a second visit, between 2 to 12 weeks after the initial visit, once it was deemed their asthma and allergic/non-allergic rhinitis symptoms were controlled. If the patient had not been receiving prescribed medications, or it was deemed that further measures were needed for optimal control, patients returned for a third visit within the 12-week window. Patients were therefore their own control.

Once the data was collected it was recorded on Research Electronic Data Capture (REDCap). All patient health information was recorded, but not disclosed.

Results and Discussion

Statistical analysis

The primary outcome variable is the percentage of patients who test positive for sleep apnea (as measured by the PSQ questionnaire) at a follow-up visit post treatment. When the sample size is 62, a two-sided 95.0% confidence interval for this proportion using the large sample normal approximation will extend 10% from the observed percentage for an expected percentage of 80%. Considering the possibility that 30% of patients will be lost to follow-up, approximately 80 patients will be recruited. In order to obtain 80 patients who test positive for sleep apnea at the initial visit, approximately 100 patients will be enrolled into the study. An interim analysis was scheduled after 40 patients had completed two visits.

Patient demographic and clinical characteristics were summarized for all patients and by study group. Descriptive statistics (number of patients, mean, standard deviation, median and range) were provided for continuous variables. Frequency distribution and percentages were provided for categorical variables. The primary outcome was analyzed using a one-sample test of proportion. A 95% confidence interval will be used to test the hypothesis that the percentage of patients who test positive for sleep apnea using the PSQ questionnaire at a follow-up visit post treatment will be 80%. All statistical tests of significance were two-sided and conducted at the 0.05 level of significance. Data analysis was conducted using SAS (Statistical Analysis System) Version 9.3.

Results

The primary outcome variable was the percentage of patients who tested positive for OSAHS as measured by the SRBD scale at a follow up visit post-treatment. The primary analysis was a one sample test of proportion.

Of the 68 recruited, a total of 28 patients or 41% were lost to follow-up and therefore disqualified. The expected percent loss to follow up was 30%, which is the average no show rate at the outpatient pulmonary practice where patients were recruited. On inter-

im analysis, a total of 40 patients were enrolled from 02/04/2015 to 10/18/2018. Demographic information on these subjects are listed in table 1. 28 patients demonstrated improvement on the SRBD scale.

12 patients, 30% did not demonstrate improvement. The ACT and SRBD scores of patients, both responders and non-responders can be found in table 2, showing no significant difference in the scores of responders compared to non-responders at the time of Visit 1, which precluded predicting the likely responders.

Characteristics	Total Cohort	Both Visits	One Visit Only
Number of Patients Recruited (N)	68 (100.0)	40 (58.8)	28 (41.2)
Male, n (%)	34 (50.0)	21 (52.5)	14 (50.0)
Female, n (%)	34 (50.0)	19 (47.5)	14 (50.0)
Age (mean ± SD)	7.9 ± 3.1	7.9 ± 3.2	8.1 ± 2.9
Patients with a diagnosis of ADHD, Autism Spectrum Disorder, or Developmental Delay, n (%)	12 (17.6)	12 (30.0)	0 (0)
ACT Score (mean ± SD)	14 ± 3.97	15 ± 4.9	15 ± 3.9
SRBD Score (mean ± SD)	0.57 ± 0.11	0.58 ± 0.09	0.55 ± 0.11
BMI (kg/m ²) (mean ± SD)	20.9 ± 6.4	21.7 ± 7.06	19.3 ± 4.62

Table 1: Demographic and Clinical Characteristics of study Population.

Number of Patients (%)		Responders	Non-Responders	Total Patients
		28 (70%)	12 (30%)	40
Asthma Control Test	Visit 1 Mean (SD)	13.6 (± 3.9)	12.6 (± 3.8)	13.3 (± 3.8)
	Visit 2 Mean (SD)	22.9 (± 2.9)	20 (± 6.3)	22 (± 4.4)
SRBD Score	Visit 1 Mean (SD)	0.57 (± 0.09)	0.60 (± 0.12)	0.58 (± 0.1)
	Visit 2 Mean (SD)	0.19 (± 0.09)	0.53 (± 0.13)	0.29 (± 0.19)
	P Value (SRBD Visit 1 vs. Visit 2)	< .0001	0.2441	< .0001

Table 2: Analysis of outcomes measures for patients who met inclusion criteria and completed two visits.

Upon reviewing the SRBD scale, several questions demonstrate an overlap in symptoms with patients who are diagnosed with autism spectrum disorder, ADHD (attention deficit hyperactivity disorder), or developmental delay. For example, the questionnaire asks does the patient “fidget with hands or feet or squirms in seat,” which is a habit often exhibited in ADHD. This overlap in symptomology could preferentially select for this subset of patients. Of the patients recruited a total of 12 demonstrated some form of devel-

opmental delay, autism spectrum disorder, or ADHD accounting for 30% of those enrolled in the study. However, children diagnosed to have ADHD, developmental delay or autism spectrum disorder appeared just as likely to have a negative SRBD scale score as those children who were thought to be developmentally appropriate for age and without symptoms of ADHD. Lack of detailed diagnoses on all members of this subgroup precluded further conclusions.

Discussion

OSA is defined by the American Academy of Sleep Medicine as “a disorder of breathing during sleep characterized by prolonged partial upper airway obstruction and/or intermittent complete obstruction that disrupts normal ventilation during sleep and normal sleep patterns.” [8]. The prevalence is reported as being between 2-3%, in middle school children [9].

Asthma, a common chronic childhood disease, according to the *Centers for Disease Control and Prevention (CDC)*, affects 8.3% of children in the United States.

It is well known that there is an interplay between symptoms of pediatric asthma and OSA. There have been hundreds of articles detailing the fact that treatment of OSAHS, improves asthma control. Though the numbers in this study are small, this is the first article demonstrating the fact that control of asthma improves symptoms suggestive of OSAHS.

Significant and independent association was present between snoring and allergic rhinitis with an odds ratio of 5.27 (95% CI, 1.57-17.77) [10].

Ross, *et al.* showed that among 108 children 4 to 18 years who were recruited from an asthma clinic, 29.6% of children had sleep-disordered breathing. Among those with OSA, there was a 3.6-fold increased odds of having severe asthma at follow up [8]. This suggests that presence of OSA could predict asthma severity [11].

Not only does there appear to be an overlap in symptoms, but recent studies have demonstrated a possible cause and effect association between asthma and obstructive sleep apnea. Teodorescu, *et al.* demonstrated that preexisting asthma was a risk factor for developing OSAHS, and the longer a patient had asthma, the higher the incidence of OSAHS later in life [12].

Nighttime symptoms suggestive of OSAHS are loud snoring, snorting, gasping, and episodes of apnea, restless sleep, diaphoresis, heavy breathing, paradoxical breathing, and nocturnal enuresis. This lack of adequate sleep may result in behavior problems and decreased attention span [13].

A child with asthma who is coughing, wheezing, experiencing chest tightness and shortness of breath may have sleep disruption, heavy breathing at night, be diaphoretic and be difficult to awaken in the morning. There may be excessive daytime sleepiness, irritability, and poor attention span. A child with asthma may snore, mouth breathe and have a dry mouth upon awakening [14].

The Asthma Control Test (ACT) is a way to help determine if asthma symptoms are well controlled, with a composite score over 19, implying that asthma symptoms are well controlled (Appendices B1 and B2) (see table 2) [2].

The Pediatric Sleep Questionnaire is a 67-item questionnaire validated for children between 4 to 18 years of age. The 22 item SRBD scale was shown in the research setting to have a sensitivity of 0.85 and a specificity of 0.87 (Appendix A) [2].

The 22 questions of the SRBD scale can be answered “Yes” equivalent to 1, “No” equivalent to 0, or “I don’t know” equivalent to zero. The number of symptoms positively endorsed are divided by the number of items positively and negatively endorsed, excluding missing responses or items answered, “I don’t know.” The result equates to a number between 0 to 1. Scores over 0.33 are considered positive and suggestive of a high risk for pediatric sleep related breathing disorder. This threshold is based on a validity study that suggested optimal sensitivity and specificity at the 0.33 cut off [2].

While research is ongoing and the exact relationship between asthma and sleep apnea is not fully understood, various tools have been established to assist clinicians, including the SRBD scale. Increasing awareness of the lack of specificity of the SRBD scale in children with poorly controlled asthma is essential, as this would decrease the number of asthmatics receiving empiric treatment and unnecessary evaluation for symptoms suggestive of sleep disordered breathing. This study demonstrated that a high percentage of patients no longer warranted further work-up or treatment once their asthma and allergic/non-allergic rhinitis were well controlled.

As there are limited resources and a lack of access to pediatric sleep studies, we can better utilize this expensive study. Furthermore, if a child does have an overnight polysomnogram when their asthma is poorly controlled, it can result in insufficient sleep due to nighttime cough and awakenings leading to poor and inaccurate results. The child and parent maybe unnecessarily subjected to the stress of having an overnight polysomnogram, when waiting for improved control can completely obviate the necessity for this study. Controlling a patient’s asthma and allergic/nonallergic rhinitis may reduce the number of patients who undergo tonsillectomy and adenoidectomy unnecessarily for symptoms that are presumed to be related to OSA. A study by

Sanchez., *et al.* in the Journal of Asthma and Allergy demonstrated that adenotonsillectomy improved asthma control but stated that since the relationship appeared to be bidirectional, the impact of asthma treatment on OSAHS needed to be looked at [5].

Limitations

One of the limitations of this study, is the high loss of patients to follow-up. This may have selectively decreased the percentage of patients who improved after treatment of their asthma and allergic rhinitis. Several patients returning after the 12-week window of the study, were determined to have a negative SRBD scale score [16]. Part of the loss to follow-up was due to the short window for the second visit. We allowed only a 12-week window for the child to be seen for a follow-up to be sure that the change in the SRBD scale score was likely due to improved asthma control. We know from the CHAT trial that 7 months of watchful waiting resulted in 42% of patients no longer meeting criteria for the diagnosis of OSAHS on a polysomnogram.

Another limitation is that it is known that nasal steroids and montelukast decrease the AHI [17]. Therefore, when these medications were used to treat bronchial asthma and allergic rhinitis, they were simultaneously treating OSAHS. In addition, because these patients were recruited from a single pediatric pulmonology practice, the data may not be generalizable.

Conclusion

Effective treatment of asthma and allergic rhinitis resulted in a 70% decrease in children screening positive for OSAHS on the SRBD scale. This would be important to disseminate as overnight polysomnograms are frequently performed on children with poorly controlled asthma, resulting in overutilization of a scarce resource as well as poor quality studies. Tonsillectomy and adenoidectomy, the first line treatment of OSAHS in children could perhaps be avoided in many asthmatic children, as their sleep disturbance may resolve once asthma was controlled.

Acknowledgements

The authors wish to thank the following individuals for their tireless efforts and dedication in helping to complete this study: Guiseppina Andrawis, Samantha Bonello, Ashley Kyle and Anthony Gonzalez.

Conflict of Interest

All research and work were performed at the Cohen Children's Northwell Health Physician Partners Pediatric Specialists at Hylan

Boulevard, Staten Island, New York. All authors have seen and approved the manuscript for submission. This study did not receive financial support. None of the authors have any conflicts of interest. This study is not part of a clinical trial.

Bibliography

1. Alkhalil M., *et al.* "Obstructive Sleep Apnea Syndrome and Asthma: What Are the Links?" *Journal of Clinical Sleep Medicine* 5.1 (2009): 71-78.
2. Chervin RD., *et al.* "Pediatric sleep questionnaire (PSQ): validity and reliability of scales for sleep-disordered breathing, snoring, sleepiness, and behavioral problems". *Sleep Medicine* 1.1 (2000): 21-32.
3. Nathan RA., *et al.* "Development of the asthma control test: A survey for assessing asthma control". *Journal of Allergy and Clinical Immunology* 113.1 (2004): 59-65.
4. Zheng H., *et al.* "Leptin Promotes Allergic Airway Inflammation through Targeting the Unfolded Protein Response Pathway". *Scientific Reports* 8 (2018): 8905.
5. Sanchez T., *et al.* "Sleep-disordered breathing in children with asthma: a systematic review on the impact of treatment". *Journal of Asthma and Allergy* 9 (2016): 83-91.
6. Ehsan ZM., *et al.* "Validation of the pediatric sleep questionnaire in children with asthma". *Pediatric Pulmonology* 52.3 (2017): 382-389.
7. Davila DG. "National Sleep Foundation (2009).
8. American Academy of Sleep Medicine. "The AASM Manual for the Scoring of Sleep and Associated Events". Summary of Updates in Version 2.5. *American Academy of Sleep Medicine* (2018).
9. Rosen CL., *et al.* "Prevalence and risk factors for sleep-disordered breathing in 8- to 11-year-old children: association with race and prematurity". *The Journal of Pediatrics* 142.4 (2003): 383-389.
10. Anuntaseree W., *et al.* "Snoring and obstructive sleep apnea in Thai school-age children: Prevalence and predisposing factors. *Pediatric Pulmonology* 32.3 (2001): 222-227.
11. Ross KR., *et al.* "Sleep-Disordered Breathing is Associated with Asthma Severity in Children". *The Journal of Pediatrics* 160.5 (2012): 736-742.

12. Teodorescu M., et al. "Obstructive Sleep Apnea Risk, Asthma Burden, and Lower Airway Inflammation in Adults in the Severe Asthma Research Program (SARP) II". *Journal of Allergy and Clinical Immunology* 3.4 (2015): 566-575.

13. National Sleep Foundation (2019).

14. Ginsberg D. "An Unidentified Monster in the Bed- Assessing Nocturnal Asthma in Children". 12.1 (2009): 31-38.

15. National Jewish Health. National Jewish Health (2019).

16. Chervin RD., et al. "Prognosis for Spontaneous Resolution of OSA in Children". *CHEST Journal* 148.5 (2015): 1204-1213.

17. Liming BJ., et al. "Montelukast and Nasal Corticosteroids to Treat Pediatric Obstructive Sleep Apnea: A Systematic Review and Meta-analysis". *Otolaryngology Head and Neck Surgery* 160.4 (2018): 594-602.

Sleep Related Breathing Disorder 22-item Subscale from the Pediatric Sleep Questionnaire (PSQ)

While sleeping, does your child...			
A2	...snore more than half the time?	Y	N DN
A3	...always snore?	Y	N DN
A4	...snore loudly?	Y	N DN
A5	...have "heavy" or loud breathing?	Y	N DN
A6	...have trouble breathing, or struggle to breathe?	Y	N DN
Have you ever...			
A7	...seen your child stop breathing during the night?	Y	N DN
Does your child...			
A24	...tend to breathe through the mouth during the day?	Y	N DN
A25	...have a dry mouth on waking up in the morning?	Y	N DN
A32	...occasionally wet the bed?	Y	N DN
Does your child...			
B1	...wake up feeling <i>un</i> refreshed in the morning?	Y	N DN
B2	...have a problem with sleepiness during the day?	Y	N DN
B4	...Has a teacher or other supervisor commented that your child appear sleepy during the day?	Y	N DN
B6	...Is it hard to wake your child up in the morning?	Y	N DN
B7	...Does your child wake up with headaches in the morning?	Y	N DN
B9	...Did your child stop growing at a normal rate at any time since birth?	Y	N DN
B22	...Is your child overweight?	Y	N DN
This child often...			
C3	...does not seem to listen when spoken to directly	Y	N DN
C5	...has difficulty organizing task and activities	Y	N DN
C8	...is easily distracted by extraneous stimuli	Y	N DN
C10	...fidgets with hands or feet or squirms in seat	Y	N DN
C14	...is 'on the go' or often acts as if 'driven by a motor	Y	N DN
C18	...interrupts or intrudes on others (e.g. butts into conversations or games)	Y	N DN

Appendix A: Permission obtained from Department of Neurology, University of Michigan, Ann Arbor, Michigan, USA



Patient's Name: _____

Today's Date: _____

Childhood Asthma Control Test for children 4 to 11 years

Know your score.

Parent or Guardian: The Childhood Asthma Control Test* is a way to help your child's healthcare provider determine if your child's asthma symptoms are well controlled. Take this test with your child (ages 4 to 11). Share the results with your child's healthcare provider.

- Step 1:** Have your child answer the first four questions (1 to 4). If your child needs help, you may help, but let your child choose the answer.
- Step 2:** Answer the last three questions (5 to 7) on your own. Don't let your child's answers influence yours. There are no right or wrong answers.
- Step 3:** Write the number of each answer in the score box to the right.
- Step 4:** Add up each score box for the total.
- Step 5:** Take the COMPLETED test to your child's healthcare provider to talk about your child's total score.

19
or less

IF YOUR CHILD'S SCORE IS 19 OR LESS, Your child's asthma symptoms may not be as well controlled as they could be. No matter what the score, bring this test to your child's healthcare provider to talk about your child's results.

NOTE: If your child's score is 12 or less, his or her asthma may be very poorly controlled. Please contact your child's healthcare provider right away.

Have your child complete these questions.

1. How is your asthma today?

 0 Very bad	 1 Bad	 2 Good	 3 Very good
--------------------------	---------------------	----------------------	---------------------------

SCORE

2. How much of a problem is your asthma when you run, exercise or play sports?

 0 It's a big problem, I can't do what I want to do.	 1 It's a problem and I don't like it.	 2 It's a little problem but it's okay.	 3 It's not a problem.
---	---	--	-------------------------------------

3. Do you cough because of your asthma?

 0 Yes, all of the time.	 1 Yes, most of the time.	 2 Yes, some of the time.	 3 No, none of the time.
---------------------------------------	--	--	---------------------------------------

4. Do you wake up during the night because of your asthma?

 0 Yes, all of the time.	 1 Yes, most of the time.	 2 Yes, some of the time.	 3 No, none of the time.
---------------------------------------	--	--	---------------------------------------

Please complete the following questions on your own.

5. During the last 4 weeks, how many days did your child have any daytime asthma symptoms?

5 Not at all	4 1-3 days	3 4-10 days	2 11-18 days	1 19-24 days	0 Everyday
------------------------	----------------------	-----------------------	------------------------	------------------------	----------------------

6. During the last 4 weeks, how many days did your child wheeze during the day because of asthma?

5 Not at all	4 1-3 days	3 4-10 days	2 11-18 days	1 19-24 days	0 Everyday
------------------------	----------------------	-----------------------	------------------------	------------------------	----------------------

7. During the last 4 weeks, how many days did your child wake up during the night because of the asthma?

5 Not at all	4 1-3 days	3 4-10 days	2 11-18 days	1 19-24 days	0 Everyday
------------------------	----------------------	-----------------------	------------------------	------------------------	----------------------

*The Childhood Asthma Control Test was developed by GSK.

This material was developed by GSK.



© 2017 GSK group of companies. All rights reserved. Produced in USA. 816205R0 January 2017

TOTAL

Appendix B1



Name: _____ Today's Date: _____

ASTHMA CONTROL TEST™

Know your score.

The Asthma Control Test™ provides a numerical score to help you and your healthcare provider determine if your asthma symptoms are well controlled.

Take this test if you are 12 years or older. Share the score with your healthcare provider.

Step 1: Write the number of each answer in the score box provided.

Step 2: Add up each score box for the total.

Step 3: Take the completed test to your healthcare provider to talk about your score.

IF YOUR SCORE IS 19 OR LESS, Your asthma symptoms may not be as well controlled as they could be. No matter what the score, bring this test to your healthcare provider to talk about the results.

NOTE: If your score is 15 or less, your asthma may be very poorly controlled. Please contact your healthcare provider right away. There may be more you and your healthcare provider could do to help control your asthma symptoms.

1. In the past 4 weeks , how much of the time did your asthma keep you from getting as much done at work, school or at home?					SCORE
All of the time [1]	Most of the time [2]	Some of the time [3]	A little of the time [4]	None of the time [5]
2. During the past 4 weeks , how often have you had shortness of breath?					
More than Once a day [1]	Once a day [2]	3 to 6 times a week [3]	Once or twice a week [4]	Not at all [5]
3. During the past 4 weeks , how often did your asthma symptoms (wheezing, coughing, shortness of breath, chest tightness or pain) wake you up at night or earlier than usual in the morning?					
4 or more nights a week [1]	2 to 3 nights a week [2]	Once a week [3]	Once or twice [4]	Not at all [5]
4. During the past 4 weeks , how often have you used your rescue inhaler or nebulizer medication (such as albuterol)?					
3 or more times per day [1]	1 to 2 times per day [2]	2 or 3 times per week [3]	Once a week or less [4]	Not at all [5]
5. How would you rate your asthma control during the past 4 weeks?					
Not Controlled at All [1]	Poorly Controlled [2]	Somewhat Controlled [3]	Well Controlled [4]	Completely Controlled [5]

TOTAL:

Copyright 2002, by QualityMetric Incorporated.
Asthma Control Test is a trademark of QualityMetric Incorporated.

This material was developed by GSK.



©2017 GSK group of companies.
All rights reserved. Produced in USA. 616207R0 January 2017

Appendix B2