Quality Improvement Initiative for the Severity Classification of Pediatric Asthma Patients in a

Community Health Center

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Abstract

The objectives of this study were three-fold: 1) to compare pediatric asthma prevalence in a Community Health Center (CHC) to state-wide prevalence of pediatric asthma, 2) to determine the proportion of individuals under the age of 19 with asthma within a CHC system whose asthma severity has been or can be classified according to NHLBI asthma severity classifications for children and 3) to determine the incidence rate of emergency department visits per patient in the 12 months prior to the start of this asthma Quality Improvement initiative for children with asthma being treated at the CHC under review. Using the Matthew Walker Comprehensive Health Center as a model, the goal was to extract relevant information from patient electronic health records across clinics located in three different cities in the state of Tennessee (Nashville, Smyrna and Clarksville). Following analysis of 2012 intake data, a total of 173 patients with asthma under the age of 19 were treated at any of the three MWCHC Clinic locations out of a total 5,034 pediatric patients seen the same year (3.5%). Of the 173 patients with asthma records retrieved for the study, the charts of 29 of these patients either already had the patient's asthma severity classified or contained adequate information for classification according to NHLBI asthma severity classification guidelines for children (17%). There was insufficient data to confidently report the number of emergency department visits for the pediatric patients with asthma as it correlates to disease management. Together, these findings suggest that the majority of pediatric patients being followed at Matthew Walker CHC with asthma have not been classified based on severity. Also, the apparent under diagnosis of asthma among pediatric patients within this CHC setting may suggest that lack of asthma related data in patient charts is a contributing factor. These and other findings may have grave implications on treatment regime and disease management.

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Introduction

Asthma is a disease marked by inflammation of the airways that can lead to expression of

various symptoms including wheezing, coughing and shortness of breath. Like several other

illnesses, Asthma is believed to be caused by both environmental and hereditary factors. The

interchange between environmental triggers and genetics not only contributes to different

presentation of symptoms, but can also play a role in varying levels of severity and

responsiveness to treatment. Since asthma is usually diagnosed based on lung function test

results proving obstruction is present, physicians often find it difficult to distinguish between it

and other pulmonary illnesses like chronic bronchitis and emphysema especially when treating

adult patients. The interplay between environment, genetic predisposition and overlapping

symptom presentation comes into play when attempting to define asthma for pediatric patients as

well (Godfrey, 1985). For this cause, one author offers the following attempt at a clear cut

definition for pediatric asthma: " Asthma in childhood is a disease characterized by wide

variations over short periods of time in resistance to flow in intrapulmonary airways and

manifest by recurrent attacks of cough or wheeze separate by symptom free intervals. The

airflow obstruction and clinical symptoms are largely or completely reversed by treatment with

bronchodilator drugs or steroids," (Godfrey, 1985).

Asthma is a disease that can drastically hinder quality of life for those affected.

According to the National Heart Lung and Blood Institute (NHLBI), more than 22 million

Americans have asthma, and asthma is one of the most common chronic diseases of childhood,

affecting an estimated 6 million children (2007). For children suffering with asthma, multiple

emergency department visits, days missed from school and inability to participate in certain

physical activities can cause an increased level of distress. For this cause, the NHLBI set forth

key clinical recommendations for successful diagnosis, classification, treatment and management

of asthma.

As a part of this initiative, the NHLBI proposes "four components of care" to providers in

order to best treat patients with asthma. The recommended components are: 1) Assessment and

Monitoring, 2) Education, 3) Control of Environmental Factors and Comorbid conditions and 4)

Medications (NHLBI 2007). The key parts of the first suggested component of care are the

concepts of severity, control and responsiveness to treatment. The NHLBI defines severity as

"the intrinsic intensity of the disease process. Severity is most easily and directly measured in a

patient who is not receiving long-term control therapy. Severity can also be measured, once

asthma control is achieved, by the step of care (i.e., the amount of medication) required to

maintain control," (2007). Importance is placed on classification of severity with the belief that

accurate assessment of severity and control can present the provider with a good sense of the

patient's current impairment, or frequency and intensity of symptoms and functional limitations

the patient is currently experiencing or has recently experienced, and future risk, or the

likelihood of either asthma exacerbations, progressive decline in lung function (or, for children,

reduced lung growth), or risk of adverse effects from medication (NHLBI 2007).

The measures that the NHLBI uses to assess asthma severity are: frequency of symptoms,

use of prescribed treatment for immediate relief of symptoms, limitations to normal activities due

to asthma, pulmonary function test results, and exacerbations. The NHLBI affirms that use of

multiple measures are essential because different measures assess different manifestations of the

disease and may not correlate with each other (2007). Specific measures and limits can be

observed in the charts created for proper classification and subsequent treatment of asthma for

pediatric patients included in Appendices A &B.

In the same report in which the "four components of care" model was introduced, the

NHLBI states that, for all age groups, it's essential to first utilize the four components of care

model, next initiate therapy based on the severity classification and then adjust therapy based on

asthma control (NHLBI 2007). Asthma severity is therefore crucial in properly assessing a

patient's experience of asthma and following up with the clinical decisions that will most likely

lead to positive health outcomes for said patient.

Background

There are several publications supporting the need for classification of asthma severity.

In one study, the researcher argues that classification is only truly accurate with up-to-date

spirometry results stating that the majority of patients will underestimate their illness, therefore

giving a self-report that may cause their provider to under treat their disease leading to poor

control (Nguyen 1996). Another researcher echoes the importance of lung function testing with

asthma classifications and showcases how the severity classification changed the majority of the

time when spirometry results were added to patient records (Stout 2006). A study done back in

2004 provides data supporting that FEV1/FVC output percentage declines with increasing

asthma severity (Bacharier 2040). By showing underestimation of severity and discussing how

treatment regimes were altered after lung function results were obtained, all of the before

mentioned researchers were sure to note how giving careful attention to classification leads to

best chances at assisting the patient in disease control.

Aside from reiterating the need for classification and the overall importance of spirometry, other studies indicate which populations of people are most likely to not have been classified or are likely to have been under classified based on area. One article in particular took a different approach and asked the providers to rate the severity of each of their patient's asthma in an urban community in Rochester, NY. The researcher found that only 40% of the children that participated in the study had a provider who had accurately classified the severity of their disease and was prescribing the most appropriate maintenance medications (Halterman 2002). When pondering reasons why this occurred, the researcher notes miscommunication and a general disconnect between patients and their providers and predicts that more positive results may have been uncovered in a rural or suburban area (Halterman 2002). Data presented in this study raised several questions supporting follow up studies comparing the results found in the initiative being reported with data collected in a health care setting not identifying as a community health center.

Methodology

Using information obtained from the Health Resources and Service Administration Uniform Data System report (HRSA UDS) from 2012 presented to Matthew Walker CHC providers and administrators via the Bureau of Primary Health Care, the first stage of execution was to acquire the total number of patients under the age of 19 (born during or after the year 1994) seen, for any reason, at either of the three Matthew Walker CHCs across the state of Tennessee. After acquisition of this figure, the next goal was to discover how many of those patients possessed an asthma diagnosis. Using these figures, estimation of the asthma diagnosis prevalence was calculated to satisfy objective one; to compare pediatric asthma prevalence in a

Community Health Center (CHC) to state-wide prevalence of pediatric asthma using statistics

from the Tennessee Department of Health.

Using the figure obtained for the number of pediatric patients under the age of 19 currently

being followed within the Matthew Walker CHC system as a sample set, the follow steps were

taken in order to satisfy objectives 2 and 3; to determine the proportion of individuals under the

age of 19 with asthma within a CHC system whose asthma severity has been or can be classified

according to NHLBI asthma severity classifications for children and to determine the incidence

rate of emergency department visits per patient in the 12 months prior to the start of this asthma

Quality Improvement initiative for children with asthma being treated at the MWCHC:

1. Extraction of the following data for the identified sample set of pediatric patients seen

   across clinics in 2012 using Next Gen Electronic Medical Records

   a. Patient ID #

   b. DOB

   c. Freq. of use of B2 agonist (non-exercise induced usage only)

   d. Reported freq. of symptoms

   e. PFT Results

   f. # of Reported ED visits in the past 12 months

   g. Reported asthma severity classification

2. If no classification was previously indicated in the charts being reviewed, each patient

   was assigned to a category based on 1) Freq. of symptoms, 2) Freq. of nighttime

   disruptions, 3) Freq. of treatment, 4) Reported interference w. normal activity, 5) PFT

   results &/or 6) # of ED visits in the past 12 months. If inconsistencies arose,

classification of severity was assigned based on the most severe level for any given data

set. Standards for classification are as follows:

a. **Category A: Mild, Intermittent Asthma**

b. **Category B: Mild, persistent Asthma**

c. **Category C: Moderate, persistent Asthma**

d. **Category D: Severe, persistent Asthma**

	Mild, Intermittent Asthma	**Mild, Persistent Asthma**	**Moderate, Persistent Asthma**	**Severe, Persistent Asthma**
Freq. of Symptoms	$\leq$ 2 days/week	> 2 days/week but not daily	Daily	Multiple occurrences throughout the day
Freq. of Nighttime Disruptions	$\leq$ 2x/month	3-4 x/moth	> 1x/week but not nightly	Often, 7x/week
Freq. of Treatment	$\leq$ 2x/week	> 2x/week but not daily and not more than 1X on any day	Daily	Several times/day
Reported Interference w. Normal Activity	None	Minor limitation	Some limitation	Severe limitation
Lung Function	Normal [85% for 8-19 yr. olds]	Normal [85% for 8-19 yr. olds]	FEV1/FVC reduced by 5%	FEV1/FVC reduced > 5%
# of ED visits in the past 12 months	0-1	$\geq$2 visits/year	$\geq$2 visits/year	$\geq$2 visits/year

Results

Using the Matthew Walker Comprehensive Health Center as a model, relevant

information was extracted from patient electronic health records across clinics located in three

different cities in the state of Tennessee (Nashville, Smyrna and Clarksville). Significant findings

from the extracted patient data is noted below based on relevance to the previously stated

objectives.

Pediatric asthma prevalence comparison

Following analysis of 2012 intake data provided by the Bureau of Primary Health Care's Health Resources and Services Administration report presented to MWCHC, a total of 173 patients with asthma under the age of 19 (born during or after the year 1994) were treated at any of the three MWCHC Clinic locations out of a total 5,034 pediatric patients under the age of 19 seen the same year. Using this information, an estimated 3.5% (173/5,034) was assigned to indicate the prevalence of asthma cases being followed in MWCHC.

Asthma severity classification

Of the 173 records retrieved for the study, the charts of 29 of these patients either already had the patient's asthma severity classified or contained adequate information for classification according to NHLBI asthma severity classification guidelines for children. Using this information, 17% (29/173) of the pediatric patients with asthma followed by MWCHC have an asthma severity classification noted in their health records.

ED visits for pediatric patients with asthma

Of the 173 patient records retrieved for the study, the charts of 27 of 173 contained information about ED visits within the 12 months prior to the start of this quality improvement initiative. The responses ranged from 0 ED visits to 3 ED visits and produced an average of 2.25 ED visits.

Discussion

Pediatric asthma prevalence comparison

With the reported estimated prevalence of 3.5% pediatric asthma cases within the MWCHC, in comparison to the state-wide prevalence of 9.5%, close to national average, the inference can be made that asthma may be under diagnosed in MWCHC (CDC 2013). Using this inference, one might also conclude that this trend of under diagnosis of pediatric asthma might be common in other community health center settings given that the data is from multiple clinics crossing several city lines.

One point of weakness with this objective is lack of information deciphering between whether or not patients charted as having asthma were actually diagnosed at a MW clinic or elsewhere and are just subsequently being treated at MW. This may provide less of a backing for the inference made about under diagnosis and instead may just showcase a minimal patient load at MW for children with asthma.

Asthma severity classification

The reported 17% of pediatric patients with asthma followed by MWCHC that were already classified or classifiable based on asthma severity is seemingly low. Since the NHLBI suggests that proper severity classification is essential to optimal treatment and improvement of health outcomes, the implication can be made that the majority of pediatric patients with asthma within this CHC setting may not be receiving therapies that will lead to ideal health outcomes. A weakness may be noted in that the proportion of classifiable pediatric patients with asthma followed outside of a community health center setting was not collected for comparison. If the inference is to be made that better adherence to accurate and up-to-date asthma severity classifications is an improvement that needs to be proactively sought after in community health center settings, the comparison to non-CHCs may strengthen this recommendation.

It may also be important to note the indistinctness set forth by the NHLBI severity classification guidelines. Under these guidelines, the provider is advised to suggest treatment regimes and therapies based on the severity classification. This creates room for inconsistency because a provider that is dong a follow up may note a decreased level of severity simply based on optimal control of the illness. The NHLBI even notes the concern with assigning severity based on symptom presentation and also notes that the disease itself can't ever really be permanently classified. For this reason, they suggest only classifying patients that are not currently being treated with maintenance medications for disease control. In concurrence with this subject matter the NHLBI states the following, "This emphasizes the multifaceted nature of asthma and the need to consider separately asthma's current, ongoing effects on the present quality of life and functional capacity and the future risk of adverse events. The two domains may respond differentially to treatment. For example, evidence demonstrates that some patients can have adequate control of symptoms and minimal day-to-day impairment, but still be at significant risk of exacerbations; these patients should be treated accordingly" (NHLBI 2007).

Lastly, it's crucial to note the lack of spirometry results in patients' electronic health records. Under the assumptions proposed in other data noted in the background section of this study, the importance of lung function testing results to true classification may cause one to question the accurateness of even the classifications that were included in patient charts. If spirometry results are being collected, that information was not easily accessible in patients' charts.

ED visits for pediatric patients with asthma

Although 27 of 173 patient charts did contain information about ED visits, the purpose of the objective was to determine whether or not the proportion of classified patients had any correlation to the number of ED visits, which would provide some insight into proper disease management. With such a low percentage of patient charts containing adequate ED visit information, such inferences can not confidently be set forth.

Recommendations

Under the NHLBI's premise that accurate classification of asthma severity followed by appropriately prescribed treatment and adjustment of treatment upon analysis of disease control leads to optimal patient health outcomes, various recommendations should be implemented given the results discovered in this study.

The first recommendation that may aid in progress towards this goal is use of a standard form that can be either scanned into patient records or recreated as an electronic form. The recommendation for this form is made under the assumption that standardizing the way that information is obtained from patients and also the way a provider can interpret what's collected against NHLBI guidelines will reduce room for error when classifying asthma severity. An example of a form that can be implemented into the MWCHC system is included in Appendices C & D in both English and Spanish. Use of a standard form also eliminates the ambiguities with language that so often showed up in the patient chart review phase of this study by having patients circle options that directly align with the same language used to classify severity.

Next, providers can be more preemptive in input and upkeep of patient charts. Recognizing that time is often a major barrier, especially in community health center settings, another vouch for usage of the chart is the ease at which the chart can be interpreted and

scanned. Each question is directly taken from the classification guidelines chart provided by the NHLBI. Also, each response that the patient circles correlates directly with the proposed level of severity. Example: If a patient circles the fourth option for any category, the NHLBI suggests that this patient may classify as having Severe, Persistent asthma. The provider would essentially only have to search for the highest level reported by the patient and circle the classification level that corresponds to that, if time was of concern.

The last recommendation comes from observation of major difficulty locating patient information linked to Asthma in the electronic health records (EHR). It is a possibility that more patients had adequate information that would allow them to be classified, but this information was not readily assessable to the inquirer. There are also several pieces of patient information that are kept as hard copies instead of being transferred into the EHR. The major benefit of making use of the EHR is that multiple providers, students, and researchers can have access to the same patient information under the assumption that the EHR is providing a complete view of that patient's health experience.

Conclusion

Assessment of asthma severity is crucial in properly assessing a patient's experience of asthma and following up with the clinical decisions that will most likely lead to positive health outcomes for patients. This assessment should include careful analysis of symptom frequency, frequency of treatment, daily limitations, urgent care visits and lung function testing results in order for the most accurate evaluation. Aside from obtaining a patient's self report and performing appropriate lung function tests, the providers should also be sure to be consistent with patient data input into the electronic health records using a method that is standard and widely-accepted by all providers that may encounter said patient.

References

Bacharier, L. (2004). Classifying Asthma Severity in Children Mismatch Between Symptoms,

Medication Use, and Lung Function. *American Journal of respiratory and Critical Care

Medicine,* Vol. 170, No. 4, pp. 426-432.

Bureaus of Primary Health Care- BPHC (2012). Health Resources and Services Administration

Uniform Data System report 2012- Matthew Walker Comprehensive Health Center.

Centers for Disease Control and Prevention- CDC (2013). CDC/ National Center for Health

Statistics: Asthma. Retrieved from USA.gov.

US Depart of Health and Human Services: Centers for Disease Control and Prevention (2012).

Summary Health Statistics for US Children : National Health Interview Survey 2011,

Retrieved from http://www.cdc.gov/nchs/data/series/sr_10/sr10_254.pdf.

Fox, P. (2007). Improving Asthma-Related Health Outcomes Among Low-Income, Multiethnic,

School-aged Children: Results of a Demonstration Project That Combined Continuous

Quality Improvement and Community Health Worker Strategies. *Journal of the

American Academy of Pediatric.* Retrieved from

http://pediatrics.aappublications.org/content/120/4/e902.full.pdf.

Godfrey, S. (1985). What is Asthma? *Archives of Disease in Childhood.*

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1777622/pdf/archdisch00716-0009.pdf.

Halterman, J. (2002). Providers Underestimate Symptom Severity Among Urban Children With

Asthma. *Archives of Pediatrics and Adolescent Medicine/ JAMA Pediatrics.* Retrieved

From http://archpedi.jamanetwork.com/article.aspx?articleid=191527.

Lewis, CE. (1984). Children with Asthma: Randomized Trial for A.C.T. (Asthma Care

Training). Retrieved from

   http://www.cdc.gov/asthma/interventions/children_medicalclinics.htm.

National Asthma Control Initiative (2010). Asthma Guideline Implementation Steps and Tools

   (GIST). Retrieved from http://www.getasthmahelp.org/gist-asthma-guideline-

   implementation-steps-and-tools.aspx.

National Heart Lung and Blood Institute- NHLBI (2007). Guidelines for Diagnosis and

   Management of Asthma. Retrieved from

   http://www.nhlbi.nih.gov/guidelines/asthma/asthsumm.pdf.

Nguyen, B. (1996). Patients' Perceptions Compared with Objective Ratings of Asthma Severity.

   Elsevier: Annals of Allergy, Asthma and Immunology. Volume 77, Issue 3. Retrieved

   From http://www.sciencedirect.com/science/article/pii/S1081120610632577.

Stout, J. (2006). Classification of asthma severity in children: the contribution of pulmonary

   function testing. *Archives of Pediatrics and Adolescent Medicine/ JAMA Pediatrics.*

   Retrieved from http://archpedi.jamanetwork.com/article.aspx?articleid=205379.

APPENDIX A

FIGURE 14. CLASSIFYING ASTHMA SEVERITY AND INITIATING TREATMENT IN YOUTHS 12 YEARS OF AGE AND ADULTS

APPENDIX B

FIGURE 16. STEPWISE APPROACH FOR MANAGING ASTHMA IN YOUTHS ≥12 YEARS OF AGE AND ADULTS
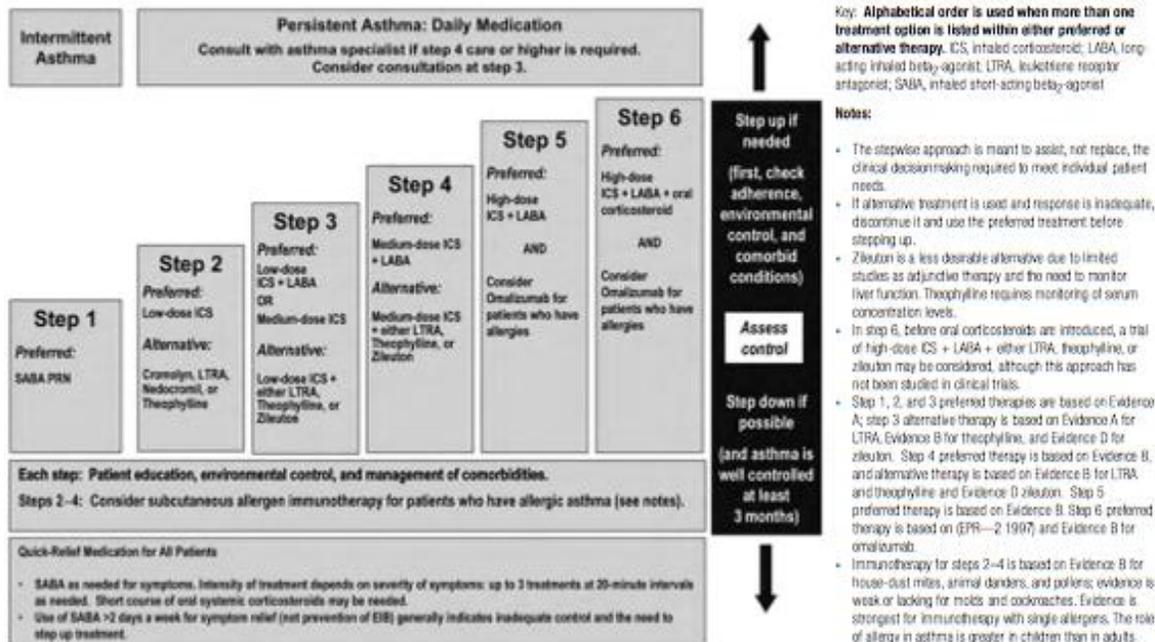
APPENDIX C

Asthma Severity Classification Form

For Pediatric patients not currently taking long-term control medications

Patient Name:	Today's Date (MM/DD/YY) _____ / _____ / _____	Date of Birth (MM/DD/YY) _____ / _____ / _____
Name of Provider for Today's Visit:	Primary Provider's Name:	

PARENT/CAREGIVER or PATIENT, please complete Question #1-5

1. In the past <u>week</u>, how frequently has the patient been experiencing symptoms?
   o Less than 2 days/week
   o More than 2 days/week but not everyday
   o Every Day
   o Several times during each day

2. In the past <u>month</u>, how often has the patient been unable to sleep due to symptoms?
   o Less than 2 times/month
   o About 3-4 times/month
   o More than 1 time/week during this month
   o Almost everyday of this month

3. In the past <u>week</u>, how frequently has the patient had to use an inhaler for symptom control (not including times when the patient was engaged in intense physical activity)?
   o Less than 2 days/week
   o More than 2 days/week but not every day
   o Every Day
   o Several times during each day

4. In the past <u>month</u>, how has asthma interfered with the patient's normal activity?
   o Patient has no limitations
   o There are minor limitations
   o There are some limitations
   o Patient is extremely limited

5. In the past <u>year</u>, how often has the patient had to visit the emergency room for urgent asthma-related symptoms? [*please write a number in the space provided*] _____

THE FOLLOWING SECTION WILL BE COMPLETED BY YOUR PROVIDER

6. Does the patient's medical record contain spirometry results taken in the last 6 months?
   o YES, patient's last spirometry results report FEV1/FVC: _____ **[Normal: FEV1/FVC= 85%]**
   o NO

7. If "No" for question 6, was lung function tested during today's visit?
   o YES, patient's spirometry results report FEV1/FVC: _____ **[Normal: FEV1/FVC= 85%]**
   o NO

Severity Classification

| Intermittent | Mild, Persistent | Moderate, Persistent | Severe, Persistent |

PLEASE REMEMBER TO SCAN THIS FORM INTO PATIENT'S CHART

APPENDIX D

Clasificación de severidad del asma

Para los pacientes pediátricos no está tomando medicamentos de control prolongado

Nombre del Paciente:	La fecha de hoy: (MM/DD/YY) _____ /_____ /_____	Fecha de nacimiento: (MM/DD/YY) _____ /_____ /_____
Nombre del proveedor de la visita hoy:	Nombre del proveedor primario:	

PADRE/TUTOR O EL PACIENTE, por favor complete Preguntas #1-5

1. La semana pasada, ¿con qué frecuencia ha sido el paciente experimenta los síntomas?
   - En menos de 2 días/semana
   - Más de 2 días/semana, pero no todos los días
   - Cada día
   - Varias veces durante cada día

2. En el último mes, ¿cuántas veces ha sido el paciente no podía dormir debido a los síntomas?
   - Menos de 2 veces al mes
   - Alrededor de 3-4 veces/mes 12
   - Más de 1 vez/semana durante este mes
   - Casi todos los días de este mes

3. En la semana pasada, ¿con qué frecuencia tiene el paciente tuvo que usar un inhalador para el control de los síntomas (no incluso en épocas cuando el paciente estaba participando en actividad física intensa)?
   - Menos de 2 días/semana
   - Más de 2 días de la semana pero no todos los días
   - Todos los días
   - Varias veces durante cada día

4. En el último mes, ¿cuántas tiene asma interfiere con la actividad normal del paciente?
   - Paciente no tiene limitaciones
   - Hay limitaciones leves
   - Hay algunas limitaciones
   - Paciente es extremadamente limitada

5. En el último año, ¿con qué frecuencia tiene el paciente tuvo que acudir a la sala de urgencias de urgencia relacionadas con el asma síntomas? [*Por favor, escriba un número en el espacio proporcionado*] _____

LA SIGUIENTE SECCIÓN SERÁ COMPLETADA POR EL PROVEEDOR

6. Does the patient's medical record contain spirometry results taken in the last 6 months?
   - YES, patient's last spirometry results report FEV1/FVC: _____ **[Normal: FEV1/FVC= 85%]**
   - NO

7. If "No" for question 6, was lung function tested during today's visit?
   - YES, patient's spirometry results report FEV1/FVC: _____ **[Normal: FEV1/FVC= 85%]**
   - NO

Severity Classification

Intermittent	Mild, Persistent	Moderate, Persistent	Severe, Persistent

PLEASE REMEMBER TO SCAN THIS FORM INTO PATIENT'S CHART