

## ASTHMA CLINICIANS WORK TOO HARD

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Most asthma clinicians work too hard. They could make their job easier by enlisting patients in their own care. After practicing pediatrics for 20 years, I spent 25 years developing materials and methods for improving asthma care. The 1997 Expert Panel Report (EPR-2) cited three of my books and displayed my diary and action plan. Expert Panel Report 3 (EPR-3)<sup>1</sup> states that patient education should occur at all points of care including clinic settings, Emergency Departments, hospitals, pharmacies, schools and patient homes. Thousands of professionals use my methods and materials in these venues to care for asthma more efficiently and effectively. They include:

- Asthma booklets
- Peak flow monitoring
- Asthma diaries
- Asthma action plans
- Asthma learning tools

**ASTHMA BOOKLETS.** When I published *One Minute Asthma: What You Need to Know* in 1991, Dr. Albert Sheffer, chair of the 1991 NHLBI Expert Panel on Asthma, called it "... accurate, clear and concise... an ideal guide for patients and parents starting to learn about asthma." The eighth edition, published in 2008, is the nation's most comprehensive and current asthma booklet. Sales in English and Spanish exceed 2,000,000 copies.

Clinicians can reduce their workload, increase patient satisfaction and increase their revenue by using *One Minute Asthma*. In 2001 I encouraged a pediatric group to use the booklet in the exam room and to assign reading between visits. This helped their patients learn more effectively and reduced the length of a 15-minute visit by three minutes. They calculated that this would enable them to increase their practice income by \$14,000 each year.<sup>2</sup>

After patients learn basic information from *One Minute Asthma* a professional can provide additional information that is specific to them or their child. For example, when you decide to prescribe an inhaled steroid during an office visit the patient doesn't realize that an inhaled steroid is the most effective medicine used to treat asthma. They may have heard that steroids can interfere with a child's growth in height or cause osteoporosis. They don't know that taking an inhaled steroid daily causes only a tiny fraction of the problems caused by oral steroids. They do not know that, if they decline to use inhaled steroids, their chance of needing treatment with an oral steroid will increase greatly.

A pediatrician can ask a parent to read one page about inhaled steroids in the exam room while he leaves to see another patient. When he returns he will have a much easier time discussing this complex subject. The same is true for other medicines and devices. There is a lot of detail to be covered when explaining the use of a peak flow meter, a holding chamber, a dry powder

inhaler or a compressor driven nebulizer. Each of these topics is covered in one or two pages of *One Minute Asthma*.

Reading in the waiting room can also streamline visits. I studied the use of *One Minute Asthma* in the waiting room of eight practices.<sup>3</sup> A receptionist gave the booklet to each new asthma patient. A label on the front cover directed them to read four pages describing asthma control, asthma medicines and changes in the airway during an episode. Patients who read these pages in the waiting room asked better questions and had a more focused visit than controls. This tactic increased office efficiency yet cost no money or staff time.

**PEAK FLOW MONITORING.** The peak flow score<sup>4</sup> is an objective measure of airflow. It is the fastest speed at which the patient can blow air out. Peak flow can be measured with a small handheld meter. It frequently detects a drop in airflow before a doctor can hear a wheeze with a stethoscope, adding important objective information to the history and physical exam. I have used a peak flow meter for more than 25 years to monitor and treat asthma in the office and at home. Instructions are:

- Move the pointer to zero.
- Stand up, hold the meter straight.
- Open your mouth wide and slowly breathe in as much air as you can.
- Place the mouthpiece FLAT on your tongue.
- Close your lips snugly around it.
- Blow out as hard as you can.
- Move the marker to zero.
- Wait at least 15 seconds and then blow again.
- Record the best of three tries.

You can use peak flow scores to guide treatment with nebulized albuterol in your office. The score will increase as the child improves. The change is obvious. A stethoscope will not give the same clear-cut information because wheezing may decrease as the airways open OR as they close. You should check peak flow five minutes after each albuterol treatment to assess progress and 30 minutes after the final treatment to make sure that the improvement is sustained.

A peak flow score will be falsely high if patients block airflow with their lips, their tongue or their glottis. When the block is removed, air will shoot out under high pressure.<sup>5</sup> The “spit” or the “peashooter” technique can raise peak flow by 300 points over the score obtained using proper technique. Six subjects blew peak flow with each of 10 different peak flow meter brands using the spit and peashooter maneuvers. When they used improper technique all increased their peak flow scores by 100 to 300 liters/min. in at least eight of ten brands (Plaut, TF. personal observation).

When a patient, who was previously able to blow a normal score, blows a very low score or is unable to move the marker, she may have a very serious problem. Never blame a low score on poor technique or effort. You should be able to correct her technique on the next blow. If the

score doesn't increase, the patient's condition may be worse than you think. You may be dealing with fatigued respiratory muscles, a life threatening emergency.

All of my patients age five and over check their peak flow at home. The personal best score is the reference point for making treatment decisions. It is the highest score a patient can blow when:

- they are having no sign or symptom of asthma,
- have taken a moderate dose of an inhaled steroid and other needed medicines for two months, and
- their scores have stayed at their highest level for a week.

Patients can usually establish their personal best within a month of full treatment with an inhaled steroid. Before that time I use their highest score or a predicted score from a table of averages, whichever is higher. I adjust the personal best score whenever the patient blows a higher score on two different days. A child's personal best increases with growth in height.

The instructions for establishing the personal best in EPR-3 and many other publications are flawed. EPR-3 identifies the personal best as the "highest peak flow number you can achieve over a two week period when your asthma is under good control. Good control is when you feel good and do not have any asthma symptoms."<sup>6</sup> However, some people can not notice symptoms when their airflow is significantly reduced. Fifteen percent of 82 patients in one study were not able to sense a reduction in airflow unless it was greater than 50 percent of their predicted value.<sup>7</sup> A study of treated hospitalized patients found that they were not able to feel symptoms when their pulmonary function was 50 percent of predicted.<sup>8</sup> An asthma action plan based on a falsely low personal best may lead to tardy or inadequate treatment.

**ASTHMA DIARIES.** An asthma peak flow diary (see Fig.4) gives the clinician and the patient or parent a good understanding of recent history. You can scan a two-week record in about two minutes. My patients often bring in diaries spanning several months. The information recorded in the Pedipress Asthma Peak Flow Diary is more accurate and detailed than a patient can recall or than can be recorded in any other diary. If they pay attention to these details, clinicians can provide better care. Parents and patients use the diary to learn about asthma and to guide their treatment at home. A combination of five design features is unique to the current Pedipress Asthma Peak Flow Diary.<sup>9</sup>

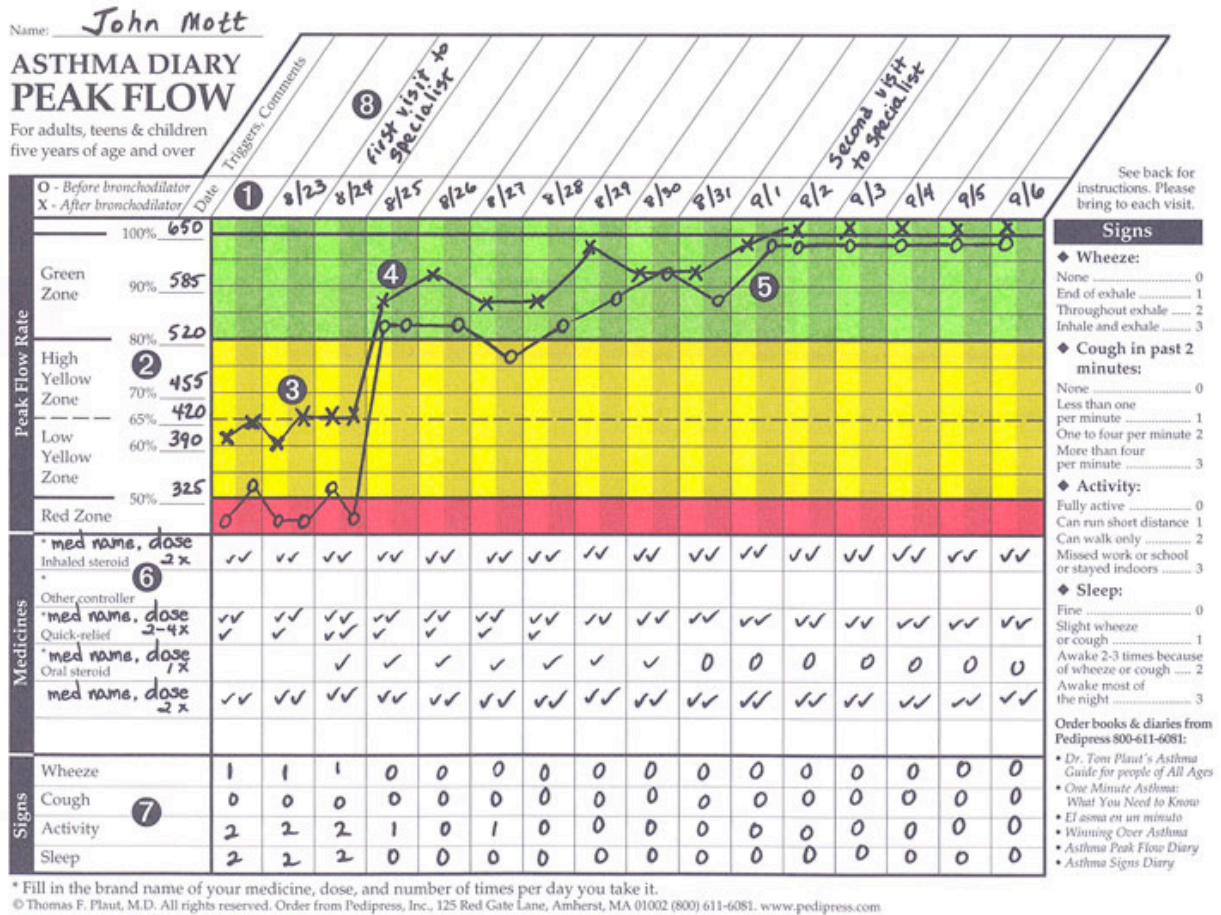
- The graphic format displays trends based on the personal best. This is easier to analyze than a series of numbers.
- Two yellow zones identify mild and moderate episodes
- There is ample space to record signs
- Relationships among triggers, medicines, peak flow and signs are easy to see.
- Colored zones highlight the change from one treatment zone to another.

The four zones noted on the diary are:

- Green zone, 80-100 percent of the personal best. This indicates that current treatment is adequate.
- High yellow zone, 65-80 percent of the personal best. This indicates a mild episode
- Low yellow zone, 50-65 percent of the personal best. This indicates a moderate episode.
- Red zone—less than 50% of the personal best. This indicates the need for emergency treatment.

Figure 1. The Asthma Peak Flow Diary

**SAMPLE DIARY:**



The sample Asthma Peak Flow Diary displayed above and in *One Minute Asthma*<sup>10</sup> shows a patient who has a personal best peak flow of 650. The top of his high yellow zone is 520. The top of his low yellow zone is 420 and the top of his red zone is 325. Peak flow scores before bronchodilator are recorded with a 0. The scores after albuterol are marked with an X. When you connect the 0s or the Xs you can see a trend. The name and dose of each medicine are entered in the left column. A check mark indicates that a dose has been given. The scores of the asthma signs should be consistent with the peak flow score. If not, you need to determine the reason.

My patients record their peak flow, signs, medicines, triggers and notable events (such as an upper respiratory infection, exposure to tobacco smoke or a trip to the zoo) each morning until they have been in the green zone for two months. They continue recording daily if the diary helps them manage their asthma or because it reminds them to take their medicines or identify triggers, otherwise they stop. They restart recording when they have any sign or symptom of asthma, at the first sign of a cold, when they enter a threatening area, go on vacation and for the week before they see me. They usually record data in their diaries less than 30 days each year.

Fifteen years ago I was invited to speak about the use of peak flow and asthma diaries to the allergy staff at a major teaching hospital. Most physicians in the room knew more about asthma than I did. One allergist asked me how many of my patients keep a diary. "All of them," I answered. "How do you make them keep a diary?" he asked. I told him that I couldn't make my patients do anything. They use a diary because they find it helps them increase their understanding of asthma. Coupled with an asthma action plan, the diary enables them to treat most episodes at home.

Many doctors say that their patients won't keep a diary. Is it possible that these doctors:

- fail to point out the benefits of using a diary,
- fail to look at the diary sheet that the patient brings in,
- fail to use the data in the diary to increase the patient's understanding or
- fail to relate the data in the diary to an action plan?

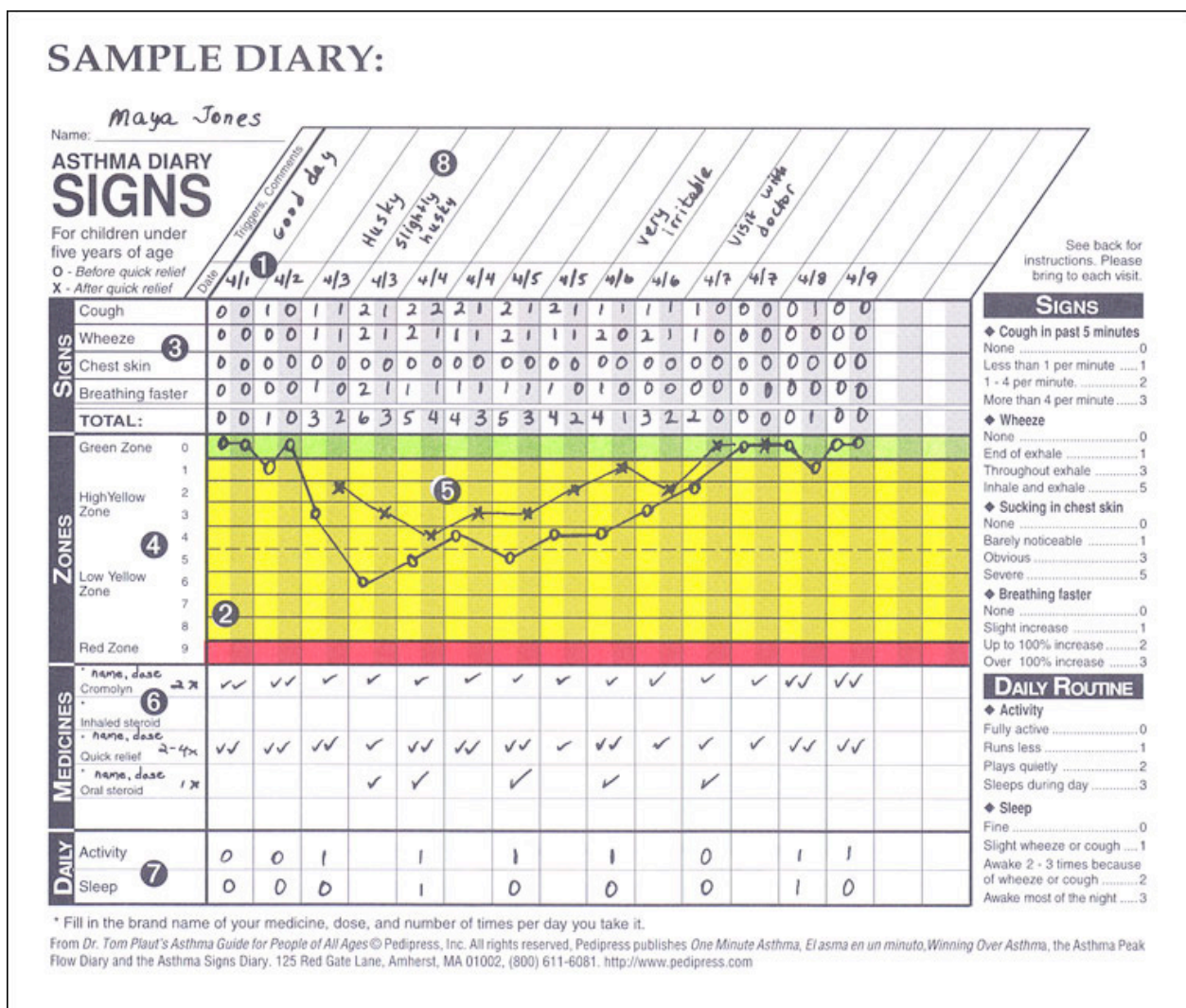
A diary is an extremely helpful tool as physicians partner with patients in their care. The 1997 *NHLBI Guidelines for the Diagnosis and Management of Asthma* displayed a single diary.<sup>11</sup> That diary was first published in my book, *Children with Asthma: A Manual for Parents*.<sup>12</sup> The current EPR-3<sup>13</sup> notes that "Patients detailed recall of symptoms decreases over time, therefore the clinician may choose to assess over a 2-week, 3-week, or 4-week recall period." EPR-3 mentions a diary on six separate pages but doesn't display one or mention that patients who keep a diary have far better recall than those who don't. Pedipress diaries have been translated into Spanish, depicted in several articles<sup>14,15,16,17,18,19</sup> and books<sup>20,21,22</sup> and purchased for use by thousands of professionals.

**ASTHMA SIGNS DIARY.** Patients less than five years of age can't blow a consistent peak flow. I developed the Asthma Signs Diary (see Fig 2) to help parents of young children learn about asthma and manage episodes at home. Signs are more accurate and reliable markers than symptoms. They are objective and can be scored by an observer using a precise scale. In constructing the Asthma Signs Diary, I chose signs that are common, appear early, change with the worsening or improvement of an episode and are easy to score. They are cough, wheeze, sucking in the chest skin and increase in breathing rate. Please see the scoring system on the right side of the Asthma Signs Diary.<sup>23</sup>

A total signs score between 1 and 4 falls in the High Yellow Zone (mild episode); a total between 5 and 8 is in the Low Yellow Zone (moderate episode) and 9 or over is in the Red Zone (severe episode).

EPR-3 notes "It is often difficult for physicians and parents to assess the severity of an asthma episode in an infant or a young child."<sup>24</sup> This statement is true if these physicians and parents don't know how to score the four signs of asthma. Once they learn, they can easily assess the severity of an episode. To prove this, try to score a young child who is: coughing twice a minute, wheezing throughout exhale, sucking in the chest skin slightly and has a slight increase in breathing rate. It is not difficult to calculate that the total score is seven, which places him in the low yellow zone.

Figure 2. The Asthma Signs Diary



Parents need to know how to assess their infant or young child in order to start treatment early. They need guidance from their doctor as they learn. This knowledge is particularly important because infants and young children:

- don't complain,
- can't describe their symptoms and
- get into trouble more quickly because they have small airways.
- are not old enough to use a peak flow meter.

**ASTHMA ACTION PLANS.** A good asthma action plan<sup>25</sup> (See figures 3 and 4) will tell patients and parents what to do in every asthma situation. When to:

- reduce activity,
- change medicine dose,
- add a medicine,
- call the doctor and
- go to the ER.

The plan should be clear enough so that patients and parents will rarely need to call for advice between visits. It can be based on peak flow scores or the four signs of asthma.<sup>26</sup> Each plan calls for early action at each level of an episode's severity. You can download and customize these plans from [www.pedipress.com](http://www.pedipress.com) for use in your office.

Figure 3. The Peak Flow Asthma Action Plan

**ASTHMA ACTION PLAN – PEAK FLOW**  
**For Adults, Teens and Children Age 5 and Over**  
**Do not guess. Call the doctor if you have any question about this plan.**

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Best Peak Flow: \_\_\_\_\_

GREEN	<p><b>GREEN ZONE: Peak flow score between _____ and _____.</b></p> <ul style="list-style-type: none"> <li>• Fully active.                             <ul style="list-style-type: none"> <li><input type="checkbox"/> Quick relief medicine (med) _____ : <u>1 or 2</u> puffs 15 minutes before exercise.</li> </ul> </li> <li>• Med to be taken every day:                             <ul style="list-style-type: none"> <li><input type="checkbox"/> Inhaled steroid _____ : _____ puffs using a holding chamber.                                      OR as a dry powder: _____ inhales _____ times a day.</li> <li><input type="checkbox"/> Other _____ : _____.</li> <li><input type="checkbox"/> Other _____ : _____.</li> </ul> </li> </ul>
HIGH YELLOW	<p><b>HIGH YELLOW ZONE: Peak flow score between _____ and _____ . OR if any cough, wheeze or sign of a cold.</b></p> <ul style="list-style-type: none"> <li>• Avoid triggers. No hard exercise.</li> <li>• Meds to be taken:                             <ul style="list-style-type: none"> <li><input type="checkbox"/> Quick relief med: _____ puffs _____ to _____ times in 24 hours.* Take it until your peak flow is in the Green Zone for two days.</li> <li><input type="checkbox"/> Keep taking your other Green Zone meds.</li> <li><input type="checkbox"/> Add: _____.</li> </ul> </li> </ul> <p><small>* Start the Low Yellow Zone plan if you need to give quick relief med six times in a day.</small></p>
LOW YELLOW	<p><b>LOW YELLOW ZONE: Peak flow score between _____ and _____.</b></p> <ul style="list-style-type: none"> <li>• Take 4 puffs of quick relief med.</li> <li>• Check your peak flow again in 10 minutes. If your score has increased into the High Yellow Zone, stay with that plan. Check your peak flow every 1 to 2 hours.</li> <li>• If your score stays in the Low Yellow Zone, or falls back into it in less than 4 hours, <b>you are stuck</b>. Follow the Low Yellow Zone plan (below):                             <ul style="list-style-type: none"> <li><input type="checkbox"/> Keep treating with High Yellow Zone meds as above.</li> <li><input type="checkbox"/> Add oral steroid _____ mg right away. Take daily until peak flow scores are in the Green Zone for at least 24 hours.</li> <li><input type="checkbox"/> Please call the office before starting oral steroid.</li> </ul> </li> </ul> <p><b>You should improve within two days of treatment and reach the green zone within five days. See your doctor if your progress is slower.</b></p>
RED	<p><b>RED ZONE: Peak flow score less than _____.</b></p> <ul style="list-style-type: none"> <li>• Take 4 puffs of quick relief med right away.</li> <li>• Take oral steroid _____ mg right away.</li> <li>• Check your peak flow again in 10 minutes.</li> <li>• If your peak flow score reaches the Low Yellow Zone, follow that plan. Check your peak flow every 1 to 2 hours.</li> <li>• If your peak flow stays in the Red Zone, or falls back into it within 4 hours, see your doctor or <b>GO TO THE E.R. RIGHT AWAY.</b></li> </ul>

Doctor \_\_\_\_\_ Parent or Patient \_\_\_\_\_

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Figure 4. The Signs Asthma Action Plan

**ASTHMA ACTION PLAN — SIGNS (For Children Under Age 5)**

Do not guess. Call the doctor if you have any question about this plan.

Name: \_\_\_\_\_

Date: \_\_\_\_\_

<b>GREEN</b>	<p><b>GREEN ZONE: No cough, wheeze, breathing faster or sucking in of the chest skin.</b></p> <ul style="list-style-type: none"> <li>Fully active.</li> <li><input type="checkbox"/> Quick relief medicine (med) _____ : <u>1 or 2</u> puffs 15 minutes before exercise.</li> <li>Medicine (med) to be taken every day:                     <ul style="list-style-type: none"> <li><input type="checkbox"/> Inhaled steroid _____ : _____ puffs times a day using a holding chamber with mask OR _____ ampules _____ times a day by mist machine.</li> <li><input type="checkbox"/> Other _____.</li> </ul> </li> </ul>	<p>Action Plan based on total score of all 4 signs:</p> <p><b>Cough:</b></p> <p>None ..... 0                  Less than 1 per minute ..... 1                  1 - 4 per minute ..... 2                  More than 4 per minute ..... 3</p> <p><b>Wheeze:</b></p> <p>None ..... 0                  End of exhale ..... 1                  Throughout exhale ..... 3                  Inhale and exhale ..... 5</p>
<b>HIGH YELLOW</b>	<p><b>HIGH YELLOW ZONE: Total asthma sign score 1 to 4. Measure this before giving quick relief medicine.</b></p> <ul style="list-style-type: none"> <li>Avoid triggers. No hard exercise.</li> <li>Meds to be taken:                     <ul style="list-style-type: none"> <li><input type="checkbox"/> Quick relief med: _____ Give _____ puffs _____ to _____ times in 24 hours.*</li> <li><input type="checkbox"/> Keep treating with Green Zone meds as above.</li> <li><input type="checkbox"/> Add: _____ : _____.</li> </ul> </li> </ul> <p>*Start the Low Yellow Zone plan if you need to give quick relief med six times in a day.</p>	<p><b>Sucking in the chest skin:</b></p> <p>None ..... 0                  Can hardly see ..... 1                  Easy to see ..... 3                  Severe ..... 5</p> <p><b>Breathing faster:</b></p> <p>None* ..... 0                  A little ..... 1                  Some ..... 2                  Double usual rate ..... 3</p> <p>*Use 25 breaths per minute until you learn your child's normal rate.</p>
<b>LOW YELLOW</b>	<p><b>LOW YELLOW ZONE: Total asthma sign score 5 to 8.</b></p> <ul style="list-style-type: none"> <li>Give quick relief med _____ puffs using a holding chamber with mask OR one ampule by mist machine.</li> <li>Check your child's total signs score again after 10 minutes. If it reaches the High Yellow Zone, follow that plan. Check the signs score every 1 to 2 hours.</li> <li>If the score stays in the Low Yellow Zone, or falls back into it in less than 4 hours, add:                     <ul style="list-style-type: none"> <li><input type="checkbox"/> Oral steroid _____ mg, _____ cc right away. Give once daily until signs score, when not taking quick relief med, is _____ for at least 24 hours.</li> <li><input type="checkbox"/> Add: _____ : _____.</li> <li><input type="checkbox"/> Please call the office before starting oral steroid.</li> </ul> </li> </ul> <p>Your child should improve within two days and reach the green zone within five days. See your doctor if your child's progress is slower.</p>	
<b>RED</b>	<p><b>RED ZONE: Total asthma sign score 9 or more.</b></p> <ul style="list-style-type: none"> <li>Give quick relief med _____ puffs using a holding chamber with mask OR one ampule by mist machine.</li> <li>Give oral steroid _____ mg, _____ cc right away.</li> <li>Check your child's total asthma signs score again in 10 minutes.</li> <li>If your child reaches the Low Yellow Zone, follow that plan. Check signs scores every 1 to 2 hours.</li> <li>If your child is still in the Red Zone, or falls back into it in less than 4 hours, visit your doctor OR <b>GO TO THE E.R. RIGHT AWAY.</b></li> </ul>	

Doctor \_\_\_\_\_ Parent or Patient \_\_\_\_\_

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A basic asthma action plan for persistent asthma<sup>27</sup> may include the following:

- Green zone (maintenance): Take an inhaled steroid or other controller daily. Take albuterol before strenuous exercise or when in contact with a trigger.
- High yellow zone: Avoid triggers, give albuterol one to five times a day as needed, start an inhaled steroid or quadruple the current dose.
- Low yellow zone: Continue high yellow zone medicines. Give four puffs of albuterol to see if peak flow or signs will enter the high yellow zone and stay there for four hours. If not the patient is stuck and needs to start prednisone.
- Red zone: If patient is stuck in red zone after four puffs of albuterol, give a dose of prednisone and go to ER.

If signs or symptoms occur when peak flow is in green zone, either the personal best has been set too low or the small airways are inflamed. The latter does not reduce peak flow. In either case the parent should follow the high yellow zone plan. The personal best should then either be confirmed or recalculated.

### **ASTHMA LEARNING TOOL (ALT)**

I designed this tool to help allied health professionals learn basic facts about asthma. The ALT is free, effective and takes 30 to 90 minutes. More than 200 nurses, student nurses, school nurses, pharmacists and respiratory therapists have downloaded the ALT from [www.pedipress.com](http://www.pedipress.com) or received a hard copy from a colleague or an instructor. They answered 40 questions and then looked up the answers in *One Minute Asthma*. The median time for answering the questions was 30 minutes and for looking up the answers was 20 minutes. Ninety-eight percent said it was worth the time they spent. Almost all named at least one thing they learned that would help them teach others to care for asthma.

Practices that ask staff to use the words and concepts in the ALT and *One Minute Asthma* improve communication among staff and with their patients. Use of several terms with the same meaning often causes confusion. For example, there are at least eight terms for albuterol: quick relief, reliever, rescue, fast acting beta-agonist, quick acting beta agonist, short acting beta agonist, Proventil and Ventolin. Patients who hear more than one term for albuterol may think that they are different medicines. They may think that one clinician is changing the medicine that another prescribed.

### **SUMMARY**

Many health professionals say that they don't have the time they need to provide patient education. In fact, taking the time to educate patients will save time in the long run. Health professionals can use five simple tools to improve the efficiency and effectiveness of their asthma care.

- Ask patients and parents to read a page or two from an accurate and current asthma book in the exam room, the waiting room and between visits. They will ask better questions and have a more focused visit.

- Teach patients and parents how to use a peak flow meter to learn about and monitor their asthma. This will help them to start treatment early and avoid severe episodes.
- Teach patients and parents how to use a comprehensive asthma diary. This tool will help them communicate face to face and by phone.
- Use four-zone asthma plans based on peak flow or asthma signs scores to guide treatment in the office and at home.
- Employ the free Asthma Learning Tool to increase staff knowledge and improve the consistency of communication in a practice.

Professionals who use these tools are able to provide more effective care, increase patient satisfaction and boost practice revenue.

## Endnotes

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- 1 EPR-3: Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma. 2007, NIH Publication Number 08-5846. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.htm>. Accessed July 27, 2009.
- 2 Plaut, TF, Hartman, L. Asthma distance learning program for staff increases practice effectiveness and revenue. *Annals of Asthma Allergy and Immunology*. 2003. Vol. 92, Jan. 2004, No. 1, pages 109-110
- 3 Plaut, TF. Asthma Education in the Waiting Room. *Annals of Asthma Allergy and Immunology*. Vol. 90, No. 1, Jan. 2003, page 141
- 4 Ibid. 28-31.
- 5 Strayhorn V, Leeper, K, Tolley E, Self T. Elevation of Peak Expiratory Flow by a "Spitting" Maneuver. *CHEST*. 1998:1134-46.
- 6 National Institute of Health Publication. EPR-3: Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma. 2007:122. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.htm>. Accessed July 2, 2009.
- 7 Perception of Asthma. Rubinfield, AR. Pain, MC, *Lancet*. 1976 Apr 24;1(7965):882-4.
- 8 Acute bronchial asthma. Relations between clinical and physiologic manifestations. McFadden ER Jr, Kiser R, DeGroot WJ. *N Engl J Med*. 1973 Feb 1;288(5):221-5.
- 9 Plaut, TF. *One Minute Asthma: What You Need to Know*, 8<sup>th</sup> ed. Amherst, MA. Pedipress; 2008:32.
- 10 Ibid. 34.
- 11 EPR-2: Expert Panel Report 2: Guidelines for the Diagnosis and Management of Asthma. 1997. NIH Publication No. 97-4051. p 37.
- 12 Plaut, TF. *Children with Asthma: A Manual for Parents*. Amherst, MA. Pedipress, 1985.

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- 13 EPR-3: Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma. 2007, NIH Publication Number 08-5846. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.htm>. Accessed July 27, 2009.
- 14 Plaut TF. The peak flow diary: A powerful tool for asthma management, *Contemporary Pediatrics*, 1993; 10:61.
- 15 Plaut, TF. The Peak Flow Diary, *American Journal of Asthma & Allergy for Pediatricians*, 1994; 7:37-39.
- 16 Plaut, TF. Asthma Peak Flow Diary Improves Care" (letter) *Annals of Allergy, Asthma, & Immunology*, 1996; 76:476-8.
- 17 Plaut, TF. The Peak Flow Diary, *American Journal of Asthma & Allergy for Pediatricians*, 1994; 7:37-39.
- 18 Plaut, TF. Managing Asthma Care, *American Journal of Managed Care*, 1997; 3:485-490.
- 19 Plaut, TF. A Systems Approach to Asthma Care, with Howell T, Walsh S, Pastor M, Jones T, *Managed Care Quarterly*, 1996; 4:6-18.
- 20 Bierman WC, Pearlman DS, Shapiro GG, Busse WW. *Allergy, Asthma, and Immunology from Infancy to Adulthood*. Philadelphia, PA. WB Saunders; 1996:277.
- 21 Berkowitz, Carol D. *Pediatrics: A Primary Care Approach*. Philadelphia, PA. WB Saunders; 2000:270
- 22 Govias, G, Mitchell I. *Asthma Education: Principles and Practices*. Edmonton, Alberta. The Asthma Education Clinic; 2005:245.
- 23 Plaut, TF. *One Minute Asthma: What You Need to Know*, 8<sup>th</sup> ed. Amherst, MA. Pedipress, Inc; 2008:42.
- 24 National Institute of Health Publication. EPR-3: Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma. 2007:392. Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.htm>. Accessed July 2, 2009.
- 25 Plaut, TF. *One Minute Asthma: What You Need to Know*, 8<sup>th</sup> ed. Amherst, MA. Pedipress, Inc; 2008:30.
- 26 *ibid*.42
- 27 *ibid*.40