Case Report

Asthma — Examples from Practice

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Abstract

Asthma is the most common chronic disease of childhood with increasing prevalence particularly in children. Many guidelines, especially Global Initiative for Asthma (GINA) and Practical Allergology (PRACTAL) have had a great impact on improvement in diagnostic and treatment of asthma in children. In children, as in adults assessment of asthma symptom control is based on symptoms, activities limitation and use of rescue medication. We present six children with different problems in asthma treatment in attempt to help primary care physician to identify possible options for care improvement of this population.

INTRODUCTION

Asthma is the most common chronic disease of childhood. Generally, the prevalence of asthma is increasing, particularly in children [1]. In Croatia asthma prevalence is high. It affects 5% of general population (220,000 people) and approximately 80-100,000 children. In Primorje - Gorski Kotar County in west Croatia high increase in asthma prevalence have been detected, from 8.4% in 2001 – 2002 to 14.2% in 2009-2010 [2]. High asthma prevalence is related with urban lifestyle (air pollution, smoking, overweight etc.). Many guidelines, especially Global Initiative for Asthma (GINA) and Practical Allergology (PRACTAL) have had a great impact on improvement in diagnostic and treatment of asthma in children. Finally good asthma control results in avoidance of chronic lung damage and better long term outcomes [3,4]. Why then despite wide accessibility of guidelines, different medication strategies and highly developed primary and secondary health care system we still have prominent number of children with inadequate threatened and uncontrolled asthma who aren’t supervised by pulmonology and allergology specialist? I hope that examples from my practice will resolve some of this questions.

What is recommended by guidelines?

GINA in Chapter of Assessment of asthma advises to assess:

1. symptom control
2. Future risk of adverse outcomes together with assessment of treatment issues: correct inhaler technique, adherence (previously compliance), side effects and comorbidities [4].

Assessment of the patient’s asthma control level is made individually.

Patient with one risk factor, for example good symptom control but risk for future exacerbations because of severe exacerbation in last year, request different treatment approach [4].

In children, as in adults assessment of asthma symptom control is based on symptoms, activities limitation and use of rescue medication. Many children with poor controlled asthma avoid exercise so their asthma seems to be good controlled. This lack of physical activities in young age can lead to obesity. In process of asthma assessment it is necessary to include parents because of different problem perception. Parents may report irritability, tiredness and mood changes in uncontrolled asthma [4].

There are several asthma control scores for the children:

- Childhood Asthma Control Test (c-ACT), with questions for parents and children [5]
- Asthma Control Questionnaire (ACQ) [6].

These test results may correlate in some extend with each other and with GINA classification of symptoms control (Table 1) [4].

CROATIAN CHILDREN HEALTH CARE

According to Croatian Ministry of Health legislation
pediatrician are responsible for health care of infants, children, and adolescents (the age limit ranges from birth up to 18 years of age). In parts of country were pediatricians are not available, general practitioners or family care physicians (Primary Care Physicians – PCP) provide healthcare for the children. Contracting model between pediatricians in primary care system and Croatian Health Insurance Fund (CHIF) allowe pediatricians to provide healthcare for 1190 children under age of 7, and expectionally for school children (age 7 to 18) if there is not enough children under age of 7 [7]. In practise CHIF make contract for health insurance for 300 children between age 7 and 18 and that is a total of 1500 children. There is almost always children who can’t be in care of pediatricians because contracted limits are exceed and they are in care of PCP, due to UNICEF’s (United Nations International Children’s Emergency Fund) Croatia data in whole country approximately 500 000 school children and adolescents [8].

There is a question of competency and healthcare quality provided to children by PCP. Pediatrician specialization duration in Croatia is 5 years, and PCP education in pediatrition is about 3 moths [9,10]. There is a strong recomendation of Croatian Pediatric Society that children under age of 18 must be under pediatrician’s care because they are most educated and competent in providing children healthcare. Recent political tendency in Croatia is to dismiss pediatricians form Primary Health Care (PHC). Croatian Society for Paediatric Pulmonology was discussing about this problem on XXVIII Meeting in Sinj (8th to 10th May, 2015) and decide to conduct survey about education and competency of PHC Physicians (Pediatricians and PCP) that

### Table 1: GINA assessment of asthma control in adults.

<table>
<thead>
<tr>
<th>A. Asthma symptom control</th>
<th>Level of asthma symptom control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Well</td>
</tr>
<tr>
<td>In the past 4 weeks, has the patient had:</td>
<td></td>
</tr>
<tr>
<td>Daytime asthma symptoms</td>
<td></td>
</tr>
<tr>
<td>more than twice/week?</td>
<td>Yes/No</td>
</tr>
<tr>
<td>Any night waking due to asthma?</td>
<td>Yes/No</td>
</tr>
<tr>
<td>Reliever needed for symptoms* more than twice/week?</td>
<td>None 1-2 3-4 of these of these</td>
</tr>
<tr>
<td>Any activity limitation due to asthma?</td>
<td>Yes/No</td>
</tr>
</tbody>
</table>

### B. Risk factors for poor asthma outcomes

Asses risk factors at diagnosis and periodically, particularly for patients experiencing exacerbations. Measure FEV1 at start of treatment, after 3-6 months of controller treatment to record the patient’s personal best lung function, then periodically for ongoing risk assessment.

Potential modifiable independent factors for flare-ups (exacerbations)

- Uncontrolled asthma symptoms [8]
- Excessive SABA use (>1 x 200-dose canister/month) [9]
- Inadequate ICS: not prescribed ICS; poor adherence [10]; incorrect technique [11]
- Low FEV1, especially if <60 % predicted [12,13]
- Major psychological or socioeconomic problems [14]
- Exposure: smoking [13], allergen exposure if sensitized [13]
- Comorbidities: obesity [15], rhinosinusitis [16], confirmed food allergy [17]
- Sputum or blood eosinophilia [18,19]
- Pregnancy [20]

Other major independent risk factors for flare-ups (exacerbations)

- Ever intubated or in intensive care unit for asthma [21]
- ≥1 severe exacerbation in last 12 months [22]

Having one or more of these risk factors increases the risk of exacerbations even is symptoms are well controlled.

Risk factors for medication side – effects

- Systemic: frequent OCS; long - term, high dose and/or potent ICS; also taking P450 inhibitors [27]
- Local: high - dose or potent ICS [27,28]; poor inhaler technique [29]

**Abbreviations**: FEV1: forced expiratory volume in 1 second; ICS: inhaled corticosteroid; OCS: oral corticosteroid; P450 inhibitors: cytochrome P450 inhibitors such as ritonavir; itraconazole, ketoconazole; SABA: short-acting beta2 agonist.

* Excludes reliever taken before exercise.
will be the base in their efforts to Croatian Ministry of Health for improving quality of their education.

**PRACTICAL PROBLEMS**

Croatian Society for Preventive and Social Pediatric Report from April 2014 emphasis need for increased responsibility of primary care medical personnel forward to health quality improvement. Primary care physician is obligated to continuous medical education and certificates of medical education are requested every 6 years for relicensing to Croatian Medical Chamber. At same time physician is fully independent in his work and without medical supervising. Unfortunately, in our practise, we are still witnessing underdiagnosed, undertreated and uncontrolled child with asthma. Explanation given to parents usually are: “there is no need for further diagnosis because child will be treated with same medication anyway and eventually overgrowth sickness”. Usually they seek help from Allergology and Pulmology specialist in the age of 14, or before when they change primary care doctor from Pediatrician to Family Care physician. Often we see patients, never properly diagnosed, from our city treated asthma with antibiotics, parenteral corticosteroid and SABA inhalation. It is question of medical responsibility of their Pediatrician. How can we stimulate them to accept current guidelines in diagnosis and treatment of child with asthma. Patient - doctor relationship is very fragile and based on trust. It starts with child and parents (or other family members) education about asthma. Satisfied interaction between physician and patient will result in preventive and therapeutic measures success. Patient decision to cease medical treatment or to 'step down' asthma medication is usually result of communication problem with physician. That situation is unfortunately no good base for alternative, nonconventional treatments.

**Patient 1**

M. S., twelve-year-old girl was diagnosed asthma and atopic rhinitis from young age. Symptoms were cough, dyspnea during exercise and weather changes... Skin prick test was positive rhinitis from young age. Symptoms were cough, dyspnea during... Patient will result in preventive and therapeutic measures education about asthma. Satisfied interaction between physician and patient will result in preventive and therapeutic measures success. Patient decision to cease medical treatment or to ‘step down’ asthma medication is usually result of communication problem with physician. That situation is unfortunately no good base for alternative, nonconventional treatments.

**Patient 2**

T. Ij. 7 - years old boy, previously controlled in our Allergologic Practise because of atopic dermatitis, atopic rhinitis and asthma. He was allergic to house dust mite and weed pollen (IgE: 1606 kU/L, specific IgE: D.P. (d1): class 3 (12.9 kU/L), secale cereale (g6): class 2 (2.47 kU/L), ECP: 48.8 µg/L (normal < 15.6). Spriometry: moderate mixed ventilation disturbance with positive post bronchodilator test. Treatment with low dose inhaled corticosteroid (ICS, fluticason propionat a 50 µg 2 x 1 breaths trow spacer) stopped symptoms. Parents reported exacerbation after every interruption of ICS advised by Pediatrician because of „corticosteroid noxiousness”. Further treatment was discus fluticason propionat a 100 µg: 1 breath in the evening. A significant proportion of parents whose children were on inhaled prophylaxis had concerns towards the use of inhaled therapy, especially ICS [33]. Eduaction of these parents are essential for asthma control improvement.

**Patient 3**

I. P., 16 – years old boy, from early childhood treated because of asthma, atopic rhinitis and pectus infundibuliforme. He was allergic to weed pollen and house dust mites verified with skin prick test, IgE and specific IgE. Repeated spirometry revealed moderate obstruction with positive post bronchodilator test, FeNO was 53.11 ppb (Figure 2). Attempting to find a cause why doubling a dose of combination medicine (fluticason propionat 100 µg/salmeterol 50 µg) didn’t stopped asthma exacerbation we were astounded because our patient start smoking! Metacholine bronchoprovocation test (BTM) showed noticeable bronchial hyperreactivity (BH): PD20FEV1 < 0.0042 µg cumulative (normaly >1400 µg) [34]. Mother confessed ignoring measures of allergen avoidance (carpets and curtains are still in boys bedroom). Without planned patients and parents education about allergen and irritance avoidance, active and passive smoking and indispensable longterm antiinflamantory treatment necesser for bronchial hyperreacticity normalisation it will be impossible to achieve goals of asthma control.

**Patient 4**

D. G., 11 – yeras old girl with positive family history for atopy (uncle, grandfather and great grandfather were asthmatic) and diagnosed asthma and atopic rhinitis was allergic to house dust mite and olive tree pollen. IgE: 1566 kU/L, specific IgE: D. P. (>100 kU/L), ECP >200 µg/L Dünger 1000; 840; 710 eq/mm³, nose smear: 4 - 6 eosinophils. Spirometry was normal except mild obstructive airflow disturbances with striking bronchodilator test (BT) of bronchial reversibility with salbutamol (Figure 1). Other diagnostic tests were recommended (IgE, specific serum IgE to grass pollen, house dust mite and eosinophil cationic protein (ECP)). During medical examination, obstructions of the nose with wheezing during lung auscultation have been found. ACT score was 19 (uncontrolled asthma). After explanation of preventive measures and allergy avoidance combination of low dose flulacson propionat and salmeterol (100 µg/ 50 µg discus, 2 x 1 breath / day), intranasal corticosteroid spray (INCS) and short-acting beta₂-agonist as needed (SABA). After symptoms disappear after 3 months of therapy, patient ceased medication and seek advice from local herbalist. Often patients seek alternative treatment (herbal tee, special diet, green honey etc.) that is problem because they stop to take their medicine. About 10 days later she experienced breathing problems with cough. She had difficulties with nose obstruction and marked breathing obstruction aproved by spirometry. Fraction of NO in exhaled air (FeNO) was 58.30 ppb (normal value < 22), as a marker of bad allergic inflammation control. Parents realised effects of their bad decision and agreed to start again with medical treatment.
control guidelines because they sometimes confuse patients and there parents (discurage comments about treatment, fear of corticosteroid side effects).

**Patient 5**

M. Š., 8 – years old boy with positive family history for atopy (brother have allergic rhinitis) was checked with allergologist in May 2013, because of persistent cough duration more than a month and episodes of dyspnea revealed with salbutamol inhalation. On clinical exam partial nose obstruction and wheezing with prolonged exhalation were found. Skin prick test was positive on house dust mite, grass pollen and feather, IgE: 1046 kU/L, specific IgE D. P. (d.): 6 (>100 kU/L), phleum pratense (g.): 4 (31.1 kU/L), ECP: >200 µg/L (normaly <16.6). Dünger test: 2000 eo/mm³, eosinophilia in peripheral blood (22 %) and many eosinophils in nose smear. Spirometry was normal, BT negative. Boy was recommended to avoid allergens and start treatment with intranasal corticosteroid spray (mometason) during 1 month and fluticason propionat 100 µg discus 2 x 1 breaths, normal saline nasal drops and antihistaminic as needed. Boy was taken medicine unregullary until few days before follow up exam. Clinical exam was normal but laboratory findings weren’t: Dünger: 1200 eo/mm³, eosinophilia in peripheral blood 13%, FeNO 28.09 ppb. That example emphasis need to be suspicious.
about patients compliance or self „step down” medication in case of slow normalisation of laboratory findings or symptoms.

**Patient 6**

A. G., 14 – year old girl was transported with emergency helicopter medical flight from nearby island in status asthmaticus. Father and grandmother had asthma. At age of 5 girl was diagnosed allergy on animal hair, house dust mite and grass pollen. They don’t posses any medical documentation. Despite treatment of „mild asthma” with LTRI (montelucast), ICS (fluticason) and combination (fluticason and salmeterol) surprisingly she never did spirometry. She wasn’t taken any medication last 5-6 years. In October 2013 she had breathing problems treated with antibiotics and SABA. After that she was without symptoms and physical active. Family physician suggested cessation of breathing problems in puberty, but everytime she had cold she needed symptom reliever (SABA). Present illness started 4 days before admittance to hospital with virosis symptoms (abdominal cramps, vomiting, sore throat, cough). Emergency medicine physician on island started treatment with SABA inhalation, parenteral corticosteroid and antibiotics. Chest radiography showed hyperinflation of left lung with low right lung base transparency and shift of hearth on the right side because of atelectasis. Emergency treatment with supplemental oxygen and restoration of fluid was started and a girl was transported to hospital. Diagnostic and therapeutic aims of good control asthma together with asthma control plan

![FeNO Test](image)

**Figure 2** Increased FeNO values in boy with asthma.
were discussed afterwords with girl and parents. This was example were additional education of PCP can change quality of their healthcare.

**CONCLUSION**

Asthma is example of disease dependent on timely diagnostic procedures, efficient preventive measures, correct long term antiinflammatory medications with good self control and support of parents, family physician and community. Education is key ston of asthmatreatment. Parents and patient with clear message about goals of asthma treatment are essential part and most important assodate in physician patient interaction. Primary Care Physician (Pediatrician and Family Physician) responsibility as connection between child with asthma and pediatrdian allergologist – pulmonologist subspecialist is underestimated. PCP have very important role in patient education and best possible treatment according current guidelines of child with asthma. Only together we can improve asthma outcomes in children.

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