

Asthma in children : towards improved monitoring strategies

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Valourisation

The valorisation of acquired knowledge of the different asthma monitoring strategies in children is presented in this chapter.

Society has advantage from the presented research on different levels.

First, some children and parents experienced benefit from the use of the home monitor. Although medication was not even titrated based on home monitor data, individual patients felt supported by the availability of a home monitor, because doctors and nurses were able to identify any increase in symptoms or decrease of lung function. Furthermore, home monitor data were useful to recognize noncompliance to short-acting bronchodilators (an item of the symptom score) in patients. In some children, home monitor data showed that despite the presence of respiratory symptoms, children did not use short-acting bronchodilators. Examples of reasons for not using the short-acting bronchodilators included feelings of shame when using short-acting bronchodilators or because the children did not have medication with them. Thus, in daily practice physicians can use the home monitor data as an aid during consultations to discuss noncompliance, symptom recognition, and asthma management. In addition, home monitoring of symptoms and lung function may lead to more accurate titration of maintenance medication and better asthma control, but the effectiveness of home monitoring e.g. FEV₁ plus electronic symptom score, needs to be studied in randomized controlled trials.

Second, assessing asthma-specific quality of life (QoL) in children sheds light upon a broader aspect of the impact of asthma on the child, beside focussing on the physical symptoms only. Doctors try to optimize asthma control and therefore focus on respiratory symptoms and lung function. However, in addition to the presence of physical symptoms, patients may also experience a reduction in health related QoL. In the management of chronic diseases, such as asthma, doctors should also pay attention to asthma-specific QoL beside asthma control. The finding that asthma control and asthma-specific QoL are associated but not mutually interchangeable, serves as a reminder for doctors to be aware of asthma-specific QoL during consultation.

Third, future societal value of this thesis is that exhaled VOCs could be used in the monitoring of children with asthma (and perhaps other diseases), with the goal to improve asthma control and asthma-specific Qo, and to prevent exacerbations. However, the effectiveness of exhaled VOCs as a monitoring tool in asthma management should be confirmed in additional studies, including a cost-effectiveness study of this method.

Different companies may profit from the results presented in this thesis. Assessing inflammatory markers in exhaled breath alone or in combination with respiratory symptoms and lung function

is innovative. Therefore, this may be an interesting opportunity for companies to invest in. Possible products to develop could be: a point-of-care device for exhaled VOC assessment during clinical visits, or even an instrument which is able to record symptoms and assess lung function plus exhaled VOCs on a regular basis at home. The collaboration between clinical, chemical and statistical researchers (knowledge about disease-specific VOCs) and companies (technical ability to produce small device and design) is required to develop such instruments.

Furthermore, in this thesis specific methods of collection of exhaled breath are used. Collection of exhaled breath and exhaled breath condensate (EBC) in children is a feasible process, which is also supported by previous studies.¹⁻³ Study findings in this thesis concerning exhaled VOCs showed that an optimal sampling frequency would be at least every 2 weeks, in order to be able to predict asthma exacerbations in children.

Assessment of markers in EBC and of VOCs in exhaled breath are innovative methods to monitor asthma. Currently, asthma in children is managed based on asthma control. Asthma exacerbations are determined based on the severity of respiratory complaints and need for care. A valorisation of the findings in this thesis is that exhaled VOCs may help in the prediction of asthma exacerbations and the identification of children with persistently controlled and uncontrolled asthma. Therefore, assessments of exhaled VOCs probably are helpful for the monitoring of children with asthma, and may provide the opportunity to more accurately titrate asthma medication. The data in this thesis support the concept that airway inflammation is increased before respiratory symptoms are present and lung function deterioration occurs.

The results regarding the inflammatory monitoring strategies emphasize the need for new methods to analyse markers in EBC. Results showed that it is difficult to measure inflammatory markers in EBC with current analytical methods. Therefore, the next step is to test which markers can be detected in EBC by using different innovative analytic methods. Additionally, the hypothesis that the EBC matrix has negative effects on the stability of cytokines/chemokines during storage of EBC could be tested.

Future research plans should include the testing of smaller instruments that can measure exhaled VOCs real-time in children. This can be performed in a pilot-study to evaluate the feasibility of the measurements. Afterwards, a cross-sectional study can be performed to investigate the predictive properties of a set of VOCs in a larger cohort of asthmatic children. If the results are promising, the instruments can be tested in an intervention study in a large sample of asthmatic children.

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