**Methods**

Children with asthma were recruited. Disease severity was determined by questionnaire and spirometry. Asthma control was assessed by 5-day peak flow variability and children’s asthma control test (CACT) on the first and fifth day of peak flow testing. Concentrations of PM2.5 were measured over a 24-h period in the living room and the child’s bedroom.

**Results**

22 children were recruited, mean age 11.0 years. Across the 22 homes the median time weighted average (TWA) PM2.5 concentration (range) in the living room was 7.4 mg/m³ (2.0–150.0) and for the bedroom was 5.6 (3.1, 11.1) mg/m³ (p=0.04 for comparison with living room). As expected, there was a significantly higher mean TWA PM2.5 in the living rooms and bedrooms of the seven homes where smoking was reported; 22.0 mg/m³ for living rooms in smoking homes and 4.7 mg/m³ for non-smoking homes, p=0.001. There was a positive association between TWA PM2.5 in the living room and peak flow variability (r=−0.51, p=0.027, see Abstract P77 Figure 1) and a negative association between TWA PM2.5 in the living room and CACT on day 5 (r=−0.48, p=0.057). TWA PM2.5 exposure was not related to indices of asthma severity including FEV₁ and treatment. Peak PM2.5 concentration was not associated with any outcome.

**Conclusions**

This small study suggests that even at relatively low concentrations, there is an exposure–response relationship between increasing indoor air PM2.5 concentrations, increased airway variability and poorer asthma control in children.

**P79**

**IMPULSE OSCILLOMETRY FOR THE ASSESSMENT OF LUNG FUNCTION DEFICITS ASSOCIATED WITH PRESCHOOL WHEEZING**

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**Introduction**

Preschool wheezing affects over 1/3 of children, and is associated with lung function deficits. There is a need for a clinical tool to evaluate lung function in preschool children, which is able to detect pathology associated with wheezing. Spirometry is the most common measurement of lung function in school aged children and adults, however spirometry measurements are a challenge in preschool children when conducted outside of specialised labs due to the complexity of the manoeuvres needed. Impulse oscillometry (IOS) is able to measure the resistance and resonant frequency of the lungs from normal breathing, and may be a suitable tool for assessing lung function in preschool children. This study aimed to measure the success rate of IOS for acquiring high quality lung function data in preschool children, and to evaluate the ability of the technique to detect differences between children with and without a history of wheezing.

**Methods**

We recruited 66 children aged 3–4 years from a hospital paediatric outpatients department. Parents were interviewed about their child’s health using a structured questionnaire. Children underwent allergy skin prick testing and lung function assessment using IOS pre- and post-bronchodilator. Variables recorded were resistance across 5–25 Hz, resonant frequency (Fres), reactance at 25 Hz and the percentage change in resistances across all frequencies post-bronchodilator.

**Results**

42 (64%) of 66 children successfully completed lung function assessment using IOS. Younger children were less likely to successfully complete IOS readings (3–3.5 years children 41% success; 3.5–4 years children 71% success; p=0.03). We found a significant increase in Fres in children with a history of wheezing (mean 23.4 Hz wheeze, 19.4 Hz no wheeze; p=0.01). Furthermore,
significant differences were found in the Fres of children who had previously been diagnosed with asthma by a doctor compared to non asthmatics (p=0.015); and those with atopy and wheeze compared to those with no atopic wheeze (p=0.015) (Abstract P79 Figure 1).

Discussion IOS yields high quality lung function data in most children over 3.5 years age. The technique is able to detect group differences related to wheezing tendency in this age group, and may be a useful clinical tool for use in young children over 3.5 years.

Introduction Historically, assessment of operative risk in children prior to scoliosis surgery has been largely based on pre-operative lung function testing. Children having scoliosis surgery suffer from a wide range of conditions and many are unable to perform lung function testing. Furthermore, the risk of post-operative ventilation is decreasing suggesting better predictors may be needed. We currently evaluate all such patients, using assessment of airway competency, cough strength, and muscle bulk in estimating the risk of requiring post-operative ventilation. Our data suggest that lung function testing is no longer a good predictor of outcome in this group of patients.

Methods We retrospectively reviewed the records of 97 patients who have undergone scoliosis surgery between 2004 and 2010. Pulmonary function testing (PFT) was attempted wherever possible. Patients were clinically assessed prior to surgery, and an estimated risk of post-operative ventilation made. Comparison of each method (PFT and clinical assessment) against a primary outcome of requirement for post-operative ventilation, and secondary outcomes of PICU/HDU and hospital length of stay.

Results PFT was successful in 68/97 (70%) of our patients. One child had an FVC <40% predicted and three children had FVC 40–80% predicted. None of these children required ventilation post-operatively. Of the 14 patients who required post-operative ventilation, pulmonary function testing was only possible for four (FVC range 59%–74% predicted). The remaining 10 who needed ventilation were unable to perform PFT. Clinical assessment of risk was highly accurate in predicting the number of children requiring post-operative ventilation in all groups (Abstract P80 Table 1).

Abstract P80 Table 1

<table>
<thead>
<tr>
<th>Predicted risk level</th>
<th>No in group</th>
<th>Predicted number ventilated</th>
<th>Actual number ventilated</th>
<th>Hospital LoS (days – median, range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low (&lt;10%)</td>
<td>62</td>
<td>3.2</td>
<td>3</td>
<td>7 (4–16)</td>
</tr>
<tr>
<td>Medium (10–30%)</td>
<td>20</td>
<td>3.1</td>
<td>5</td>
<td>9 (3–21)</td>
</tr>
<tr>
<td>High (&gt;30%)</td>
<td>13</td>
<td>6.3</td>
<td>5</td>
<td>10 (3–22)</td>
</tr>
</tbody>
</table>

Conclusions The group of patients who are most likely to require post-operative ventilation are poor candidates for pulmonary function testing. To assess these children we need to take account of other factors which are important for their respiratory function post-operatively. Clinical assessment of risk can be highly accurate in predicting the need for ventilation following scoliosis surgery.

Abstract P79 Figure 1 The differences in resonant frequency between preschool children with a history of wheeze and those without a history of wheeze.