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BRIEF COMMUNICATION

Feasibility of routine respiratory function testing in preschool children☆

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Spirometry;
Feasibility;
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Abstract
Introduction: The assessment of respiratory function in preschool children, which has recently been attracting considerable interest, has several methodological particularities. Whether this is feasible in clinical practice with large groups of patients still needs to be investigated.
Aim: To assess the feasibility of pulmonary function testing in preschool children in clinical practice, and report the degree of success achieved according to age.
Methods: Retrospective analysis of lung function tests performed in children from 2 to 6 years old at the respiratory function laboratory of CUF Descobertas Hospital between September 2006 and August 2011. Whole-body pletismography without occlusion for specific airway resistance (sRaw) assessment and animated spirometry were performed using the equipment Jaeger 4.65 (Viasys Healthcare), before and after 400 μg of inhaled salbutamol via a spacer device. The research fulfilled international criteria (ATS/ERS) for acceptability and reproducibility.
Results: Of 1,239 lung function tests performed, 1,092 (88%) had acceptable and reproducible criteria for spirometry (children with a mean age of 4.3 ± 0.91 years; 60.7% male), and 979 (79%) for sRaw measurement. We were able to report FEV_1 in 801 (65%) tests (children with a mean age of 4.5 ± 0.89 years). In 23 (2%) tests it was only possible to report $FEV_{0.5}$ (children with a mean age of 3.5 ± 0.67 years) and in 268 (22%) only $FEV_{0.75}$ (children with a mean age of 4.0 ± 0.89 years).
Conclusion: Spirometry and sRaw assessment in preschool children can be used in clinical practice, with an increasing success rate as children get older. Reporting maneuvers of 0.5 or 0.75 seconds facilitates spirometric evaluation in a larger number of children.

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PALAVRAS-CHAVE
Espirometria;
Exequibilidade;
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Resistência específica das vias aéras

Exequibilidade do estudo funcional respiratório em idade pré-escolar na prática clínica

Resumo
Introdução: A avaliação da função respiratória em idade pré-escolar reveste-se de particularidades metodológicas, tendo ganho recentemente um interesse crescente. A sua exequibilidade na prática clínica, em grandes grupos de doentes, continua, no entanto, por investigar.
Objetivo: Avaliar a exequibilidade do estudo funcional respiratório em idade pré-escolar e o grau de sucesso de acordo com a idade.
Métodos: Análise retrospetiva de provas funcionais respiratórias realizadas em crianças com 2 a 6 anos no laboratório de exploração funcional respiratória do Hospital CUF Descobertas entre Setembro de 2006 e Agosto de 2011. Foi efetuada pletismografia corporal sem oclusão para avaliação da resistência específica das vias aéreas (sRaw) e espirometria animada, com equipamento Jaeger4.65 (VIASYS Healthcare) antes e após 400 ug de salbutamol inalado em câmara expansora. Foram cumpridos os critérios internacionais (ATS/ERS) para aceitabilidade e reprodutibilidade.
Resultados: De 1 239 provas funcionais respiratórias realizadas, 1 092 (88%) tinham uma espirometria com critérios de aceitabilidade e reprodutibilidade (crianças com idade média de $4,3 \pm 0,91$ anos; 60,7% do sexo masculino), e 979 (79%) sucesso na determinação de sRaw. Foi possível reportar FEV_1 em 801 (65%) provas (crianças com idade média $4,5 \pm 0,89$ anos). Em 23 (2%) das provas apenas foi possível reportar $FEV_{0,5}$ (crianças com idade média de $3,5 \pm 0,67$ anos) e em 268 (22%) apenas $FEV_{0,75}$ (crianças com idade média de $4,0 \pm 0,89$ anos).
Conclusão: A espirometria e a avaliação de resistências em idade pré-escolar são exequíveis na prática clínica diária, com um aumento do sucesso em crianças mais velhas. O registo de manobras com duração de 0,5 ou 0,75 s permite a avaliação funcional respiratória de um maior número de crianças.

Introduction

Pulmonary function tests (PFT) are useful tools for objective quantification of pulmonary compromise, diagnosis confirmation, therapy monitoring and prognosis assessment of various respiratory diseases.[1]

In preschool children, given the difficulties of coordination and cooperation, as well as the inadequacy of adult criteria.[2] PFT have previously been restricted to clinical research.

In this age group, it is not possible to measure static lung volumes, because children will not tolerate the valve closing. However, specific airway resistance (sRaw) can be obtained by measuring changes in airflow relative to changes in plethysmographic volume without having to breathe against a closed shutter[3] and spirometry can be performed by experienced technicians using animated software in a friendly and comfortable environment, giving increased success rates in older preschool children.[4]

Recommendations for acceptability and reproducibility criteria in preschool children were published in 2007 by the American Thoracic Society (ATS) and European Respiratory Society (ERS)[5], enabling the standardization of methods and practices, with reference equations now already available in this age group for spirometry[6] and specific airway resistance (sRaw) evaluation[7].

With this study, carried out in a specialized clinic, we aim to determine the feasibility of routine PFT with spirometry and plethysmography without occlusion, both before and after bronchodilation in preschool children, and the degree of success achieved according to age.

Methods

Study design and population

Retrospective analysis of PFT performed in CUF Descobertas Hospital between September 2006 and August 2011. The children selected were between 2 to 6 years old, were followed at the allergy outpatient clinic due to asthma, recurrent wheezing or chronic cough, and referred by their doctor to the respiratory function laboratory of the same hospital. Children with respiratory infection or exacerbation of their respiratory symptoms in the preceding three weeks were not tested.

Pulmonary function testing

Performed before and 20 minutes after administration of 400 μg of inhaled salbutamol through a spacer device, using a MasterScreen Body Jaeger spirometer (v.4.65, CareFusion Ltd, Viasys Healthcare, Hoöchberg, Germany), calibrated daily according to manufacturer's instructions. All data was corrected for body temperature, pressure and saturation (BTPS).

The study took place in a friendly and comfortable environment, and was performed by an experienced technician.