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ORIGINAL ARTICLE

Validation study of an acute bronchiolitis severity scale to determine admission to a paediatric intensive care unit☆

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KEYWORDS
Bronchiolitis;
ROC curve;
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Abstract
Introduction: At present, there are few validated scoring tests for assessing acute bronchiolitis (AB) severity, and limited information on their test power. The aim of the present study is to evaluate the validity of an acute bronchiolitis severity score (ABSS) to help in deciding PICU admission.
Patients and method: Prospective, descriptive, observational study of previously healthy infants under 1 year of age with AB, where the ABSS was used to compare severity as regards the need for PICU admission. The sample size was estimated as at least 175 patients. The research team was trained in the use of ABSS. All patients in the study were evaluated with ABSS daily, as well as in the case of clinical deterioration. The initial and maximum ABSS scores were contrasted to the need for PICU admission. A receiver operative curve was constructed, and the area under the curve was calculated, and the optimum point of sensitivity/specificity was estimated.

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Results: The study included a total of 190 patients (male/female: 58%/42%). PICU was required in 11 (6%). The mean ± SD ABSS-maximal score for patients who required and did not require PICU was 10.55 ± 1.12 and 6.35 ± 2.3, respectively ($p < .001$). The AUC for ABSS-maximal was 0.94 ($p < .001$, 95% CI: 0.90–0.98). The optimal cut-off point was set at ≥10 points for a sensitivity of 82% and a specificity of 91%.
Conclusions: ABSS estimates the severity of AB regarding the need for PICU admission, with a sensitivity and specificity of clinical usefulness.

PALABRAS CLAVE
Bronquiolitis;
Curva COR;
Sensibilidad y especificidad;
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Estudio de validez de una escala de gravedad de la bronquiolitis aguda para orientar el ingreso en UCIP

Resumen
Introducción: En la actualidad existen pocas escalas validadas para valorar la bronquiolitis aguda (BA) y escasa información de su potencia de prueba. El objetivo del presente estudio es valorar la validez de una escala de severidad de BA (ESBA) para orientar los ingresos en UCIP.
Pacientes y método: Estudio observacional prospectivo descriptivo de lactantes previamente sanos menores de un año con BA, donde se utilizó la ESBA para contrastar la gravedad con la necesidad de ingreso en UCIP. El tamaño de la muestra se estimó en al menos 175 pacientes. El equipo investigador fue entrenado en el uso de la ESBA. Todos los pacientes del estudio fueron evaluados con la ESBA diariamente y en caso de deterioro clínico. Se analizaron y compararon las puntuaciones ESBA inicial y máxima respecto a la necesidad de UCIP. Se construyó una curva operativa de receptor, se calculó el área bajo la curva y se estimó el punto óptimo de sensibilidad/especificidad.
Resultados: Se incluyó a 190 pacientes (varón/mujer: 58%/42%). Precisaron UCIP 11 (6%). La puntuación media ± DE de la ESBA-máxima para pacientes que precisaron y no precisaron UCIP fue de 10,55 ±1,12 y 6,35 ±2,3, respectivamente. Esta diferencia fue significativa ($p < 0,001$). El ABC para la ESBA-máxima fue 0,94 ($p < 0,001$; IC del 95%: 0,90-0,98). El punto de corte óptimo se estableció en ≥ 10 puntos, para una sensibilidad del 82% y una especificidad del 91%.
Conclusiones: La ESBA estima la gravedad de la BA respecto a la necesidad e ingreso en UCIP con una sensibilidad y especificidad de utilidad clínica.

Introduction

The possibility of assessing severity in patients with acute bronchiolitis (BA) based on clinical manifestations is of great interest to clinicians as an indispensable step in decision-making or for the purpose of sharing information with other providers regarding infants with AB. Clinical scoring systems are assessment tools that, based on the observation of certain variables in patients with a disease, allow the addition of ratings given to different items to obtain a total, cumulative score. Several scales have been published for assessment of bronchiolitis,[1–5] and the one used most widely is the Wood-Downes-Ferres (WDF) scoring system.[6,7] Since the WDF score is a modification of a scale originally developed for assessment of asthma patients, was not designed in consideration of the pathophysiology of AB and has not been originally designed for or validated in patients with AB, its use for assessment of this disease may not be justified.

On the other hand, few clinical scoring systems for AB have been validated,[1,2,4] and even fewer have been studied for the purpose of establishing the sensitivity and specificity of different cut-off points in relation to changes in clinical parameters during the course of AB and patient outcomes. Some of the scales that have been validated attempt to comprehend the full range of infectious respiratory disease, without taking into account the specific pathophysiological characteristics of AB.[3] In some instances, the validation process has revealed that the scale was a poor fit for bronchiolitis.[8] Furthermore, the clinical practice guidelines published in Spain call for the development and validation of scales for the assessment of severity of AB.[9] Recently published systematic reviews have voiced the need to validate scales specifically designed to assess severity in AB.[10]

The previously published Acute Bronchiolitis Severity Scale (ABSS) seems to be easy to use and administer,[4] and has shown adequate test–retest reliability, inter-observer reliability and internal consistency. It is based on reproducible parameters commonly assessed in the physical examination and does not include measurements that require equipment such as oxygen saturation. The final score is obtained by