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ORIGINAL ARTICLE

Comfort and noise level in infants with helmet interface☆

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KEYWORDS
Helmet;
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Abstract
Objectives: To evaluate comfort and noise intensity using the COMFORT scale in infants who receive respiratory support with a helmet interface.
Patients and methods: An observational descriptive study was conducted on all infants (1–12 months of age) admitted to a PICU from November 1st 2013 to March 31th 2014 and who received non-invasive ventilation with a helmet interface. Tolerance to the interface was assessed by use of the COMFORT scale. The intensity of the noise to which the infants were exposed was measured with a TES1350A HIBOK 412 sound-level metre. Three measurements were made every day.
Results: Twenty-seven patients with bronchiolitis (median age: 54 days; range: 10–256) were included. Median COMFORT score in the first day was 21 points (14–28). An increase in patient comfort was found with a gradual decrease in the scores, with a maximum reduction of 22% from the first hours (score of 22) to the fifth day (score of 18). The minimum sound intensity registered was 42 dB, and the maximum was 78 dB. Background noise intensity was associated with noise intensity in the helmet. No differences were observed in COMFORT score and noise intensity between ventilator devices.
Conclusions: Helmet interface was well tolerated by infants. COMFORT score results are an indicator that infants were comfortable or very comfortable. The measured noise intensity was in the safe range permitted by World Health Organization.
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PALABRAS CLAVE
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Ruido;
Bienestar

Confort y nivel de ruido en ventilación no invasiva con interfase *helmet* en lactantes

Resumen
Objetivos: Evaluar el grado de bienestar y el nivel de ruido en lactantes que reciben asistencia respiratoria con interfase tipo *helmet*.
Pacientes y método: Estudio analítico, observacional y descriptivo en el que se incluye a todos los lactantes (entre 1 y 12 meses de edad) con *helmet* ingresados en una UCIP entre el 1 de noviembre del 2013 y el 31 de marzo del 2014. Para la valoración del bienestar se utilizó la Escala de Confort Pediátrica (ECP). Los niveles de ruido fueron medidos con el sonógrafo HIBOK 412. Se realizaron mediciones 3 veces al día.
Resultados: Se incluyó a 27 pacientes con bronquiolitis (edad mediana 54 días; rango: 10–256). La puntuación mediana de ECP en el primer día fue de 21 puntos (rango: 14–28). Se observó una mejoría en el bienestar objetivado por una disminución progresiva de las puntuaciones, con una reducción máxima del 22% desde las primeras horas (puntuación de 23) al quinto día (puntuación de 18). La cifra mínima de ruido interno fue de 42 dB, la máxima fue de 78 dB. Las cifras de ruido externo se correlacionan con las de ruido interno tomadas en el mismo momento. No se observaron diferencias en el grado de bienestar del paciente, ni en el ruido en función del tipo de dispositivo de ventilación empleado.
Conclusiones: El *helmet* es una interfase bien tolerada. La puntuación COMFORT obtenida permite mantener a los niños con un grado entre cómodo y muy cómodo. Los niveles de ruido medidos se encuentran dentro del rango máximo de ruido permitido por la Organización Mundial de la Salud.
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Introduction

In recent years, the use of noninvasive ventilation (NIV) in acute paediatric care has been spreading and increasing in neonatal and paediatric intensive care unit (PICU) settings.[1–3] The use of NIV reduces length of stay and hospitalisation costs while improving patient comfort.[3,4]

Helmets are one of the types of interface whose use in infants has been increasing in recent years. The interface is based on an inflatable plastic structure shaped as an astronaut's helmet that contains the entire head and neck of the child without any contact with the face. It offers several advantages, such as fewer leaks due to incorrect fitting of the interface or opening of the mouth, prevention of damage to the nasal mucosa, and allowing modifications to fit the heads of younger children, as well as a high level of humidification and continuous eye contact with the patient.[5]

There are also disadvantages to the helmet interface, such as increased difficulty in the management and securing of central or scalp vein catheters. It also cannot guarantee the effective delivery of nebulised medication. It is necessary to avoid excessively high temperatures inside the helmet. The helmet may make patients feel claustrophobic. Another limitation is that the face of the child cannot be freely accessed without loss of pressure; furthermore, since the dead space in helmets is greater, it requires a high flow (>30 lpm) to reduce carbon dioxide rebreathing, and this flow rate could be bothersome to the child.[5] Some of these drawbacks may cause discomfort in paediatric patients.

There are few studies on the helmet interface, and those that have been conducted have provided contradictory evidence as it concerns noise and patient comfort. Some studies suggest that the noise level is higher inside helmets compared to other interfaces, which may lead to discomfort in the child.[6,7]

The objectives of our study were to assess the comfort level of infants fitted with a helmet interface in the PICU and the noise level both inside and outside the helmet.

Materials and methods

We designed an observational prospective study to analyse the comfort and noise levels associated with the use of the helmet interface in infants admitted to a PICU over a 5-month period (November 2013 to March 2014).

The study was approved by the Comité Ético de Investigación Clínica Regional (regional clinical research ethics committee). Infants were admitted to the study upon receipt of informed consent by the parents.

We included patients diagnosed with bronchiolitis and admitted to the PICU requiring continuous positive airway pressure (CPAP) based on the criteria of the Respiratory Working Group of the SECIP[8] by consecutive sampling. In our PICU, helmets are the only type of interface used to deliver CPAP to infants. Prior to the beginning of the study, we explained its purpose to the nursing staff and provided instructions on how to collect the data.

We collected data on demographic variables, patient comfort and noise level inside and outside the helmet, and the flow generator used (Vision®, Dräger CF800® or others).

The scale used to measure the level of comfort of patients was the COMFORT-B scale,[9,10] adapted from the COMFORT scale originally developed by Ambuel et al.[11]

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