



ORIGINAL ARTICLE

Assessing the use of procalcitonin in the hospitalised young febrile infant[☆]



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KEYWORDS

Procalcitonin;
C-reactive protein;
Infants;
Hospitalisation;
Bacterial infection;
Cost

Abstract

Introduction: The use of procalcitonin (PCT) in the evaluation of the febrile infant in the emergency care unit has been widespread. The aim of this study is to assess whether the introduction of PCT has changed the management of hospitalised febrile infants and the cost/effectiveness of this marker.

Materials and methods: A retrospective study was performed comparing 2 periods: January–December 2009 (without PCT) and January–December 2011 (routine use of PCT). Infants aged 7–90 days with fever who were admitted to a university hospital and had a blood test performed were included in the study. Bacterial infection rate, antibiotic use, hospitalisation days, and analytical costs were compared. Evaluations were made using PCT, C-reactive protein (CRP), white cell count, Rochester score, and the lab-score proposed by Galetto-Lacour for the diagnosis of bacterial infection.

Results: A total of 109 patients were included in period 1, and 111 in period 2 (87 of which had a PCT value). The prevalence of bacterial infection, use of antibiotics, number of blood tests, and days of hospital admission was similar in both periods. The blood test cost was significantly higher in the second period. Sensitivity, specificity, positive predictive value and negative predictive value were 70.6, 58.1, 52.6 and 75%, respectively for the CRP (cut-off 1 mg/dL) and 41.7; 78.4; 57.7, and 65.6% for the PCT (cut-off value 0.5 ng/mL).

Conclusions: The use of PCT does not seem to have a significant impact on the management of the hospitalised febrile infant.

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PALABRAS CLAVE

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 Coste

Valoración del uso de la procalcitonina en el lactante febril hospitalizado**Resumen**

Introducción: El uso de la procalcitonina (PCT) se ha generalizado en la evaluación del lactante febril en urgencias. Este trabajo pretende evaluar si la introducción de la PCT ha cambiado el manejo del lactante febril hospitalizado y el coste/efectividad de dicho marcador.

Pacientes y métodos: Estudio retrospectivo comparando 2 periodos: enero-diciembre de 2009 (sin PCT) y enero-diciembre de 2011 (uso rutinario de PCT). Se incluyó a los pacientes de 7 a 90 días de vida con fiebre ingresados en un hospital universitario y con analítica realizada. Se compararon porcentajes de infección bacteriana, uso de antibióticos, estancia hospitalaria y coste analítico. Se evaluó la PCT, la proteína-C reactiva (PCR), recuento leucocitario, score de Rochester y el lab-score propuesto por Galetto-Lacour para el diagnóstico de infección bacteriana.

Resultados: Se incluyó a 109 pacientes en el periodo 1 y 111 en el periodo 2 (de los cuales en 87 se dispuso de valour de PCT). La prevalencia de infección bacteriana, uso de antibióticos, repetición de analíticas y estancia hospitalaria fue similar en los 2 periodos. El coste analítico fue significativamente superior en el segundo periodo. La sensibilidad, especificidad, valour predictivo positivo y valour predictivo negativo de la PCR (punto de corte 1 mg/dl) fue 70,6; 58,1; 52,6 y 75% y de la PCT (punto de corte 0,5 ng/ml) 41,7; 78,4; 57,7 y 65,6%.

Conclusiones: El uso de la PCT no parece haber tenido un impacto significativo en el manejo del paciente hospitalizado.

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Introduction

Fever is one of the most common reasons for paediatric medical visits. Most episodes of fever are due to benign and self-limiting viral infections that do not require treatment. However, in infants, and especially in those aged less than 3 months, fever can be a sign of severe bacterial infection (SBI) and thus results in a significant number of admissions. The assessment of the febrile infant is a diagnostic challenge that has led to the development of different tools that attempt to identify the patients most at risk of SBI: clinical scores such as the Yale scale,¹ blood markers assessed alone (C-reactive protein [CRP], procalcitonin [PCT], interleukin-6, ...) or in combination (lab-score²) as well as combinations of clinical and laboratory criteria (Rochester criteria³).

The determination of PCT may offer some advantages in the early diagnosis of bacterial infection due to its shorter half-life and more rapid elevation, and it seems that it is a more specific marker than CRP in children with SBI.⁴ Most studies agree that low levels of PCT have a high negative predictive value (NPV) for ruling out bacteraemia, and in the past decade PCT has been included in many protocols for the management of children with fever without source (FWS) in emergency settings. Nevertheless, testing of PCT levels may also lead to false positive and false negative results (sensitivity [Sn], 70–91%; specificity [Sp], 59–85%),^{5–7} which means that clinical decisions cannot be based on this marker alone.

The usefulness of PCT as a predictive marker has been validated in several studies in adults, and its use to guide initiation or discontinuation of treatment in adult patients seems safe and efficacious, and contributes to a significant

reduction in antibiotic use.^{8,9} However, few studies have evaluated the results of the routine use of PCT in clinical practice (indication of admission, repetition of laboratory tests, antibiotic use, length of stay) and its cost in paediatrics.

The aim of this study was to assess whether determination of PCT has changed the assessment and management of hospitalised febrile infants in our hospital, and to compare the Sn, Sp, positive predictive value (PPV) and NPV of different markers and scores in this population. We also assessed the added cost of determining CRP and PCT levels compared to traditional combined clinical and laboratory scores.

Materials and methods

We conducted a retrospective descriptive study over two time periods: January to December 2009 (period 1: no PCT) and January to December 2011 (period 2: routine use of PCT). The protocol for the management of febrile infants aged less than 3 months was the same during the two periods except for the routine use of PCT in period 2: in our hospital, the protocol for infants aged 1–3 months with fever without source is based on the Rochester criteria; for newborns, the protocol includes blood, urine and cerebrospinal fluid (CSF) testing, chest X-ray in case of respiratory manifestations, hospital admission, and decision to use or not use antibiotics based on clinical manifestations and test results; and in patients with specific diagnoses (bronchiolitis, urinary tract infection [UTI], pneumonia, etc.) the corresponding protocol was applied. The protocol did not include any recommendations regarding determination of PCT.

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