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ORIGINAL ARTICLE

Systematic review of the validity of urine cultures collected by sterile perineal bags☆

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Abstract
Introduction: The perineal adhesive bag is the most commonly used method in our country for urine culture collection in infants, despite having a high risk of contamination and false-positive results. We aim to quantify both types of risks through a systematic review.
Methods: Search updated in May 2014 in PUBMED, SCOPUS (includes EMBASE), IBECS; CINAHL, LILACS AND CUIDEN, unrestricted by language or date. Percentage of contaminated samples, false positives, sensitivity and specificity (with respect to catheterization or bladder puncture) were recorded.
Results: A total of 21 studies of medium quality (7659 samples) were selected. The pooled percentage of contaminated samples was 46.6% (15 studies; 6856 samples; 95% confidence interval [95% CI]: 35.6–57.8%; I^2: 97.3%). The pooled percentage of false positives was 61.1% (12 studies; 575 samples; 95% CI: 37.9–82.2%; I^2: 96.2%). Sensitivity (88%; 95% CI: 81–93%; I^2: 55.2%) and specificity (82%; 95% CI: 75–89%; I^2: 41.3%) were estimated in five studies, but without including contaminated samples.
Conclusion: The perineal adhesive bag is not a valid enough method for urine culture collection, because almost half of all samples are contaminated, and two out of three positives are false. Although these estimates are imprecise, because of their great heterogeneity, they should be considered when choosing the method of urine collection. The estimates of sensitivity and specificity are not applicable because they do not take into account the risk of contamination.

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PALABRAS CLAVE
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Revisión sistemática de la validez de los urocultivos recogidos con bolsa estéril perineal

Resumen
Introducción: La bolsa adhesiva perineal es el método más usado en nuestro medio para la recogida de orina para cultivo en el lactante, a pesar de que presenta un alto riesgo de contaminación y de resultados falsos positivos. Nos proponemos cuantificar ambos riesgos a través de una revisión sistemática.
Métodos: Búsqueda actualizada a mayo del 2014 en PUBMED, SCOPUS (incluye EMBASE), IBECS; CINHAL, LILACS Y CUIDEN, sin límites de idioma ni tiempo. Se extrajeron porcentajes de orinas contaminadas, falsos positivos, sensibilidad y especificidad (respecto cateterismo o punción vesical).
Resultados: Se seleccionaron 21 artículos de calidad media (7.659 muestras). El porcentaje agrupado de orinas contaminadas fue del 46,6% (15 estudios; 6.856 muestras; intervalo de confianza del 95% [IC del 95%], 35,6 a 57,8%; I^2: 97,3%). El porcentaje agrupado de falsos positivos fue del 61,1% (12 estudios; 575 muestras; IC del 95%, 37,9 a 82,2%; I^2: 96,2%). En 5 estudios se pudieron estimar la sensibilidad (88%; IC del 95%, 81 a 93%; I^2: 55,2%) y especificidad (82%; IC del 95%, 75 a 89%; I^2: 41,3%), aunque en los recuentos no se incluyeron orinas contaminadas.
Conclusión: La bolsa adhesiva perineal no es un método suficientemente válido para cultivo de orina porque casi la mitad resultarán contaminados y de los positivos 2 de cada 3 serán falsos. Aun siendo estimaciones imprecisas, por su gran heterogeneidad, deben ser tenidas en cuenta en la elección del método de recogida de orina. Las estimaciones de sensibilidad y especificidad no son aplicables por no considerar el riesgo de contaminación.

Introduction

Urinary tract infection (UTI) in paediatric patients is one of the most frequent causes of visits in the health care system, in Primary Care as well as in the emergency room, and it is a frequent cause of hospitalisation. In children, urinary tract infection symptoms are usually unspecific, such as fever without a source, food rejection or failure to thrive. That is why diagnostic confirmation with a urine culture is particularly important. Diagnostic methods must be quick and sensitive enough to facilitate prompt treatment and lower mortality rates, but specific enough to avoid unnecessary complementary tests and therapies.

Currently, we have several techniques for the collection of urine samples from children. When the child has bladder control, the technique usually employed is the collection of urine from the urinary stream. In children who do not have bladder control, the most widely used method is the perineal adhesive bag, even though samples collected with this technique have a high risk of contamination or false positives. Samples collected through bladder catheterisation or suprapubic aspiration have a lower risk of contamination, but these are invasive, potentially risky techniques. Therefore, they are used as confirmatory tests or in emergency situations in which an immediate diagnosis or treatment is required.[1,2] The use of sterile compresses, a technique employed in other countries, is uncommon in Spain.

Several technical reports and clinical practice guidelines mention studies that show the limitations of the perineal bag for urine culture collection.[1,3–5] However, no review studies have as yet quantified the principle problems associated with this sampling technique: the high risk of contamination and false positives. Our objective is to perform a systematic review to estimate the validity of samples collected with a perineal bag as a basis for clinical practice guidelines.

Material and methods

Bibliographic search

The PUBMED, SCOPUS (including PUBMED and EMBASE) CINHAL, IBECS and CUIDEN databases were searched for articles published up to May 2014, with no restrictions on type of study, language, or year of publication.

For PUBMED, SCOPUS and CINHAL, 2 search strategies were employed: 1 extensive search using the string (''infant''[MeSH Terms] OR ''child''[MeSH Terms]) AND (''Urinary tract infections''[MeSh] OR (''Urine'' AND ''Culture'') OR (Urinary AND Infection)) AND (''Specimen Handling''[MeSh] OR Specim* OR ''Urine Specimen Collection''[Mesh] OR ''Bag'' OR ''Bags'') AND (''Urine/microbiology''[Mesh] OR ''Contamination'' OR ''false positive'' OR ''Diagnosis''[Mesh] OR ''Sensitivity and Specificity''[Mesh]''; and 1 simplified search using (''infant OR child'') AND ''urine'' AND ''specimen handling''. In IBECS and CUIDEN, the equivalent terms in Spanish were employed. The references from the recovered studies were examined to identify other undetected studies.