

## Phase-contrast microscopy in the diagnosis of urinary tract infections in the outpatient setting: A diagnostic validity study



### Microscopía de contraste de fases en el diagnóstico de la infección urinaria en la comunidad: un estudio de validez diagnóstica

Dear Editor:

Urinary tract infection (UTI) is one of the most common acute bacterial infections among adult females and accounts for about 15–20% of antibiotics prescribed.<sup>1</sup> However, up to 60% of patients receiving an antibiotic for an UTI do not have a microbiologically confirmed UTI.<sup>2</sup> While point-of-care tests have been actively promoted, these tests have often been introduced into routine care before rigorous studies. Some Scandinavian countries have used microscopy to detect bacteriuria for several decades, but to date no study has validated its use in current practice. This study was aimed at assessing its validity for the diagnosis of uncomplicated UTI in women, considering urine culture as the gold standard.

A diagnostic accuracy study was carried out in two primary health care centers from 2008 to 2016. Women aged 14 years or older with suspected uncomplicated UTI, defined as the presence of at least dysuria, urgency or frequency, were consecutively recruited. A clean-catch midstream urine specimen was collected from each patient and divided into three tubes: one for microscopic analysis, another one for dipstick analysis, and the remaining sample was sent to the Microbiology Department for assessment of pyuria and urine culture. The microscopic examination was carried out by phase-contrast microscope at a magnification of 400× of an unspun drop of urine obtained within the first 20 min after being taken and was always carried out by the same investigator who was blind to all the variables collected. The physician performing the microscopic evaluation had undergone previous training in microscopic analysis.

Samples which underwent microscopic evaluation at a later time were stored in the fridge until analysis. Samples kept longer than 24h were discarded. A positive urine culture was defined as more than 1000 colony-forming units (CFU) of pure or predominant recognized uropathogen per milliliter, as recommended by IDSA.<sup>3</sup> Significant bacteriuria was defined as the presence of  $>10^5$  CFU/mL according to Kass,<sup>4</sup> and is still considered as the threshold for considering UTI in some countries. The validation parameters of the different diagnostic methods used were calculated.

Of the 689 eligible urine samples collected, 631 were finally analyzed. Of these, 167 (26.5%) presented bacterial contamination and 292 (46.3%) presented UTI. Among the latter, 184 (67%) presented significant bacteriuria. The mean age of the patients included was  $44.1 \pm 19.3$  years. Microscopy presented a sensitivity of 0.79 and a specificity of 0.63. However, this point-of-care test performed better when a significant bacteriuria was considered (Table 1). Bacteriuria by microscopy was the best predictor of positive urine culture, achieving an AUC of 0.71 (95% CI, 0.67–0.75).

We compared the diagnostic performance of the detection of bacteriuria with microscopy with pyuria and urine dipsticks, with their performance as surrogate markers of UTI being poor. This study had some limitations: only few health care centers participated and only one physician evaluated the urine samples by microscopy. In a Danish study, in which urine specimens with a known quantity of bacteria were sent to doctors for microscopic examination, it was found that phase-contrast microscopy presented a sensitivity of 95% and a specificity of 83%. However, these results cannot be compared with our study as the urine samples were artificially produced.<sup>5</sup>

Although microscopic detection of bacteriuria is rapid, this is not sufficiently accurate as the number of false positives is high. Furthermore, its cost is substantial. The need for improved and efficient POCT overcoming these limitations are urgently needed for helping doctors to make more rational decisions when dealing with patients with uncomplicated UTI.<sup>6</sup> The ideal POCT for the detection of bacteriuria in the outpatient setting should be rapid, inexpensive, accurate, that could predict benefit from antibiotic therapy.

**Table 1** Validity of the diagnostic tools used for the diagnosis of UTI.

Parameter	Cut-off point considered	Sensitivity (95% CI)	Specificity (95% CI)	Positive predictive value (95% CI)	Negative predictive value (95% CI)	Positive likelihood ratio (95% CI)	Negative likelihood ratio (95% CI)
Positive protein result	>10 <sup>3</sup> CFU/mL	0.45 (0.39–0.51)	0.66 (0.61–0.71)	0.53 (0.48–0.58)	0.58 (0.55–0.61)	1.33 (1.09–1.61)	0.83 (0.73–0.95)
	>10 <sup>5</sup> CFU/mL	0.46 (0.39–0.54)	0.64 (0.59–0.68)	0.34 (0.30–0.39)	0.74 (0.71–0.77)	1.28 (1.05–1.57)	0.84 (0.72–0.98)
Positive blood result	>10 <sup>3</sup> CFU/mL	0.70 (0.64–0.75)	0.47 (0.42–0.53)	0.53 (0.50–0.56)	0.64 (0.60–0.69)	1.32 (1.17–1.50)	0.64 (0.52–0.79)
	>10 <sup>5</sup> CFU/mL	0.73 (0.65–0.79)	0.44 (0.39–0.49)	0.35 (0.32–0.37)	0.80 (0.75–0.84)	1.29 (1.15–1.46)	0.63 (0.48–0.81)
Positive nitrite result	>10 <sup>3</sup> CFU/mL	0.34 (0.29–0.40)	0.86 (0.82–0.89)	0.67 (0.60–0.73)	0.60 (0.58–0.62)	2.40 (1.76–3.26)	0.77 (0.70–0.84)
	>10 <sup>5</sup> CFU/mL	0.38 (0.31–0.45)	0.83 (0.79–0.86)	0.47 (0.40–0.54)	0.76 (0.74–0.78)	2.16 (1.64–2.84)	0.75 (0.67–0.85)
Positive LE result	>10 <sup>3</sup> CFU/mL	0.92 (0.89–0.95)	0.22 (0.18–0.27)	0.51 (0.49–0.52)	0.78 (0.69–0.84)	1.19 (1.12–1.27)	0.34 (0.21–0.53)
	>10 <sup>5</sup> CFU/mL	0.91 (0.86–0.95)	0.18 (0.15–0.22)	0.31 (0.30–0.33)	0.84 (0.76–0.89)	1.12 (1.05–1.19)	0.48 (0.29–0.79)
Positive LE or nitrites	>10 <sup>3</sup> CFU/mL	0.96 (0.92–0.98)	0.19 (0.15–0.24)	0.50 (0.49–0.52)	0.83 (0.74–0.90)	1.18 (1.12–1.25)	0.23 (0.13–0.41)
	>10 <sup>5</sup> CFU/mL	0.96 (0.92–0.98)	0.16 (0.13–0.20)	0.32 (0.31–0.33)	0.91 (0.83–0.96)	1.14 (1.09–1.20)	0.24 (0.11–0.51)
Positive nitrite or both LE and blood	>10 <sup>3</sup> CFU/mL	0.79 (0.74–0.84)	0.48 (0.42–0.53)	0.56 (0.53–0.59)	0.73 (0.67–0.77)	1.51 (1.34–1.70)	0.44 (0.34–0.57)
	>10 <sup>5</sup> CFU/mL	0.82 (0.76–0.88)	0.43 (0.38–0.47)	0.37 (0.35–0.39)	0.86 (0.81–0.89)	1.44 (1.29–1.59)	0.41 (0.30–0.58)
Presence of pyuria	>10 <sup>3</sup> CFU/mL	0.86 (0.82–0.90)	0.51 (0.45–0.56)	0.60 (0.57–0.63)	0.81 (0.76–0.85)	1.75 (1.55–1.97)	0.27 (0.20–0.37)
	>10 <sup>5</sup> CFU/mL	0.89 (0.83–0.93)	0.43 (0.38–0.48)	0.39 (0.37–0.42)	0.90 (0.86–0.93)	1.56 (1.41–1.72)	0.26 (0.17–0.40)
Bacteriuria by microscopy	>10 <sup>3</sup> CFU/mL	0.79 (0.74–0.84)	0.63 (0.58–0.68)	0.65 (0.61–0.68)	0.78 (0.74–0.82)	2.15 (1.85–2.51)	0.33 (0.26–0.41)
	>10 <sup>5</sup> CFU/mL	0.91 (0.86–0.95)	0.57 (0.53–0.62)	0.47 (0.44–0.50)	0.94 (0.91–0.96)	2.14 (1.90–2.40)	0.16 (0.10–0.25)

LE: leucocyte esterase; CI: confidence interval.

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## Conflict of interests

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Carles Llor<sup>a,\*</sup>, Ana Moragas<sup>b</sup>, Aitor Alfaro<sup>c</sup>, Nuria Sierra<sup>c</sup>

<sup>a</sup> Via Roma Health Centre, Barcelona, Spain

<sup>b</sup> University Rovira I Virgili, Jaume I Health Centre, Tarragona, Spain

<sup>c</sup> Jaume I Health Centre, Tarragona, Spain

\* Corresponding author.

E-mail address: [carles.llor@gmail.com](mailto:carles.llor@gmail.com) (C. Llor).

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## Impacto sobre la adherencia a la dieta mediterránea desde la consulta de enfermería de atención primaria en pacientes con cardiopatía isquémica



### Impact of Primary Care nursing clinics on the adherence to the Mediterranean diet in patients with ischaemic heart disease

Sr. Editor:

La dieta mediterránea (DietMed) forma parte de las recomendaciones de múltiples guías clínicas de prevención cardiovascular<sup>1,2</sup>. Con el objetivo de evaluar una intervención educativa breve realizada por el profesional de enfermería para aumentar la adherencia a la DietMed, diseñamos un estudio de intervención no controlado en pacientes con cardiopatía isquémica (CI). El estudio se realizó en un centro de atención primaria urbano, con una asignación de 18.397 personas adultas, atendida por 13 unidades asistenciales.

Entre julio y diciembre del 2015 se realizó un muestreo secuencial seleccionando 111 pacientes, del total de pacientes con CI pertenecientes a 10 unidades asistenciales. Se aplicaron los siguientes criterios de inclusión: CI y edad igual o inferior a 80 años; y de exclusión: pacientes institucionalizados, esperanza de vida corta, incapacidad para responder a un cuestionario, haber presentado un síndrome coronario agudo en los 3 meses previos, imposibilidad de contactar

con el paciente o rechazar la participación. El protocolo de estudio se realizó en la consulta de enfermería e incluía la medición de factores de riesgo cardiovascular y estilos de vida, y la intervención dietética, realizando un consejo breve tras aplicar el cuestionario de adherencia a la DietMed (MEDAS-14) al inicio y cuatrimestralmente. Dicho cuestionario, validado en población española<sup>3</sup> y empleado en el estudio PREDIMED<sup>4</sup>, es rápido y permite dirigir el consejo; consta de 14 ítems, y ofrece un resultado final de 0 a 14 puntos (a mayor puntuación, mejor adherencia). El estudio finalizaba al completar 4 intervenciones o en su defecto tras un máximo de 18 meses de seguimiento. Como criterio de evaluación se estableció alcanzar una puntuación  $\geq 9$  o un aumento de  $\geq 2$  puntos en el MEDAS-14 al final del estudio, en al menos el 20% de participantes. El tamaño muestral necesario para detectar dicha diferencia en grupos apareados se calculó en 133 participantes. El estudio fue aprobado por el Comité de Ética del Institut d'Investigació en Atenció Primària Jordi Gol (P18/110).

De los 111 pacientes, 15 (14%) cumplieron un único cuestionario y fueron excluidos. Los 96 pacientes incluidos completaron un seguimiento medio de 13,6 meses (desviación intercuartil de 12 a 15). El 81% recibió intervención dietética al menos en 3 ocasiones.

La **tabla 1** muestra los resultados del estudio. Aumentó la respuesta positiva en cada uno de los ítems del cuestionario, excepto en el consumo de alcohol, pero únicamente fue significativo para el consumo recomendado de aceite de oliva y de legumbres. La puntuación media aumentó un punto (diferencia 0,96, intervalo de confianza del 95%: 0,6-1,3 puntos), el 22% de pacientes alcanzaron  $\geq 9$  puntos (intervalo de confianza del 95%: 11-33%) y destacamos que un 39% aumentó