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ORIGINAL ARTICLE

Economic evaluation of ceftibuten in the treatment of uncomplicated urinary tract infections in adult Mexican patients

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KEYWORDS
Urinary infection;
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Abstract
Background: Urinary tract infections are a leading cause of medical consultations in Mexico and the growth of antimicrobial resistance results in increased morbidity and rising costs.
Aim: To make an economic evaluation of ceftibuten as treatment for uncomplicated urinary tract infections in adults, from the perspective of the Mexican private health system.
Methods: A cohort-based decision-making model was developed to compare ceftibuten with TMP-SMX, ciprofloxacin, and cefalexin. Effectiveness was measured using local susceptibility rates of *Escherichia coli*. Costs were obtained from official market value data and converted to 2014 USD values. Incremental analysis was employed to determine if ceftibuten was a worthwhile investment on the part of the private health system in Mexico.
Results: The total expected cost per patient for ciprofloxacin was $116 USD and the corresponding costs for TMP/SMX and cefalexin were $92.40 USD and $74.80 USD, respectively. Ceftibuten had a lower expected cost ($34.50 USD) and a higher percentage of therapeutic success (99.4%), compared with ciprofloxacin 21%, cefalexin 41%, and TMP/SMX 31.7%.
Conclusions: Even though ceftibuten has a higher market price than other antimicrobials in Mexico, it can represent possible savings by avoiding the costs associated with undesirable results due to antimicrobial resistance to *E. coli*.

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PALABRAS CLAVE
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Evaluación económica del ceftibuteno en el tratamiento de infecciones no complicadas urinarias en pacientes adultos mexicanos

Resumen
Antecedentes: Las infecciones urinarias son una causa principal de consultas médicas en México. La resistencia antimicrobiana creciente incrementa la morbilidad y los costos.
Objetivo: Realizar una evaluación económica del ceftibuteno como tratamiento de infecciones urinarias no complicadas en adultos desde la perspectiva del sistema de salud privado en México.
Material y métodos: Cohorte de modelo de decisión comparando ceftibuteno con TMP-SMX, ciprofloxacina y cefalexina. Medición de efectividad usando rangos de susceptibilidad locales para *Escherichia coli*. Costos obtenidos de datos oficiales de valores de mercado y convertidos en valores en dólares americanos en 2014. Análisis incremental utilizado para determinar la inversión en ceftibuteno desde la perspectiva del sistema de salud privado en México.
Resultados: Los costos totales por paciente con ciprofloxacina fueron US$116 mientras que los costos correspondientes con TMP/SMX y cefalexina fueron US$92.4 y US$74.8 respectivamente. El ceftibuteno resultó con valor más bajo (US$34.50) y un alto porcentaje de éxito terapéutico (99.4%) comparado con ciprofloxacina (21%); cefalexina (41%) y TMP/SMX (31.7%).
Conclusiones: El ceftibuteno aun teniendo el valor más alto por unidad en México provee de posibilidad de obtener ahorros evitando costos asociados a resultados indeseables por la resistencia antimicrobiana de *Escherichia coli*.

Introduction

Urinary tract infections (UTIs) are one of the leading causes of medical consultations by adults in Mexico, especially in sexually active women.[1] The incidence of UTIs has increased more than 500% in Mexico, becoming a public health problem that has put pressure on the national healthcare system.[1] A report published by the Mexican Epidemiology Surveillance System revealed a rising incidence of UTIs from 2004 to 2010. The age group of 25–44 years was the most affected with 1,090,886 cases, followed by the group of 50–59 years of age with 386,584 cases. There were 345,152 cases reported for the population 65 years of age and older.[1]

Common symptoms of cystitis are dysuria, urinary frequency and/or pollakiuria,[2] but inappropriate management can result in the complication of pyelonephritis. The impact of UTIs on patient work activities and quality of life makes them a matter of public health.[3]

UTI treatment

Antimicrobial therapy is central in UTI management and essential for preventing the involvement of the renal parenchyma.[4] Choosing antibiotics entails factors that must be considered, such as their in vitro activity against the most prevalent uropathogens, urinary concentrations of the chosen antibiotics, the possibility of sub-optimal concentrations, effects of the antibiotic on the vaginal and gastrointestinal flora, adverse events, and the cost of the therapy.

Most antibiotics reach high concentrations in urine, above the minimum inhibitory concentration for common uropathogens, which will influence treatment effectiveness.[5]

Patterns of antimicrobial resistance

Antimicrobial resistance is a growing global concern because of increased morbidity and mortality, and the consequent rising cost. It is a multifactorial phenomenon caused by the unnecessary use of antibiotics and treatment discontinuation.[6]

In Mexico, *Escherichia coli* is the most prevalent bacteria in ambulatory patients, causing 70–95% of the cases, followed by *Staphylococcus saprophyticus* (5–20%), *Klebsiella pneumoniae* and *Proteus mirabilis* (5–20%).[7]

Studies published over the last decade have reported patterns of in vitro bacterial resistance of *E. coli* strains to amoxicillin-clavulanate, ampicillin-sulbactam, cefuroxime, trimethoprim sulfamethoxazole (TMP-SMX), and fluoroquinolones. This resistance pattern involves most of the oral antimicrobials available in Mexico, limiting treatment to ambulatory UTI patients.[7,8] Other studies have found that TMP-SMX administered 3–6 months prior to the occurrence of a new UTI increases the risk of antibacterial resistance 2.5- to 5-fold, similar to the risk of other factors such as recent hospitalization and diabetes.[9,10]

Within the framework of these rates of antimicrobial resistance, recent studies have shown that the percentage of resistance of *E. coli* to TMP-SMX in a given community is greater than 22% and empirical therapy with fluoroquinolones would be less expensive than TMP-SMX. However, resistance to fluoroquinolones has increased in the last decade in other countries.[11] A specific concern for the present authors is that the Mexican Clinical