Revista de Ciencias Médicas de Pinar del Río

**ISSN:** 1561-3194 **RNPS:** 1877
Rev Ciencias Médicas. 2025; 29(S2): e7060

**REVIEW ARTICLE**

# First-line therapeutic strategies for the management of recurrent urinary tract infections caused by Escherichia *coli*

**Emily Dayana Guzmán-Ramos[1], Alison Dennise Santamaria-Enríquez[1], Alex Ramón Valencia-Herrera[1], Francisco Xavier Poveda-Paredes[1]**

[1]Universidad Regional Autónoma de los Andes. Ambato, Ecuador.

**Received:** December 30, 2025
**Accepted:** December 31, 2025
**Published:** December 31, 2025

**Citar como:** Guzmán-Ramos ED, Santamaria-Enríquez AD, Valencia-Herrera AR, Poveda-Paredes FX. Estrategias terapéuticas de primera línea para el manejo de infecciones urinarias recurrentes causadas por Escherichia *coli*. Rev Ciencias Médicas [Internet]. 2025 [citado: fecha de acceso]; 29(S2): e7060. Disponible en: http://revcmpinar.sld.cu/index.php/publicaciones/article/view/7060

## ABSTRACT

**Introduction:** urinary tract infections represent a growing challenge for health systems, requiring comprehensive approaches based on updated scientific evidence.
**Objective:** to critically analyze recent scientific literature in order to identify first-line therapeutic strategies and preventive measures against recurrent urinary tract infections caused by Escherichia *coli*.
**Methods:** a systematic review of scientific literature was conducted across various databases. The search was performed using an algorithm with keywords and Boolean operators, allowing the identification of relevant sources. Selected studies, after applying inclusion and exclusion criteria, were critically analyzed considering timeliness, methodological quality, and thematic relevance, and integrated into the final synthesis of the review.
**Development:** the reviewed evidence indicates that first-line antibiotics include nitrofurantoin, trimethoprim-sulfamethoxazole, and fosfomycin trometamol, each with specific advantages and limitations. In pregnant women, nitrofurantoin is safe after the first trimester, while fosfomycin offers good adherence due to its single-dose administration. In cases of extended-spectrum beta-lactamase-producing strains, carbapenems and aminoglycosides are recommended, although they require monitoring due to toxicity. The most effective preventive measures include postcoital prophylaxis, vaginal estrogen use in postmenopausal women, adequate hydration, and hygiene practices.

**ISSN:** 1561-3194 **RNPS:** 1877
Rev Ciencias Médicas. 2025; 29(S2): e7060

**Conclusions:** the review confirms that the management of recurrent urinary tract infections requires combining safe antibiotic therapies with sustainable preventive strategies. Strengthening primary care, monitoring bacterial resistance, and fostering technological innovation are key elements to reduce recurrences and guide public health policies in community healthcare.

**Keywords:** Anti-Bacterial Agents; Drug Resistance, Microbial; Escherichia coli Infections; Urinary Tract Infections.



## INTRODUCTION

Recurrent urinary tract infections (RUTIs) are defined as three episodes of UTIs within the last 12 months or two episodes within the last six months. They can occur in both men and women but predominantly affect young sexually active women, pregnant individuals, postmenopausal women, and patients with underlying urological conditions.[1] RUTIs may result from reinfection or relapse, both occurring more than two weeks after initial treatment. Reinfection accounts for approximately 95 % of cases and is caused by Gram-negative bacteria originating outside the urinary tract—primarily from the gut, with *Escherichia coli* (*E. coli*) responsible for 75–95 % of these infections. [2]

It is estimated that approximately 60 % of women experience at least one episode of acute bacterial cystitis in their lifetime. Of these, 20–40 % will have another episode, and 25–50 % will suffer multiple recurrences. [3] In Ecuador, the annual incidence among women reaches up to 15 %, particularly in those with underlying conditions.[4]

RUTIs caused by *E. coli* are driven by virulence factors such as adhesins, toxins, and capsules that enable the bacterium to adhere to, invade, and persist in the urinary tract.[5] Additionally, host-related factors—including alterations in vaginal microbiota, loss of normal acidic pH in secretions, anatomical abnormalities, immunological dysfunction, and use of urinary devices—contribute to susceptibility.[6]

Management of *E. coli*-related RUTIs relies on first-line antibiotics—nitrofurantoin, TMP-SMX, and fosfomycin trometamol—combined with preventive measures such as postcoital prophylaxis, vaginal estrogens in postmenopausal women, adequate hydration, and proper hygiene. Nitrofurantoin stands out for its efficacy and low resistance rates, although it may cause adverse effects in patients over 50 years of age. TMP-SMX acts synergistically by inhibiting folic acid synthesis, while fosfomycin offers high treatment adherence due to single-dose administration and a favorable safety profile. In pregnancy, nitrofurantoin is considered safe during the second and third trimesters, whereas fosfomycin serves as an effective alternative. These strategies aim to reduce recurrences while balancing therapeutic efficacy and safety.[7,8,9,10]

However, the presence of extended-spectrum beta-lactamase (ESBL)-producing strains poses a clinical challenge, as they inactivate penicillins and cephalosporins, necessitating broad-spectrum antibiotics such as carbapenems, aminoglycosides, and newer-generation cephalosporins (e.g., ceftazidime/avibactam). Fosfomycin remains useful due to its safety and convenience—even in pregnant and lactating women—though aminoglycoside use requires monitoring for renal and auditory toxicity. Empirical treatment must consider expected resistance patterns, with options including meropenem, piperacillin/tazobactam, and amikacin,

**ISSN:** 1561-3194 **RNPS:** 1877
Rev Ciencias Médicas. 2025; 29(S2): e7060

pending antimicrobial susceptibility results. Overall, evidence underscores the need for protocols based on microbiological surveillance and rational antibiotic use to address rising bacterial resistance.[11,12,13]

Given this context, the present review was conducted to critically analyze recent scientific literature and identify first-line therapeutic strategies and preventive measures for RUTIs caused by *E. coli*.

## METHODS

A systematic and descriptive bibliographic review was conducted, restricted to English and Spanish languages. High-impact, academically relevant scientific articles were selected using rigorous Medical Subject Headings (MeSH) terms: "Urinary Tract Infections," "Therapeutics," "Anti-Bacterial Agents," "Prevention & Control," combined with Boolean operators (AND, OR) to refine the search strategy. The search period spanned May to July 2024.

Inclusion criteria comprised publications from 2019 to June 2024 addressing: "Confirmed Diagnosis of Urinary Tract Infection," "Recurrent Infections," "Antibiotic Resistance," and "Clinical Symptoms." Exclusion criteria included: "Medical Complications," "Adverse Effects or Allergies," "Recent Antibiotic Use," and "Severe Infections." Indexed, high-impact journal articles, systematic reviews, meta-analyses, updated textbooks, and relevant medical literature on first-line therapeutic management of *E. coli*-associated RUTIs were included.

The PICOT framework guided the research scope and evidence evaluation:

- P (Population): Women of all ages, including pregnant individuals, with recurrent UTIs
- I (Intervention): First-line therapeutic management
- C (Comparator): Available alternative treatments
- O (Outcome): Efficacy in reducing recurrences and improving symptoms
- T (Time): Follow-up period

PICOT Question: In women of all ages, including pregnant individuals, with recurrent urinary tract infections, what is the first-line therapeutic management compared to alternative treatments in terms of efficacy in reducing recurrences and improving symptoms?

Following PRISMA methodology (Figure 1), an exhaustive search was performed in electronic databases including SciELO, Elsevier, PubMed, Cochrane, Epistemonikos, and journals such as Medigraphic Artemisa, Medicrit, Science, and Recimundo. Approximately 80 records were identified; after duplicate removal, 54 remained. Following title/abstract screening and publication date verification, 26 were excluded, leaving 28 eligible articles. After applying inclusion/exclusion criteria, 19 were removed, and 35 articles were included in the final analysis and synthesis.

**ISSN:** 1561-3194 **RNPS:** 1877
Rev Ciencias Médicas. 2025; 29(S2): e7060

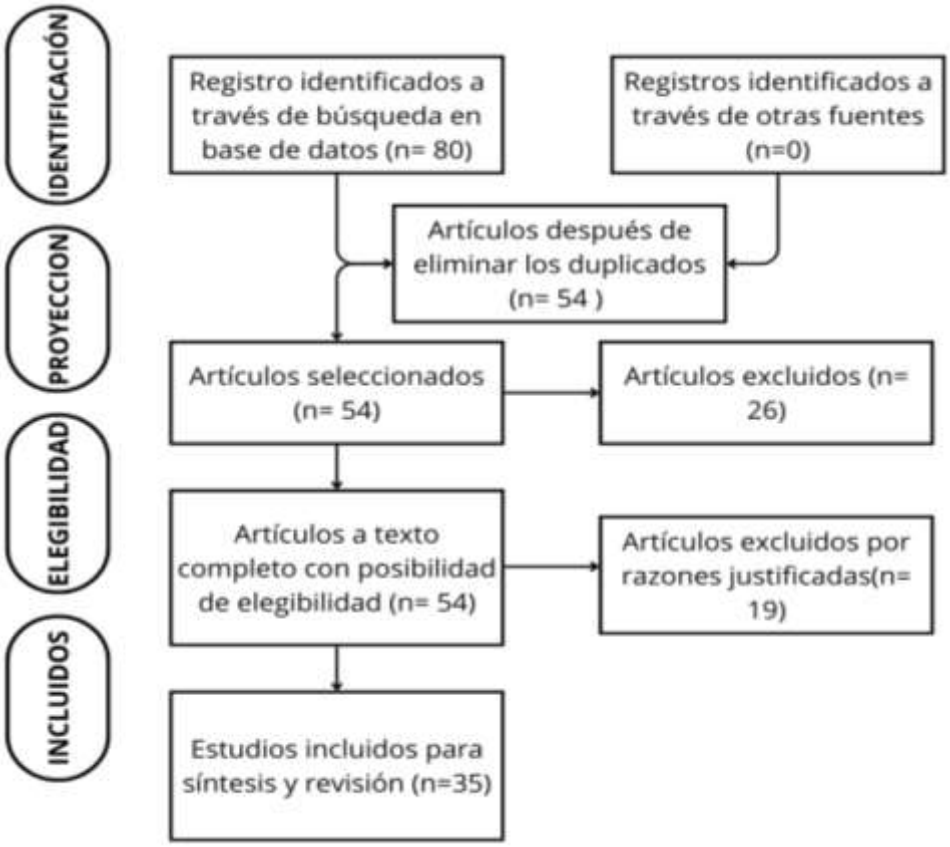


**Fig. 1** PRISMA flow diagram.

## RESULTS

First-line treatment for *E. coli*-related RUTIs includes antibiotics such as nitrofurantoin, trimethoprim-sulfamethoxazole (TMP-SMX), and fosfomycin trometamol, combined with postcoital prophylaxis and preventive measures to reduce recurrence risk.[7]

Nitrofurantoin, administered at 50–100 mg doses, is preferred for its ability to inhibit bacterial DNA and RNA synthesis, effectively eliminating pathogens without disrupting intestinal or vaginal microbiota and exhibiting low resistance rates. However, it may cause adverse effects in patients over 50 years, including acute pulmonary reactions and severe cutaneous allergic reactions, which can be life-threatening in rare cases.[8]

TMP-SMX's efficacy stems from the synergistic action of two antimicrobials that inhibit folic acid synthesis. At doses of 400 mg and 200 mg, respectively, it effectively eradicates *E. coli*. Prolonged use has not been linked to increased recurrence rates. Despite its effectiveness, it may cause allergic reactions and gastrointestinal disturbances.[9]

Fosfomycin trometamol inhibits bacterial cell wall synthesis, leading to rapid pathogen clearance. Its main advantage is single-dose administration (3 g), which improves treatment adherence. It has minimal side effects and lower bacterial resistance rates compared to other common

**ISSN:** 1561-3194 **RNPS:** 1877
Rev Ciencias Médicas. 2025; 29(S2): e7060

antibiotics, achieving high urinary concentrations and maintaining therapeutic levels for extended periods.[10]

Management of *E. coli* RUTIs in pregnant women requires special attention due to risks to both mother and fetus. Nitrofurantoin is the antibiotic of choice during the second and third trimesters but is avoided in the first trimester due to potential teratogenic effects.[11]

Vaginal estrogen therapy can reduce RUTIs in postmenopausal women by restoring vaginal epithelium and microbiota, which are compromised by declining estrogen levels after menopause. This creates a healthier vaginal and urethral environment less susceptible to pathogenic colonization.[12]

Postcoital antimicrobial prophylaxis is an effective preventive strategy, particularly in women prone to UTIs after sexual activity. This approach involves taking a single antibiotic dose immediately after intercourse—commonly nitrofurantoin—to prevent infection development.[13]

To prevent UTIs caused by *E. coli*, it is crucial to maintain adequate hydration and good personal hygiene, such as wiping from front to back and fully emptying the bladder when urinating, which is also fundamental.[14] Avoiding irritants such as tobacco and alcohol, and opting for cotton underwear to allow better ventilation, may reduce the risk of UTIs.[15]

Of particular concern are antibiotic-resistant strains, such as ESBL-producing *E. coli*. RUTIs caused by these bacteria present a significant therapeutic challenge due to their resistance to beta-lactam antibiotics.[16]

ESBL-producing *E. coli* are common and require broad-spectrum antibiotics. These resistant strains inactivate penicillins and cephalosporins via beta-lactamase enzymes, often resulting from inappropriate antibiotic use.[17]

Preferred agents for ESBL-producing *E. coli* RUTIs include carbapenems such as ertapenem (1 g IV/IM daily for 3–14 days), which are highly effective but require monitoring to prevent selection of resistant strains. Aminoglycosides are also effective but necessitate careful blood level and renal function monitoring due to high toxicity.[18]

Newer-generation cephalosporins like ceftazidime/avibactam (2,5 g IV infusion over 2 hours every 8 hours for 5–14 days) are effective against ESBL-producing *E. coli*, especially in severe infections. Fosfomycin trometamol (3 g oral single dose dissolved in water) offers a favorable safety profile and convenient administration.[19]

In pregnant women with ESBL-producing *E. coli* RUTIs, treatment options include ertapenem (1 g IV daily), fosfomycin trometamol (3 g oral single dose), and nitrofurantoin (100 mg every 6–12 hours for 5–7 days)—the latter avoided in the first trimester due to potential congenital defects and in late pregnancy due to risk of neonatal hemolytic anemia.[20]

In lactating infants, carbapenems and aminoglycosides (e.g., amikacin 15 mg/kg/day IV in one or two divided doses; gentamicin 5–7,5 mg/kg/day in two–three divided doses for 7–10 days) are preferred, with careful monitoring due to ongoing renal and auditory system development. Fosfomycin may be used cautiously.[21]

Empirical treatment of ESBL-producing *E. coli* UTIs is complex due to multidrug resistance. Initial therapy must account for expected resistance patterns while awaiting culture and susceptibility results.[22]

**ISSN:** 1561-3194 **RNPS:** 1877
Rev Ciencias Médicas. 2025; 29(S2): e7060

Empirical treatment options include carbapenems such as meropenem 1 g intravenously every 8 hours, fosfomycin trometamol as a single 3 g oral dose, piperacillin/tazobactam 3,37 g intravenously every 6 hours, and amikacin 15 mg/kg per day administered intravenously.[23]

RUTIs are defined as three UTI episodes in the past 12 months or two in the past six months. While affecting both sexes, they are especially prevalent in young sexually active women, pregnant individuals, postmenopausal women, and those with underlying urological conditions.[24]

Reinfection (95 % of cases) is typically caused by gut-derived Gram-negative bacteria like *E. coli*, responsible for 75–95 % of RUTIs.[25]

In terms of incidence and prevalence, approximately 60 % of women experience at least one episode of acute bacterial cystitis during their lifetime. Of these, between 20 % and 40 % will have another episode, and between 25 % and 50 % experience multiple recurrences.[3] In Ecuador, the annual incidence in women is up to 15 %, being higher among those with underlying conditions.[26]

First-line treatment for UTIs caused by *E. coli* includes antibiotics such as nitrofurantoin, trimethoprim-sulfamethoxazole, and fosfomycin trometamol, along with postcoital prophylaxis and preventive measures. Nitrofurantoin, at doses of 50 or 100 mg, is preferred for its efficacy in inhibiting bacterial DNA and RNA synthesis without altering intestinal or vaginal microbiota, and for its low resistance rate. However, it may cause severe adverse effects in patients over 50 years of age. Trimethoprim-sulfamethoxazole combines two antimicrobial agents that inhibit folic acid synthesis, effectively eradicating *E. coli* at doses of 400 mg and 200 mg respectively. Despite its effectiveness, it may cause allergic reactions and gastrointestinal disorders.[26]

Fosfomycin trometamol inhibits bacterial cell wall synthesis and is administered as a single 3 g dose, improving treatment adherence. It has minimal side effects and a low bacterial resistance rate, reaching high urinary concentrations and maintaining prolonged therapeutic levels. In pregnant women, treatment of UTIs caused by *E. coli* requires special attention. Nitrofurantoin is the antibiotic of choice during the second and third trimesters but is avoided in the first trimester due to potential teratogenic effects.[27]

Vaginal estrogen therapy can reduce UTIs in postmenopausal women by restoring the vaginal epithelium and microbiota, creating an environment less susceptible to bacterial colonization.[12] In addition to antibiotic therapy, postcoital microbial prophylaxis is effective in preventing UTIs, especially in women susceptible after sexual activity, using nitrofurantoin.[28]

To prevent UTIs caused by *E. coli*, it is crucial to maintain good hydration, personal hygiene (wiping from front to back and fully emptying the bladder when urinating), avoid irritants such as tobacco and alcohol, and opt for cotton underwear to improve ventilation.

Extended-spectrum beta-lactamase (ESBL)-producing *E. coli* resistance to beta-lactam antibiotics such as penicillins and cephalosporins represents a significant challenge in UTI treatment. This resistance is due to the bacterium's ability to inactivate these antibiotics through the production of specific beta-lactamases.[29]

To address this resistance, several antibiotics of choice have been identified: carbapenems such as ertapenem and meropenem are highly effective against ESBL-producing *E. coli*, but prolonged use requires careful monitoring to avoid the selection of resistant strains.[29]

**ISSN:** 1561-3194 **RNPS:** 1877
Rev Ciencias Médicas. 2025; 29(S2): e7060

Aminoglycosides such as amikacin and gentamicin are also effective, although their use must be accompanied by strict monitoring due to potential toxicity, which may manifest as nephrotoxicity and ototoxicity. Fosfomycin trometamol stands out for its safety profile and convenience, as it is administered as a single oral dose and is effective in severe infections.[30]

In pregnant women, carbapenems and fosfomycin trometamol are safe options, although nitrofurantoin should be avoided in the first trimester and in the last weeks of pregnancy due to potential risks to the fetus, such as congenital defects and neonatal hemolytic anemia.[31] In infants, carbapenems and aminoglycosides are preferred, with special attention to monitoring due to the risk of toxicity in developing systems, and fosfomycin may be used cautiously.[21]

Empirical treatment for urinary tract infections caused by ESBL-producing *Escherichia coli* is challenging due to resistance to multiple antibiotics. Empirical options include carbapenems such as meropenem (1 g intravenously every 8 hours) and ertapenem (1 g intravenously every 24 hours), which are effective against these resistant strains. Fosfomycin trometamol (3 g orally as a single dose) may be considered in uncomplicated infections.[32]

Although piperacillin/tazobactam (3,37 g intravenously every 6 hours) may be useful in some strains, its efficacy is not guaranteed in the presence of ESBLs. Amikacin (15 mg/kg/day intravenously) is another effective alternative for complicated infections. Treatment selection must be tailored to the severity of the infection and antimicrobial susceptibility results.[33]



## CONCLUSIONS

Recurrent urinary tract infections constitute a significant clinical challenge due to their high prevalence and impact on quality of life—particularly in young women, pregnant individuals, postmenopausal women, and those with urological comorbidities. First-line treatment includes nitrofurantoin, trimethoprim-sulfamethoxazole, and fosfomycin trometamol, selected based on safety and resistance profiles. Preventive strategies—postcoital prophylaxis, vaginal estrogens, adequate hydration, and proper hygiene—are essential to reduce recurrences. In cases of ESBL-producing *Escherichia coli*, empirical management is complex and requires broad-spectrum antibiotics such as carbapenems, fosfomycin, piperacillin/tazobactam, or amikacin, enabling early intervention and improved clinical outcomes despite the challenge of bacterial resistance. These findings highlight the importance of integrating antimicrobial stewardship, resistance surveillance, and patient-centered prevention into community health strategies.

## REFERENCIAS BIBLIOGRÁFICAS

1. 1. Valdevenito JP, Álvarez D. Infección urinaria recurrente en la mujer. Rev médica Clín Las Condes [Internet]. 2018 [citado 30/06/2024]; 29(2): 222–31. Disponible en: http://dx.doi.org/10.1016/j.rmclc.2018.02.010

2. Solano Mora A, Solano Castillo A, Ramírez Vargas X. Actualización del manejo de infecciones de las vías urinarias no complicadas. Rev Medica Sinerg [Internet]. 2020 [citado 30/06/2024]; 5(2): e356. Disponible en: https://www.researchgate.net/publication/339614238_Actualizacion_del_manejo_de_infecciones_de_las_vias_urinarias_no_complicadas

**ISSN:** 1561-3194 **RNPS:** 1877
Rev Ciencias Médicas. 2025; 29(S2): e7060

3. Bono MJ, Leslie EW. Uncomplicated Urinary Tract Infections [Internet]. StatPearls; 2025 [citado 30/06/2026]. Disponible en: https://www-ncbi-nlm-nih-gov.translate.goog/books/NBK470195/?_x_tr_sl=en&_x_tr_tl=es&_x_tr_hl=es&_x_tr_pto=tc

4. Rodríquez J, López Y. EPIDEMIOLOGÍA DE LAS INFECCIONES DE VÍAS URINARIAS POR ENTEROBACTERIAS PRODUCTORAS DE BLEE EN MUJERES EMBARAZADAS DE ECUADOR [Tesis]: UNIVERSIDAD ESTATAL DEL SUR DE MANABÍ; 2020 [citado 30/06/2024]. Disponible en: https://repositorio.unesum.edu.ec/handle/53000/2541?mode=full

5. Córdova Zea SP, Marcillo Indacochea XE, Lucas Parrales EN. Infecciones del tracto genitourinario asociadas a Escherichia coli: epidemiologia en Latinoamérica. MQRInvestigar [Internet]. 2023 [citado 30/06/2024]; 7(1): 309–29. Disponible en: https://www.investigarmqr.com/ojs/index.php/mqr/article/view/169

6. Giordani V. Infección urinaria en la mujer [Internet]. HOSPITAL ITALIANO DE L A PLAT;s\a [citado 30/06/2024]. Disponible en: https://sedici.unlp.edu.ar/bitstream/handle/10915/147703/Documento_completo.pdf-PDFA.pdf?sequence=1&isAllowed=y

7. Furiasse D, Martos I, Juaneda R, Aviles N, Orecchini A, Bergallo C, et al. Perfil etiológico y sensibilidad antimicrobiana en infecciones urinarias de la comunidad en un Centro Privado de la ciudad de Córdoba. Rev salud pública [Internet]. 2020 [citado 30/06/2024]; 24(3): 29–36. Disponible en: https://revistas.unc.edu.ar/index.php/RSD/article/view/27587

8. Cervantes J. EFICACIA DEL USO DE GENTAMICINA INTRAVESICAL EN COMPARACIÓN CON NITROFURANTOÍNA EN EL TRATAMIENTO PROFILÁCTICO DE PACIENTES CON INFECCIÓNES DE VÍAS URINARIAS RECURRENTES DEL HOSPITAL CENTRAL "DR. IGNACIO MORONES PRIETO", ENSAYO CLÍNICO ALEATORIZADO DOBLE CIEGO [Tesis]. UNIVERSIDAD AUTÓNOMA DE SAN LUIS POTOSÍ FACULTAD DE MEDICINA HOSPITAL CENTRAL"DR. IGNACIO MORONES PRIETO"; 2020 [citado 30/06/2024]. Disponible en: https://repositorioinstitucional.uaslp.mx/xmlui/handle/i/7360

9. Jent P, Berger J, Kuhn A, Trautner BW, Atkinson A, Marschall J. Antibiotics for preventing Recurrent urinary tract infection: Systematic review and meta-analysis. Open Forum Infect Dis [Internet]. 2022 [citado 30/06/2024]; 9(7): ofac327. Disponible en: https://academic.oup.com/ofid/article/9/7/ofac327/6628136

10. Matthews PC, Barrett LK, Warren S, Stoesser N, Snelling M, Scarborough M, et al. Oral fosfomycin for treatment of urinary tract infection: a retrospective cohort study. BMC Infect Dis [Internet]. 2016 [citado 30/06/2024]; 16(556). Disponible en: http://dx.doi.org/10.1186/s12879-016-1888-1

11. Habak PJ, Carlson K, Griggs, Jr RP. Urinary Tract Infection in Pregnancy. [Updated 2024 Apr 20]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan- [citado 30/06/2024]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK537047/

12. Ferrante KL, Wasenda EJ, Jung CE, Adams-Piper ER, Lukacz ES. Vaginal estrogen for the prevention of recurrent urinary tract infection in postmenopausal women: A randomized clinical trial. Female Pelvic Med Reconstr Surg [Internet]. 2021 [citado 30/06/2024]; 27(2): 112–7. Disponible en: https://pubmed.ncbi.nlm.nih.gov/31232721/

**ISSN:** 1561-3194 **RNPS:** 1877
Rev Ciencias Médicas. 2025; 29(S2): e7060

13. Pérez Fernández T, Agüero Moreira M, Troz Parra IP. Tratamiento y profilaxis de la infección urinaria recurrente en la mujer. Rev Medica Sinerg [Internet]. 2022 [citado 30/06/2024]; 7(2): e737. Disponible en: https://revistamedicasinergia.com/index.php/rms/article/download/737/1705/5337

14. Calderón-Jaimes E, Casanova-Román G, Galindo-Fraga A, Gutiérrez-Escoto P, Landa-Juárez S, Moreno-Espinosa S, et al. Diagnóstico y tratamiento de las infecciones en vías urinarias: un enfoque multidisciplinario para casos no complicados. Bol Med Hosp Infant Mex [Internet]. 2013 [citado 30/06/2024]; 70(1): 03–10. Disponible en: https://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S1665-11462013000100003

15. Pascual Lopez I. Relación entre la microbiota intestinal y genital con las infecciones urinarias recurrentes en mujeres [Tesis]. Universitat Autònoma de Barcelona. Facultat de Medicina; 2020 [citado 30/06/2024]. Disponible en: https://ddd.uab.cat/record/232824

16. Pinguil Yugsi ME, Estevez Montalvo E, Andrade Campoverde D, Fernanda Alvarado M. Escherichia coli productora de BLEE de origen comunitario e intrahospitalario. Revista Vive [Internet]. 2022 [citado 30/06/2024]; 5(14): 518–28. Disponible en: http://www.scielo.org.bo/scielo.php?pid=S2664-32432022000200518&script=sci_arttext

17. Hidalgo C, Godoy V, Bernuy M. Abordaje de la infección urinaria recurrente causada por Escherichia coli BLEE (+) mediante regulación del pH vaginal [Internet]. 2023 [citado 30/06/2024]; 9(2): 150-154. Disponible en: https://dialnet.unirioja.es/servlet/articulo?codigo=9523481

18. Pascual IP, Santiago AD de, Serrano AM. Infecciones por bacilos gramnegativos productores de carbapenemasas. Medicine [Internet]. 2022 [citado 30/06/2024]; 13(51): 2992–3001. Disponible en: http://dx.doi.org/10.1016/j.med.2022.03.004

19. de Cueto M, Hernández JR, López-Cerero L, Morillo C, Pascual Á. Actividad de fosfomicina sobre cepas de Escherichia coli y Klebsiella pneumoniae productoras de betalactamasas de espectro extendido. Enferm Infecc Microbiol Clin [Internet]. 2006 [citado 30/06/2024]; 24(10): 613–6. Disponible en: https://www.elsevier.es/es-revista-enfermedades-infecciosas-microbiologia-clinica-28-articulo-actividad-fosfomicina-sobre-cepas-escherichia-13095372

20. Quirós-Del Castillo AL, Apolaya-Segura M. Prevalencia de infección de la vía urinaria y perfil microbiológico en mujeres que finalizaron el embarazo en una clínica privada de Lima, Perú. Ginecol. obstet. Méx. [Internet]. 2018 [citado 30/06/2024]; 86(10): 634-639. Disponible en: http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S0300-90412018001000634&lng=es.

21. Gutiérrez V, Pérez R, Pavez D, Hevia P, Acuña M, Benadof D, et al. Recomendaciones para diagnóstico y tratamiento de la infección del tracto urinario en pediatría. Parte 1: Grupo de trabajo asociado al Comité de Antimicrobianos, Sociedad Chilena de Infectología (SOCHINF). Rev. chil. infectol. [Internet]. 2022 Abr [citado 30/06/2024]; 39(2): 174-183. Disponible en: http://www.scielo.cl/scielo.php?script=sci_arttext&pid=S0716-10182022000200174&lng=es.

**ISSN:** 1561-3194 **RNPS:** 1877
Rev Ciencias Médicas. 2025; 29(S2): e7060

22. Bringas A, Rosario E. Factores de riesgo para infección urinaria por Escherichia coli Productor de Betalactamasa de Espectro Extendido (BLEE) en pacientes hospitalizados en el servicio de Medicina Interna del Hospital Vitarte de Enero 2020 a Diciembre 2021 [Internet]. Universidad Ricardo Palma – URP; 2023 [citado 30/06/2024]. Disponible en: https://repositorio.urp.edu.pe/entities/publication/8f4017d4-9576-4acc-ac99-29f9044225fb

23. Nemirovsky C, López Furst MJ, Pryluka D, De Vedia L, Scapellato P, Colque A, et al. Consenso Argentino intersociedades de Infección Urinaria 2018-2019 - Parte II. Medicina (B. Aires) [Internet]. 2020 Jun [citado 30/06/2024]; 80(3): 241-247. Disponible en: http://www.scielo.org.ar/scielo.php?script=sci_arttext&pid=S0025-76802020000400007&lng=es.

24. Pigrau C, Escolà-Vergé L. Infecciones urinarias recurrentes: desde la patogenia a las estrategias de prevención. Med Clin (Barc) [Internet]. 2020 [citado 30/06/2024]; 155(4): 171–7. Disponible en: http://dx.doi.org/10.1016/j.medcli.2020.04.026

25. Solís MB, Romo S, Granja M, Sarasti JJ, Paz y Miño A, Zurita J. Infección comunitaria del tracto urinario por Escherichia coli en la era de resistencia antibiótica en Ecuador. Metro Ciencia [Internet]. 2022 [citado 30/06/2024]; 30(1): 37-48. Disponible en: https://revistametrociencia.com.ec/index.php/revista/article/view/321

26. Ramírez F, Exeni A, Alconcher L, Coccia P. GU-A PARA EL DIAGN-STICO, ESTUDIO Y TRATAMIENTO DE LA INFECCI-N URINARIA: ACTUALIZACI-N 2022. ASOCIACI-N LATINOAMERICANA DE NEFROLOGA PEDIÁTRICA [Internet]. 2022 [citado 30/06/2024]; 22(3): 128-49. Disponible en: https://www.alanepe.org/wp-content/uploads/2023/03/ALANEPE-2022-3-completa.pdf

27. Espitia De La Hoz FJ. Infección de las vías urinarias en el embarazo. Rev. Avances en salud [Internet]. 2020 Nov. 16 [citado 30/06/2024]; 4(2): 40-53. Available from: https://revistas.unicordoba.edu.co/index.php/avancesalud/article/view/2478

28. Isasi Barrado L. Profilaxis no antimicrobiana en infecciones del tracto urinario. Revisión bibliográfica [Tesis]. Universidad de Valladolid; 2023 [citado 30/06/2024]. Disponible en: https://uvadoc.uva.es/handle/10324/67869

29. Díaz Velásquez S, Castañeda Torres K, Santa Cruz López C, Carrasco Solano F, Moreno Mantilla M. ETIOLOGIA DE INFECCIONES URINARIA Y PREVALENCIA DE Escherichia coli, PRODUCER OF EXTENDED SPECTRUM BETALACTAMASES AND CARBAPENEMASES. Rebiol [Internet]. 2021 [citado 30/06/2024]; 41(2): 179-186. Disponible en: https://revistas.unitru.edu.pe/index.php/facccbiol/article/download/4026/4953

30. Marcos-Carbajal P, Galarza-Pérez M, Huancahuire-Vega S, Otiniano-Trujillo M, Soto-Pastrana J. Comparación de los perfiles de resistencia antimicrobiana de Escherichia coli uropatógena e incidencia de la producción de betalactamasas de espectro extendido en tres establecimientos privados de salud de Perú. Biomédica [Internet]. 2020 May [cited 30/07/2024]; 40(Suppl 1): 139-147. Available from: http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S0120-41572020000500139&lng=en.

31. Rodríguez Pin A, López Anchundia S. A DE LAS INFECCIONES DE VAS URINARIAS POR ENTEROBACTERIAS PRODUCTORAS DE BLEE EN MUJERES EMBARAZADAS DE ECUADOR [Tesis]. UNIVERSIDAD ESTATAL DEL SUR DE MANABí; 2020 [citado 30/06/2024]. Disponible en: https://repositorio.unesum.edu.ec/handle/53000/2541?mode=full

**ISSN:** 1561-3194 **RNPS:** 1877
Rev Ciencias Médicas. 2025; 29(S2): e7060

32. Chacón A, Hoepker R. Perfil epidemiológico y microbiológico de los hemocultivos y cultivos respiratorios positivos en el Hospital Nacional de Geriatría y Gerontología durante el período de abril 2021 a abril 2022 [Tesis]. Costa Rica: Universidad de Costa Rica; 2023 [citado 30/06/2024]. Disponible en: https://www.kerwa.ucr.ac.cr/server/api/core/bitstreams/03dbe07a-89fd-49f1-8dd2-7ae7a79e58d0/content

33. Álvarez J, Rojas Á, Carvajal C, Revello J, Meza P, Guggiana P, et al. Evaluación de susceptibilidad y respuesta al tratamiento con piperacilina/tazobactam en pacientes con infecciones por Escherichia coli productoras de β-lactamasas de espectro extendido (BLEE) CTX-M. Rev. chil. infectol. [Internet]. 2018 Ago [citado 02/08/2024]; 35(4): 343-350. Disponible en: http://www.scielo.cl/scielo.php?script=sci_arttext&pid=S0716-10182018000400343&lng=es.