J Antimicrob Chemother
doi:10.1093/jac/dkw578

Journal of Antimicrobial Chemotherapy

# Antimicrobial resistance in uropathogens and appropriateness of empirical treatment: a population-based surveillance study in Indonesia

**Adhi Kristianto Sugianli[1]†, Franciscus Ginting[2]†, R. Lia Kusumawati[3], Emmy Hermiyati Pranggono[4], Ayodhia Pitaloka Pasaribu[5], Firza Gronthoud[6]‡, Suzanne Geerlings[7], Ida Parwati[1], Menno D. De Jong[6], Frank Van Leth[8]§ and Constance Schultsz[6,8]*§**

*[1]Department of Clinical Pathology, Faculty of Medicine, Universitas Padjadjaran, Dr Hasan Sadikin General Hospital Bandung, Bandung, Indonesia; [2]Department of Internal Medicine, Faculty of Medicine, Universitas Sumatera Utara, H. Adam Malik Hospital Medan, Medan, Indonesia; [3]Department of Microbiology, Faculty of Medicine, Universitas Sumatera Utara, H. Adam Malik Hospital Medan, Medan, Indonesia; [4]Department of Internal Medicine, Faculty of Medicine, Universitas Padjadjaran, Dr Hasan Sadikin Hospital Bandung, Bandung, Indonesia; [5]Department of Pediatrics, Faculty of Medicine, Universitas Sumatera Utara, H. Adam Malik Hospital Medan, Medan, Indonesia; [6]Department of Medical Microbiology, Academic Medical Center, University of Amsterdam, Amsterdam, The Netherlands; [7]Department of Internal Medicine, Division of Infectious Diseases, Academic Medical Center, University of Amsterdam, The Netherlands; [8]Department of Global Health-Amsterdam Institute for Global Health and Development, Academic Medical Center, University of Amsterdam, Amsterdam, The Netherlands*

*Corresponding author. Department of Global Health-Amsterdam Institute for Global Health and Development, Academic Medical Center, P.O. Box 22700, 1100DE Amsterdam, The Netherlands. Tel: +31-20-5667800; E-mail: c.schultsz@aighd.org
†These authors contributed equally.
‡Present address: Department of Medical Microbiology, University Hospital of South Manchester NHS Foundation Trust, Manchester, UK.
§These authors contributed equally.

*Received 3 October 2016; returned 10 November 2016; revised 9 December 2016; accepted 16 December 2016*

**Objectives:** Urinary tract infections (UTIs) are a common reason for empirical treatment with broad-spectrum antibiotics worldwide. However, population-based antimicrobial resistance (AMR) prevalence data to inform empirical treatment choice are lacking in many regions, because of limited surveillance capacity. We aimed to assess the prevalence of AMR to commonly used antimicrobial drugs in *Escherichia coli* and *Klebsiella pneumoniae* isolated from patients with community- or healthcare-associated UTIs on two islands of Indonesia.

**Methods:** We performed a cross-sectional patient-based study in public and private hospitals and clinics between April 2014 and May 2015. We screened patients for symptoms of UTIs and through urine dipstick analysis. Urine culture and susceptibility testing were supported by telemicrobiology and interactive virtual laboratory rounds. Surveillance data were entered in forms on mobile phones.

**Results:** Of 3424 eligible patients, 3380 (98.7%) were included in the final analysis, and yielded 840 positive cultures and antimicrobial susceptibility data for 657 *E. coli* and *K. pneumoniae* isolates. Fosfomycin was the single oral treatment option with resistance prevalence <20% in both *E. coli* and *K. pneumoniae* in community settings. Tigecycline and fosfomycin were the only options for treatment of catheter-associated UTIs with resistance prevalence <20%, whilst the prevalence of resistance to meropenem was 21.3% in *K. pneumoniae*.

**Conclusions:** Patient-based surveillance of AMR in *E. coli* and *K. pneumoniae* causing UTIs indicates that resistance to the commonly available empirical treatment options is high in Indonesia. Smart AMR surveillance strategies are needed to inform policy makers and to guide interventions.