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Short Communication

Trends and factors associated with antimicrobial resistance of *Acinetobacter* spp. invasive isolates in Europe: A country-level analysis

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ABSTRACT

Objectives: This study investigated trends and factors associated with antimicrobial resistance (AMR) in *Acinetobacter* spp. in Europe.
Methods: Using data from EARS-Net, population-weighted multilevel logistic regression models with random intercepts for each participating country were performed to assess trends in *Acinetobacter* AMR. Countries were divided into two groups (Northern versus Southern-Eastern) using a convenient US $35 000 cut-off of the 2016 gross domestic product per capita (GDPPC).
Results: In most countries, there were no ascending or descending trends over time. The models showed a consistent higher prevalence of AMR to aminoglycosides, carbapenems and fluoroquinolones in countries with GDPPC <US$35 000. The estimated 2016 proportion of *Acinetobacter* resistance was 6.4% (95% CI 3.2–9.6%) and 66.5% (95% CI 56.3–76.8%) to aminoglycosides, 5.9% (95% CI 3.5–8.3%) and 68.5% (95% CI 58.1–79%) to carbapenems, 9.1% (95% CI 5.8–12.5%) and 74.7% (95% CI 66.2-83.2%) to fluoroquinolones, and 3.5% (95% CI 1.6–5.4%) and 57.4% (95% CI 43.1–71.7%) to all three antibiotic groups in countries with GDPPC >US$35 000 and <US$35 000, respectively. In a multivariable model, country-level factors associated with a lower risk of *Acinetobacter* carbapenem resistance were greater GDPPC [adjusted odds ratio (aOR) = 0.18 per log-US$, 95% CI 0.09–0.34] and distance from the equator (aOR = 0.93 per degree of latitude, 95% CI 0.88–0.98).
Conclusions: No rising trends of AMR in *Acinetobacter* spp. in Europe were observed. Northern countries, with colder climate and greater GDPPC, have a lower proportion of *Acinetobacter* AMR than Southern and Eastern countries.

1. Introduction

Bacteria belonging to the genus *Acinetobacter* are commonly isolated in hospital environments and cause healthcare-related infections such as wound infections, ventilator-associated pneumonia, urinary tract infections and intravascular catheter-related bloodstream infections [1]. Because of the selective impermeability of their outer membrane, *Acinetobacter* spp. are intrinsically resistant to most antimicrobials, excluding fluoroquinolones, aminoglycosides, carbapenems and polymyxins [1]. However, acquired resistance to these antimicrobials poses a significant threat to human health and a heavy economic burden on health systems [2,3].

A 2013 survey suggested that the epidemiological situation of antimicrobial-resistant *Acinetobacter* in Europe was worsening over the past years [4]. However, systematic collection of data regarding antimicrobial resistance (AMR) of *Acinetobacter* spp. in invasive isolates has only been implemented in the majority of European countries since 2012 [1]. The 2016 report from the European Antimicrobial Resistance Surveillance Network (EARS-Net) showed important differences in terms of AMR between Northern European countries and countries from Southern and Eastern Europe [1]. The aim of this study was to analyse trends in *Acinetobacter* AMR in countries from Northern and Southern-Eastern Europe and to investigate country-level factors associated with *Acinetobacter* AMR using multilevel logistic regression models.

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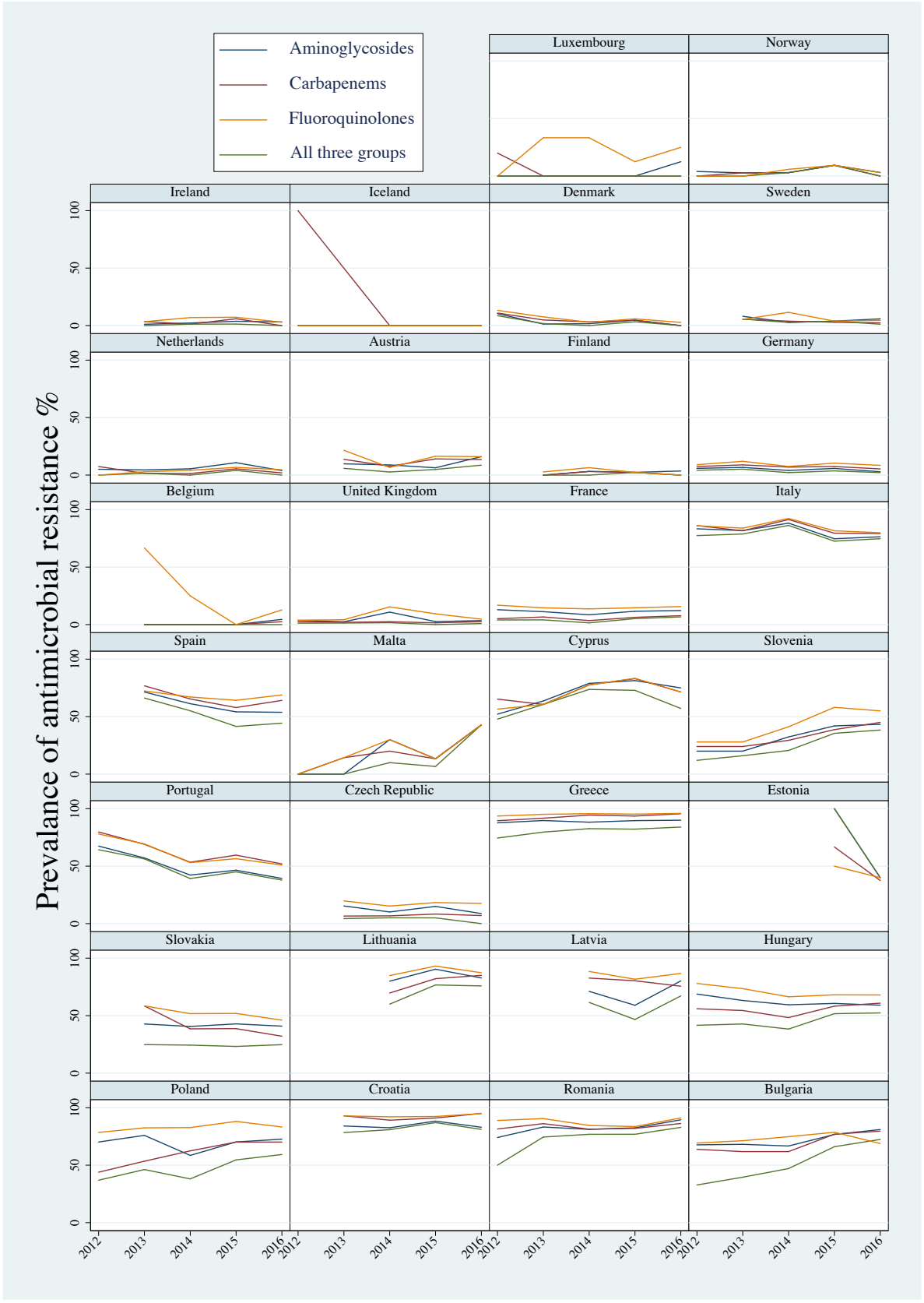

Fig. 1. Proportion of *Acinetobacter* antimicrobial resistance over time in 30 European countries in descending order of gross domestic product per capita.