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Pharmacoepidemiology

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Influence of primary care antibiotic prescribing on incidence rates of extended-spectrum β-lactamase-producing bacteria (ESBLs) in hospitalised patients

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Background and Objective: Use of antibiotics can give rise to the selection of resistant bacteria. The goal of this study was to explore the impact of prior community antibiotic usage on hospital detected ESBL incidence rate, focusing at an individual patient level.

Setting and Method: This pharmacoepidemiological study was case-control in design, and was carried out within the Antrim Area Hospital in two phases. During the first phase, the controls were matched according to: age (two categories: 16-65 years and > 65 years), gender, admission ward, date of admission (± 30 days) and age-adjusted Charlson co-morbidity index score (two categories: 0-2 and >2). During the second phase, controls were selected randomly from the total population of admissions to the hospital over a two year period. Following Univariate analysis, multivariate logistic regression was employed to identify particular antibiotics (and patient-related risk factors) that were independently associated with the hospital detected ESBLs.

Main outcome measures: The primary outcome measure was the impact of antibiotic prescribing (penicillin combinations, fluoroquinolones, second and third generation cephalosporins and macrolides) in primary care on hospital detected ESBLs. The primary outcome measure of phase 2 was the association between matching variables for Phase 1 and other risk factors.

Results: In total, 183 ESBL isolates were recovered from the hospitalised patients within the study site hospital over the two year study period. After applying the study inclusion criteria, 98 patients harbouring ESBLs were eligible, and comprised the cases group. *E. coli* were found to be the most frequently (75.3%) detected ESBLs. The majority (66.3%) of the ESBL strains were cultured from urine samples. The overall prevalence rate of ESBLs was 0.088 cases/100 bed-days. In phase 1, multivariate analysis revealed that prior exposure to second and third generation cephalosporins ($p=0.004$) and fluoroquinolones ($p=0.023$) in primary care was associated with an increased likelihood of ESBLs in inpatients. In phase 2, an independent relationship between an increased risk of infection with ESBLs was associated with: prolonged hospitalisation ($p<0.001$), being elderly ($p<0.001$), being female ($p=0.007$) and having genitourinary disease ($p<0.001$).

Conclusion: The study identified the independent association between previous exposure (in primary care) to certain antibiotic groups (second and third generation cephalosporins and fluoroquinolones) and the prevalence rate of ESBL-producing bacteria detected in secondary care. 'Non-antibiotic' risk factors, independently associated with the detection of ESBL-producing organisms in hospital were: prolonged hospitalisation, being female, presence of genitourinary disease (as a primary diagnosis) and older age.

Disclosure of Interest: None Declared