

Trends in Antimicrobial Resistance in Children Admitted with *Escherichia coli* Urinary Tract Infections

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Urinary tract infections (UTI) are common in children, with *Escherichia coli* (*E.coli*) being the most common uropathogen. Current national guidelines recommend the empiric use of co-amoxiclav and gentamicin for hospitalised children over two months of age while urine culture and sensitivity is awaited¹. Previous studies have demonstrated significant global variation in resistance rates though the overall prevalence of resistance is increasing². As a broad-spectrum antibiotic, co-amoxiclav has become widely used both in hospitals and primary care settings to treat various infections including respiratory tract infections and UTIs. Up to 80% of antibiotics used in Europe are prescribed at primary care level³ and co-amoxiclav is the most frequently prescribed antibiotic despite not being recommended as first line treatment for many community acquired infections⁴. The aim of this study was to identify the prevalence of antibiotic resistance in children admitted with UTI caused by *E.coli* and to assess the change in this prevalence over the past four years.

A retrospective chart review was conducted of all children admitted with UTI in 2015 and 2019. A UTI was defined as the presence of typical symptoms in a child with a pure growth of an organism with $>10^5$ colony forming units per milliliter on urine culture. Following 24-hour culture on chromogenic agar, organisms were identified in the laboratory using MALDITOF mass spectrometry. Automated susceptibility testing was performed using Vitek 2 (Biomérieux) and reported in line with European Committee Antimicrobial Susceptibility Testing guidelines.

The prevalence of resistance to commonly prescribed antibiotics increased over the four year study period in patients with UTI caused by *E.coli*. In 2015, *E.coli* was resistant to co-amoxiclav in 143/583 (24.5%) of samples. However, in 2019, the resistance rate had doubled, with resistance detected in 308 of 608 urinary isolates (50.1%).

Compared to 2015, in 2019 modest increases in resistance rates were seen in many other antibiotics including trimethoprim which increased from 164/593 (27.7%) to 172/607 (28.3%), ceftazidime increased from 15/594 (2.5%) to 33/608 (5.4%), ceftriaxone increased from 12/588 (2%) to 38/607 (6.3%), cefuroxime increased from 43/594 (7.2%) to 48/609 (7.9%), gentamicin increased from 19/594 (3.2%) to 28/609 (4.6%) and ciprofloxacin increased from 32/594 (5.4%) to 48/609 (7.9%).

E.coli causing UTI remains mostly susceptible to nitrofurantoin with resistance seen in just 3/594 (0.5%) and 2/607 (0.2%) of *E. coli* cultured from urinary tract specimens in 2015 and 2019 respectively. All isolates of *E.coli* causing UTI were found to be sensitive to meropenem in both 2015 and 2019.

This study highlights the importance of knowing local susceptibility data when prescribing antibiotics for children with UTI. Increasing prevalence of antibiotic resistance is common worldwide and Ireland is no exception. The doubling of resistance rates to co-amoxiclav is an area of particular concern as this is a component of current empiric antibiotic prescribing guidelines. Antimicrobial stewardship and appropriate prescribing of antibiotics remains vital in slowing the development of antimicrobial resistance. Local surveillance systems should be in place with regular review of data and guidelines by antimicrobial stewardship teams.

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