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Editorial

Increasing Antimicrobial Resistance of *Escherichia coli* Makes Antimicrobial Stewardship More Important

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Increasing antibiotic resistance to enteric gram-negative bacteria is already a global trend. Especially in Korea, community-acquired urinary tract infection caused by extended-spectrum beta-lactamase (ESBL) producing *Enterobacteriaceae* is very common.[1] The increase in resistant bacteria leads to hesitation when choosing narrow-spectrum antibiotics as empirical antibiotics, resulting in increased frequency and amount of broad-spectrum antibiotic use in definite treatment. In particular, changes in antibiotic use in UTIs with high disease burden are expected to have a significant effect on overall antibiotic resistance. This can be shown by the correlation between antibiotic usage and antibiotic resistance in the big data study analyzing the Korean Antimicrobial Resistance Monitoring System (KARMS) data from the Korea Centers for Disease Control and Prevention (kCDC) and National Health Insurance (NHI).[2] Therefore, the selection of empirical antibiotics considering increased resistance and the concern about the administration of appropriate and narrow-spectrum antibiotics in definite treatment are key questions for current UTI antimicrobial stewardship.

Strategic antibiotic use in simple UTI patients is important in controlling the overall antibiotic burden. The 2018 Guideline for the treatment of UTI by the Korean Society for Antimicrobial Therapy strongly recommends the use of nitrofurantoin and fosfomycin in simple cystitis.[3] As the resistance rate of *Escherichia coli* to these antibiotics is very low, excellent therapeutic results can be expected. The use of these antibiotics, which are rarely used in other diseases, is expected to reduce the use of broad-spectrum antibiotics such as beta-lactam and quinolone.

In this issue, Kim et al.[4] investigated the antimicrobial susceptibility changes of *E. coli* isolated from urinary tract infection patients at a university hospital in Korea between 2008 and 2017. They clearly showed an increasing trend in antibiotic resistance of *E. coli*, the most common causative strain of UTI. They particularly concerned about the increase in ESBL-producing strains in CA-UTI. The authors also described co-resistance in drugs such as beta-lactam/beta-lactamase inhibitors and quinolone, trimethoprim/sulfamethoxazole (TMP/SMX), which can be used as an alternative to carbapenem in ESBL producing *Enterobacteriaceae*. These results raise concerns about the choice of empirical antibiotics and the widespread use of antibiotics (carbapenem) in the current era of increasing ESBL producing strains. However,

I think it is advisable that the empirical administration of carbapenem should be avoided as much as possible and that ongoing consideration of non-carbapenem antibiotics is desirable. This is based on the meta-analysis that the treatment results of susceptible non-carbapenems are non-inferior to carbapenems, except for severe infections such as sepsis, and the findings that the inadequacy of empirical antibiotics does not significantly affect the outcome.[5,6] Since the increased use of broad-spectrum antibiotics contributes not only to the production of ESBL producing strains but also to carbapenem resistance strains, we need further efforts and further follow-up studies to administer appropriate and narrow-spectrum antibiotics.

Lastly, as in this study, continuous observation and analysis of antibiotic resistance change in each disease/strain is necessary. The pathogens and antibiotic resistance patterns of major infectious diseases vary from hospital to hospital and over time. The steady collection and analysis of epidemiology data for each hospital is the objective basis of antimicrobial stewardship, limiting the use of unnecessary antibiotics and inducing the proper use. In times of increased resistance, individualized antibiotic administration guidelines based on local epidemiology data can be used to improve patient outcomes. Also, continuous monitoring of antibiotic-resistant bacteria in the hospital is an important source of data for the establishment and management of infection control targets. Constant attention and research on infection prevention and hospital epidemiology, legal and institutional support are always needed.

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