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Antimicrobial use at a multi-disciplinary hospital

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BACKGROUND: The problem of antimicrobial resistance has become topical and alarming all over the world, including Kazakhstan. Nosocomial strains of microorganisms are widespread, being resistant to the majority of available antimicrobials. This results in longer periods of hospital stay, increases in financial expenditures, and sometimes, in lethal outcomes. The social importance of antimicrobial resistance is preconditioned by the spread of resilient strains of microorganism beyond the hospital environment, which leads to lower effectiveness of antibiotic therapy against infectious diseases and growth in their incidence [1, 2].

Our in-patient health facility is a multifunctional one. It provides therapeutic, surgical and oncology and hematology care including organ transplantation. Measures to reduce antibiotic resistance are very important.

OBJECTIVE: To develop a standardized approach to the use of antimicrobial drugs aimed at reducing of antimicrobial resistance, postoperative complications and mortality rates along with financial expenditures. The expected result of this approach should be the enhancement of quality of care.

METHODS: In September 2014 we developed and introduced a local protocol of the antimicrobials use, namely antibiotics for surgical prophylaxis and treatment, based on the evidence of international clinical guidelines evidence-based medicine approach, taking into account the microbial landscape and antibiotic resistance patterns to major pathogens: *Staphylococcus aureus, Pseudomonas aeruginosa, Acinetobacter baumannii, Escherichia coli, Klebsiella pneumoniae* [3]. We planned to assess the effectiveness of this policy by the following criteria: the percentage of post-surgical sequela, the number of bed days, the percentage of resistant cases and antibiotic expenditures. In order to improve the quality of bacteriological studies, together with microbiologists we trained the medical staff on the methods of obtaining of biological material for microbiological testing.

RESULTS: We analyzed the indicators of antibiotic resistance from October 2014 to March 2015 (hereafter period I) on the basis of the data from the microbiological laboratory with data of April–August 2015 (hereafter period II). The analysis on the basis of other criteria has yet to be carried out. The biomaterial was obtained from different loci, including blood. The results of the oncology and hematology were analyzed separately. We received the following results of sensitivity of the listed microorganisms to various antimicrobials in the period I and the period II respectively expressed as percentages:

Staphylococcus aureus: Oxacillin – 95% and 100%, Azythromycin – 62% and 100%, Vancomycin – 100% and 100%, Levofloxacin/Moxifloxacin – 100% and 100%.

Pseudomonas aeruginosa: Ceftazidime – 34% and 67%, Piperacillin/Tazobactam – 91% and 84%, Cefepime – 59% and 81%, Amikacin – 95% and 100%, Meropenem – 100% and 100%, Ciprofloxacin – 97% and 100%.

Escherichia coli: Gentamicin – 93% and 96%, Piperacillin/Tazobactam – 86% and 92%, Ceftriaxone – 82% and 100%, Amikacin – 99% and 100%, Ciprofloxacin – 69% and 80%, Amoxycillin/Clavulanate – 44% and 46% respectively.

Klebsiella pneumoniae: Gentamicin – 50% and 100%, Piperacillin/Tazobactam – 95% and 100%, Cefepime – 100% and 100%, Ceftriaxone – 96% and 100%, Amikacin – 99% and 100%, Ciprofloxacin – 100% and 100%, Amoxycillin/Clavulanate – 22% and 23%.

Acinetobacter baumannii: Gentamicin – 83% and 83%, Piperacillin/Tazobactam – 33% and 58%, Cefepime – 0% and 33%, Ceftriaxone – 0% and 33%, Amikacin – 50% and 83%, Ciprofloxacin – 83% and 67%, Meropenem/Imipenem-Cilastin – 83% and 83%.

CONCLUSIONS: During the analyzed periods we observed some improvement in the sensitivity of the main pathogens to antibiotics. At the same time, the resistance of Acinetobacter *baumannii* to carbapenems and fluoroquinolones increased.

Limitations of the study: There are many other than antibiotic use factors, which influence these results. Further analysis is planned to be carried out. Nevertheless, this analysis makes us believe that we are, probably, on the right path for improving the use of antibacterial drugs.

Keywords: Antimicrobial, antibiotic, use, hospital, resistance

Conflict of interest statement: None.

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