Pattern of antimicrobials use in the hospitals of Emilia-Romagna Region

E. Buccellato, R. Lategana, M. Melis, C. Biagi, D. Motola, A. Vaccheri

Pharmacology Unit, DIMEC, University of Bologna, Bologna, Italy

Background

Analysis of antimicrobials consumption plays an important role in hospital-healthcare, as it allows the identification of areas where measures to improve the appropriateness of use and rationalization of resources should be taken. Little information is available on antibiotics consumption in Italian hospitals.

Aim

To investigate the trend of antibiotics consumption and expenditure over the period 2004-2011 in hospital care in Emilia-Romagna, and the variability between hospitals and between clinical areas.

Methods

The study was carried out in all the hospitals of Emilia-Romagna region. Consumption and expenditure data of antibacterials for systemic use (ATC J01) in the period 2004-2011 were obtained from the Emilia-Romagna Health Authority Database. Data were represented by ward identification, code of the medicinal product, number of unit doses and reference year. The number of bed-days was available for the single wards from hospital discharge database. Drug consumption was expressed as number of DDDs per 100 bed-days and data were analyzed by active substance (ATC 5th level) or by therapeutic subgroups (ATC 4th level). Expenditure was expressed as Euros per 100 bed-days.

Results

The overall consumption of antibiotics increased by 27%, from 57.24 to 72.54 DDD/100 bed days in the study period. Expenditure only increased by 3%, from 421.30 to 435.20 Euros per 100 bed-days.

Use of antimicrobials similarly increased in all the hospitals. Burns ward, intensive care and infectious and tropical diseases unit showed the highest antibiotics use and the highest antibiotics expenditure in 2011.

Penicillins and β-lactamase inhibitors ranked first, representing 37% of the total amount and 23% of the expenditure in 2011, with 26.81 DDD and 100.89 Euros, respectively. Fluoroquinolones and third-generation cephalosporins, ranked second and third, respectively, in 2011 (18% and 12% of the total, respectively) with a decrease in expenditure from 2004 to 2011. Other antibacterials, carbapenems and glycopeptide antibacterials showed a marked increase in expenditure (+30.91, +23.77 and +6.73 Euros, respectively), and accounted for 9%, 19% and 16% of total expenditure in 2011, despite the slight increase in consumption (+0.33, +1.25 and +0.57 DDD, respectively).

Levofloxacin, piperacillin/tazobactam and meropenem markedly increased in both use (74%, 286% and 202% DDD, respectively) and expenditure (115%, 166% and 138%, respectively). Linezolid, represented 7% of total expenditure in 2011, and showed a sharp increase in both consumption and expenditure.

Discussion

Antibiotic use increased in Emilia-Romagna hospitals over the period 2004-2011, with a narrow range of 36.72 DDD between hospitals. The wide use of third-generation cephalosporins could have caused the emergence of *K. pneumoniae* resistance due to production of extended-spectrum beta-lactamases. Carbapenems are best alternative available, but their inappropriate use to treat *K. pneumoniae* sepsis represents an important risk to develop bacteria producing carbapenemases, cause of multidrug-resistant infectious worldwide.

Fluoroquinolones were the second most used drug class from 2004 to 2011 and this could have led to the increase of piperacillin/tazobactam consumption due to development of levofloxacin resistant *E. coli* sepsis. Among Gram-positive organisms, the most important resistant pathogens are meticillin-resistant *S. aureus* (MRSA), beta-lactam-resistant and vancomicycin-resistant enterococci. In addition, as multiple surveillance studies demonstrated, glycopeptide-resistant *S. aureus* strains are also rising and this could lead to the increase of linezolid use, as seen in our consumption data.

Conclusion

Our findings strengthen the importance of *ad hoc* communication for citizens and health professionals by the Italian regulatory agency and the regional health authorities, with the aim of reducing antibiotic-resistance and making aware the entire community through better information.