

# A Five Years Surveillance on Use of Antimicrobial Therapies in Biella's General Hospital (Italy): Effective Management to Reduce Antibiotic Resistance and Improve Outcome

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## Short Communication

The risk of nosocomial infection due to multidrug resistance is a substantial threat in modern day treatment. According to the European Surveillance of Antimicrobial Consumption Network, systemic use of antibiotics increased to 3.4-fold in 2015, outside the hospitals in comparison to 2014 data. However, during 2011 to 2015, systemic use of antibiotics significantly increased in the hospitals and data showed this trend varied from 1.0 to 2.9 DDD (defined daily doses) per 1000 inhabitants and per day [1-5].

In present scenario, there are no great success stories in the development of new antibiotics. Alternative therapy of antibiotics is one of the novel approaches to fight the growth of antibiotic-resistant pathogens. The alternative therapy must be applicable for both preventive and therapeutic measure, such as, modulate the gut ecosystem, either via consuming additives or faecal transplantation. It has been observed that several alternative methods enhance antibiotic efficacy by increasing bactericidal effect and reducing options for antibiotic resistance. Therefore, continue to use alternative therapy along with antibiotic to restrict the bacterial evolution for development of resistance [6].

European Medicines Agency (EMA) plays a big role in overall global response against threat of antimicrobial resistance through their continuous endeavour of supporting the development of new medicines and treatment approaches; promoting responsible use of existing antibiotics; collecting antimicrobial consumption data to guide policy and research. EMA and other international organization work together for preparing a list to indicate the member states about the harmonized use of antibiotics and restrict the misuse or over use of antibiotics. This initiative facilitates member states to supervise the use of antimicrobials in humans, food-producing animals and food, and evaluate the progress for implementing their action plans against antimicrobial resistance [7].

Since 2011, General Hospital of Biella developed its Antimicrobial Stewardship Program (ASP), executed by multidisciplinary antimicrobial utilization teams comprising of physicians, pharmacists, microbiologists, epidemiologists and infectious disease specialists, with adequate experience in their respective fields, to optimize antimicrobial therapy, minimize treatment-related cost, get better clinical outcomes and safety. To reduce or stabilize the antimicrobial resistance, it is necessary to strictly follow the existing guideline. Moreover, prudent guidelines for using of antibiotics were defined, based on Pharmacokinetic (PK) and Pharmacodynamic (PD)

properties of antibiotics. Other than this, Hospital introduced several other strategies to control high antimicrobial resistance such as, advanced diagnostic testing, clinical response and effects on the microbiota.

In a 5-year surveillance on consumption and sensitivity, amoxicillin-clavulanic acid has been the most consistently prescribed antibiotic inside the Hospital, on top from 2011 to 2016 with a steady number of prescriptions (between 51.000 and 55.000 prescriptions/year) during the studied period.

Due to the relatively low cost and broad spectrum of amoxicillin-clavulanic acid-considered as the first line for a plenty of infections, from the airway to the urinary tract, including skin infections-Authors performed a cross analysis on its bacterial sensitivity trends, in order to assess a susceptibility rate over time.

The sensitivity data to this antibiotic proved a stable pattern for *Escherichia coli*, *Haemophilus parainfluenzae*, *Klebsiella* species, *Proteus mirabilis* and even *Streptococcus pneumoniae*; for all of them sensitivity was above 90%.

It's worthy of note that the organism *Klebsiella pneumoniae* moved from a 72% of sensitivity in 2012 to 97% in 2016, statistically significative (p value 0.03); this is probably due to a specific clinical policy, i.e., a better isolation of the patients exposed or an earlier detection of the microorganism.

According to the recent literature warnings, we observed an increasing tendency on resistance of *Escherichia coli* and *Klebsiella* species with extended-spectrum beta-lactamases (sensitivity less than 40%) and *Staphylococcus aureus* (below 60%).

Biella's General Hospital Governance Program demonstrated how every member of the Hospital take on responsibility for maintaining the effectiveness of antibiotics, perform their role, and finally succeeded in reducing antibiotic resistance. In summary, both "front-end" interventions: (i) The development of situation-specific treatment guideline; (ii) Education of prescribers; (iii) Accurate organism-identification; (iv) Understanding Pharmacokinetic (PK) and Pharmacodynamics (PD) properties of drugs which helps selecting optimal dose and duration of antibiotics; and "Back-end" interventions, including: (i) Clinical decision support; (ii) Post-prescription review and feedback; (iii) Determination of therapy length; and (iv) Antibiotic heterogeneity (cycling and mixing) are extremely important to maintain an effective antimicrobial stewardship.

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