# Antimicrobial Stewardship in Community pharmacies in Jordan: Assessing Current Status and the Effect of Training Workshop in Improving Pharmacists Knowledge and Practice

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## Abstract

**Background**: The Center for Disease Control and Prevention and the World Health Organization issued a practical approach and Global Action Plan to control the threatening emerging antibacterial resistance. One of the main basis of this plan is the Antibiotic Stewardship Program (ASPs). Community pharmacists have an essential role in the reinforcement and implementation of ASPs. Up to our knowledge, there is no previous study investigated the awareness and perception of community pharmacists regarding ASPs in Jordan. Thus, this research aimed to evaluate community pharmacists' awareness and perception towards antimicrobial resistance and ASPs using quantitative and qualitative approach. In addition, we aimed to assess the impact of online-education workshop in improving their awareness and perception towards ASPs, and in improving their antimicrobial prescribing skills.

**Methods**: Both qualitative and quantitative studies were conducted to assess pharmacists' awareness and perception about ASPs using in-depth interviews (20 pharmacists) and online-based survey (200 pharmacists). Also, a 2-day education workshop was conducted to enhance pharmacists' awareness, and perception towards the ASPs and to improving their antimicrobial prescribing skills (100 pharmacists).

**Results**: Qualitative analysis of the data yielded four themes and eleven sub-themes. All the respondents showed good understanding of the causes of antimicrobial resistance. Also, most of the community pharmacists believed that they are competent to provide ASPs. However, several barriers against the implementation of ASPs in community pharmacies in Jordan were demonstrated by the participants, including organizational obstacles, resources obstacles, and personal obstacles.

The quantitative cross-sectional study showed that the main sources of knowledge about antimicrobial resistance and ASPs were university courses and books, with a median knowledge score of 6/10. Also, most of the pharmacists had positive perceptions towards ASPs. Barriers against the implementation of ASPs were consistent with the qualitative study, where lack of training and lack of physicians' cooperation (89.0% and 87.5%, respectively) were the most reported barriers. Multivariate linear regression showed that female pharmacists showed significantly higher knowledge score compared to males (p-value= 0.045).

Finally, community pharmacists showed a good knowledge prior the educational workshop with a median score [6 (IQR= 4)] out of 10; which was improved significantly following the educational workshop with a median score [7 (IOR=2)]. Most of the pharmacists showed a positive perception towards ASPs before and after the workshop. Regarding community pharmacist's skills in dealing with virtual cases, they showed a significant improvement in selecting the optimal antimicrobial for cases following the workshop (p-value < 0.05).

**Conclusion**: This study highlighted that community pharmacists have a good knowledge in antibiotic resistance and ASPs. Moreover, it revealed an improvement in their knowledge, and skills following the educational workshop. Even though pharmacists were not highly familiar with ASPs, but they showed great support for involvement in such programs. Also, several barriers against the implementation of ASPs in community pharmacies in Jordan were reported. Thus, Incorporating ASPs in the community pharmacy settings requires proper pharmacist training, several academic disciplines team efforts, and good pharmacy practice of antimicrobial guidelines ASPs.
**Keywords:** antimicrobial stewardship programs; community pharmacists; awareness; perception; qualitative; workshop; Jordan