ORIGINAL ARTICLE

# Active educational intervention as a tool to improve safe and appropriate use of antibiotics

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**Abstract**  Misconception about antibiotics use among the public has been widely outlined to be a main reason for inappropriate use of antibiotics including failure to complete treatment, skipping of doses, re-use of leftover medicines and overuse of antibiotics. The study was devised to evaluate whether education might be a potential strategy to promote safer use of antibiotics and reducing self-medication. Two hundred seventy one adults were asked to complete two questionnaires; a pre and posteducation. The questionnaires comprised of three parts consisting of 17 statements assessing the knowledge on: appropriate use, safe use and resistance of antibiotics. Knowledge score was estimated by calculating the percentage of correct responses. The mean (SD) knowledge score pre-education was 59.4% (20.3). However, posteducation the score was 65.9% (17.9), $p < 0.001$ ($t$-test). Knowledge scores were classified as poor, adequate and good. Posteducation, participants within poor and adequate knowledge categories were significantly shifted to the good category describing better knowledge, McNemar-$\chi2 = 28.7$, $df = 3$, $p < 0.001$.

It is concluded that using tailored education material targeting antibiotic need and use with a major aim of improving the public knowledge about antibiotics can be an effective and feasible strategy. This pilot study could be considered as the starting point for a wider scale public educational intervention study and national antibiotic campaign. However, the improvement in participant's knowledge might not reflect an actual change in antibiotics–seeking behaviour or future retention of knowledge. Future research should seek to assess the impact of education on participant's behaviour.

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## 1. Introduction

Antibiotics are one of the most commonly purchased drugs. Over and inappropriate use of antibiotics account for 20–50% of all antibiotics used globally which is becoming a major concern particularly in developed countries (Bisht et al., 2009). Unnecessary use of antibiotics reported to be a fundamental reason for resistance (Levy and Marshall, 2004; Spellberg

et al., 2008). Antibiotics resistance is a globally growing problem that contributes to real threats on public health and costs due to failure in the treatment and prevention of infectious diseases (Ozgenc et al., 2011; Shorr et al., 2011). Lack of adequate knowledge about antibiotics has been widely outlined to be a main reason for inappropriate use of antibiotics which includes failure to complete treatment, skipping of doses, re-use of left-over medicines and overuse of antibiotics (Kim et al., 2011; Ling Oh et al., 2011; You et al., 2008). Approximately, 50–75% of antibiotics administered daily in USA within hospital and community settings considered unnecessary because they were prescribed for viral infections particularly respiratory infections (Misurski et al., 2011; Rodis et al., 2004). One-third of adults in the United Kingdom incorrectly agreed that 'antibiotics work on most coughs and cold' and 43% incorrectly agreed that 'antibiotics can kill viruses' (McNulty et al., 2007). In Jordan, several studies demonstrated significant alerts, not only regarding the irrational prescription of antibiotics for the treatment of viral infections, but also the prevalence of self-medication and resistance (Al-Bakri et al., 2005; Suaifan et al., 2012; Yousef et al., 2008; cdc, 2015). In our previous work, we reported that adults in Jordan incorrectly believed that antibiotics can be effective in the treatment of common cold, cough and other viral infections. Furthermore, over 50% of the study population kept antibiotics at home for emergency use and prophylaxis against infections and used left-over antibiotics without physicians' consultation (Shehadeh et al., 2012; Suaifan et al., 2012). Therefore, pursuing strategies to enhance the rational use of antibiotics in Jordan was demanded.

Enhancing public knowledge about antibiotic resistance and appropriate use by educational interventions has been strongly advocated (Finch et al., 2004; Misurski et al., 2011; Ranji et al., 2008). The Infectious Diseases Society and the Society of Healthcare Epidemiology of America suggest education as an essential component of any programme designed to influence long-term prescribing behaviour of antibiotics. The primary objective of this study was to assess the impact of pharmacist-initiated educational intervention on participants' knowledge regarding appropriate and safe antibiotic use and resistance among adults in Jordan. The secondary objective was to evaluate the outcome of the pharmacist-initiated educational intervention on the enhancement of safer antibiotic use and reduction of self-medication.

## 2. Methods

Using a structured pre- and posteducational questionnaire, knowledge about appropriate antibiotics use and resistance was evaluated among a sample of adults living in Jordan. Questionnaires were developed by reviewing available content validated questionnaires in the literature (Chen et al., 2005; Ling Oh et al., 2011; McNulty et al., 2007; You et al., 2008). Questionnaires were then face validated individually by two clinical pharmacists, one statistician and one sociologist. This aimed to ensure applicability and appropriateness within the context of the Jordanian community. The questions were written with no medical jargons or difficult terminology. The questionnaires were pretested and validated on a pilot sample of 14 participants (5% of the target sample) to clarify any ambiguities.

A sample of adults (anybody who appeared to be 18 years old or above) were approached and verbally informed about the study. In order to ensure variation and generalizability within the study sample with respect to background, occupation, and education, participants were recruited at different public sites including shopping malls, supermarkets, gyms, female beauty centres. Data were collected between April and July 2012. Ethical approval for conducting the study was obtained from the Institutional Review Board (IRB) at Jordan University Hospital (JUH) and the Scientific Committee at the Deanship of Scientific Research at The University of Jordan.

The intervening pharmacist engaged participant in a 10 min dialogue session during which the pharmacist asked the participant to fill a pre-educational questionnaire (Table 1) assessing the background knowledge about antibiotics appropriate use and resistance. After this, the participant was verbally educated on one to one basis using educational card contained information based on the published educational materials by the Centre for Disease Control and Prevention (Yousef et al., 2008). Additionally, the educational card included further information outlined in the previously published recommendations (Shehadeh et al., 2012; Suaifan et al., 2012). Following the education, the participant was asked to complete a posteducation questionnaire.

The pre-education questionnaire comprised of three parts (17 statements) with the choice of answering either yes or no. The first part consisted of five statements designed to evaluate knowledge regarding the appropriate use of antibiotics. The second part consisted also of five statements regarding the knowledge on safe use of antibiotics by pregnant, lactating mother, children under 8 years old, if a family member is allergic to an antibiotic and as a prophylactic against infections. The final part consisted of seven statements regarding the knowledge on antibiotics resistance.

Posteducation questionnaire consisted of the same number of statements, but with slight re-wording. Statements were reworded not only to ensure authenticity of participants' responses but also to avoid ambiguity and to ensure that the changes in responses (if any) would provide a validated tool to measure participant's satisfaction with the educational intervention. Details of statements rephrased in the post-education phase are shown in Table 2.

Educational card entitled "Get smart, know when antibiotics can be used" and the study questionnaires were translated from English into Arabic and back into English by two senior academic staff members who are fluent in both languages to address any ambiguity and to determine whether the data would provide reliable information.

Responses were coded and entered into SPSS for Windows, version 16. Correct response comprised of participant agreement (yes answer) with some statements and disagreement (No answer) with other statements (as shown by asterisk ($^*$) sign in Table 1) were used to calculate the knowledge score. One point was given for each correct response. Good knowledge score of 3 was given for participants with more than 70% correct response. Adequate knowledge score of 2 was given for participants with 50–70% correct response. Poor knowledge score of 1 was given for participants with less than 50% correct response. The analysis excluded those who answered 8 or less out of the 18 statements, i.e. missing data.