

## Awareness of antibiotic use and antimicrobial resistance in the Iraqi community in Jordan

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### Abstract

**Introduction:** Antimicrobial resistance is a serious global health concern. It has considerable implications on societies' health and resources. In Jordan, there is a large Iraqi community due to the ongoing turmoil in Iraq. Unfortunately, health awareness and practices of this community are under-investigated due to scarcity of research. This paper assesses the awareness of antibiotic use and antimicrobial resistance in the Iraqi community residing in Amman, Jordan. Their level of interaction with health care professionals regarding antibiotics and differences in their antibiotic use between Iraq and Jordan are also discussed.

**Methodology:** A cross-sectional questionnaire-based survey involving randomly selected Iraqis residing in Amman, Jordan was conducted.

**Results:** The study involved 508 participants. Sixty-two percent of participants agreed with buying antibiotics without a prescription, 29% agreed with obtaining antibiotics from friends or relatives, and 46% agreed with keeping leftover antibiotics for future use. Furthermore, 60% disagreed with not completing an antibiotic course and almost 90% of the sample listed viral diseases as an indication for antibiotics. Forty-four percent of participants abided by physicians' instructions on antibiotic use. Half of the participants believed that pharmacists provided instructions on antibiotics all the time, whereas physicians were perceived to do so by 29% of participants.

**Conclusions:** Gaps exist in knowledge of antibiotic use and reasons for antimicrobial resistance among Iraqis residing in Jordan. These gaps should serve in planning educational campaigns to raise the community's awareness of responsible antibiotic use. Law enforcement to restrict access to antibiotics is also pivotal to tackle their misuse.

**Key words:** awareness; antibiotics; antimicrobial resistance; Iraqi; Jordan

*J Infect Dev Ctries* 2014; 8(5):616-623. doi:10.3855/jidc.4086

(Received 05 August 2013 – Accepted 02 January 2014)

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### Introduction

*The issue of antibiotic resistance in Jordan and internationally*

Antibiotic resistance is a serious health concern locally and worldwide [1-3]. The World Health Organization (WHO) has reported increasing levels of antimicrobial resistance, which are threatening the control of infectious diseases [2]. Misuse of antibiotics and lack of awareness are fundamental reasons for the emergence of antimicrobial resistance, which jeopardizes the sustainability and effectiveness of these valuable drugs [4,5]. In Jordan, several recent studies revealed a considerable level of antimicrobial agents' misuse [6-9]. In Al Bakri *et al.*'s study, almost half of the participants purchased antibiotics without a prescription. Purchases were either self-directed or made upon pharmacists' recommendations, of which one-third were inappropriate [6]. Similarly, Al Azzam

*et al.*'s study revealed a high prevalence of self-medication with antibiotics, seen in 40% of the sample. The study participants mainly used leftover antibiotics at home or purchased them from a pharmacy without a prescription. Factors associated with self-medication were age, income level, educational level, and previous experience with antibiotics [7].

*Background of the Iraqi community residing in Jordan and their health status*

The actual size of the Iraqi population in Jordan is debatable. The governmental estimates vary between 450,000 and 500,000 Iraqis in Jordan [10], out of which 25,600 were registered with the United Nations High Commissioner for Refugees (UNHCR) by the end of 2011 [11]. An overwhelming majority of the Iraqis reside in urban areas, mainly in Amman, the

capital city [11,12]. A survey by Dale *et al.* reported that 7% of the Iraqis residing in Jordan suffered acute conditions in 2007, which was comparable to the Jordanian population [12]. Monitoring of their health status was stated to be difficult, attributable to their large number, scattered distribution, and the fact that a majority of them was not registered with the UNHCR [10]. This was augmented by the pattern in which they fled to Jordan, in large groups and over a short period of time.

Unfortunately, the information on health status, beliefs, and practices by this community is scarce due to lack of research. The large size of the Iraqi population justifies granting attention to their health conditions and practices. Since antimicrobial resistance transmits across communities, it seemed worthwhile to assess the level of awareness of proper use of antibiotics and reasons for antimicrobial resistance in this community. This was the focus of this paper, in addition to exploring their level of interaction with health care professionals (HCPs) regarding use of antibiotics, and the differences in their use between Iraq and Jordan.

## Methodology

### *Study design and population*

This was a descriptive cross-sectional questionnaire-based survey. Data were collected over the period of August 2011 through February 2012.

The study included a random sample of adult Iraqis (> 18 years old) residing in Amman, the capital city of Jordan. The sample was captured from multiple sites, taking into consideration the geographical distribution representing different socio-economic classes. The study sites included community pharmacies in areas heavily populated with Iraqis (n = 37), the health attaché at the Iraqi consulate (n = 1), a university (n = 246), health care centers known to serve Iraqis (n = 2), community development centers (n = 7), and cafes (n = 2). Participants' consent was verbally obtained prior to handing out the questionnaires. Participants were assured of the confidentiality and anonymity of the results. The study was also reviewed by the Board of Scientific Research at the University of Petra, Jordan (Approved June 2011; # 06/5-2011)

### *Study tool: design and development of questionnaire*

Relevant literature was reviewed and the questionnaire was compiled by the research team, which included two clinical pharmacists and a microbiologist. Data were collected by a team of Iraqi

pharmacy students in their final year of college. The latter were professionally trained by the main researchers on how to approach participants and respond to their queries about the questionnaire, if any.

The questionnaire was designed in the Arabic language, the mother tongue of Iraqis. To clarify any ambiguities, the questionnaire was field tested twice on a sample of Iraqis (n = 10). Every effort was made to make the questionnaire shorter to enhance the level of participation, without jeopardizing the objectives of the study.

The questionnaire contained 33 questions. It investigated five main areas:

- a) The participant's demographic information (6 questions): age, gender, insurance status, area of living, educational level, and job.
- b) Antibiotic use by participants (10 questions): ability to name an antibiotic, frequency of antibiotic use over the past 12 months, procurement of antibiotics, obtaining information on antibiotic use, keeping leftover antibiotics for future use, purchasing antibiotics without a prescription, completion of antibiotic regimen, and buying antibiotic against doctors' recommendation.
- c) Awareness of antibiotics action, indications, causes and consequences of antimicrobial resistance (9 questions). Also included were questions about how serious the issue of antimicrobial resistance is locally and internationally.
- d) Interaction between participants and HCPs pertinent to antibiotics use (6 questions): abiding by physicians' instructions on the use of antibiotics, requesting antibiotics from physicians, trusting the physicians' decisions when not having antibiotics prescribed, and perception of level of instructions provision by physicians and pharmacists on antibiotics.
- e) Perceptions of differences in the sample's use of antibiotics in Jordan versus Iraq (2 questions).

### *Question format*

Fifteen questions were in the form of statements for which the participants could choose an answer of either "I agree", "I don't agree", or "I don't know".

Fourteen questions were multiple choice ones, with five questions having a "yes", "no", or "I don't know" answer, and two questions having more than one answer that could be chosen simultaneously (*e.g.* questions on indications of antibiotics and consequences of antimicrobial resistance). Finally,

four questions allowed open answers by participants (*e.g.* age, job, area of residence, and name(s) of antibiotics used within the past 12 months).

### *Data analysis*

Data were coded and analyzed using SPSS version 17.0. Data analysis involved quantitative statistics and testing for significant association between sample demographic variables and the level of awareness of antibiotic use and antimicrobial resistance. Significance was examined using Chi-square and Fischer's exact tests and was defined as a  $p$  value  $< 0.05$ .

## **Results**

### *Sample size and demography*

The participants who agreed to answer the questionnaire in this study were 510 adult Iraqis residing in Amman, Jordan; there was a response rate of 100%. Two cases were excluded because they were under 18 years of age. Distribution of participants over the study sites at which they were captured is shown in Table 1. The proportion of males to females was almost equal. Ninety-six percent of the sample was under the age of 65; 60% were uninsured, 63% held a university degree, and 7% worked in medicine-related fields (Table 2).

### *Knowledge and use of antibiotics*

Two-thirds of participants ( $n = 338$ ) answered positively when asked if they knew any antibiotic names, 32% ( $n = 165$ ) stated they didn't know any antibiotic names, and data were missing for 1% ( $n = 5$ ) of the sample. However, of those who stated they knew an antibiotic name, 16% ( $n = 55$ ) gave a partially correct or an incorrect answer, for example listing an analgesic for an antibiotic, and 4% ( $n = 12$ ) could not recall an antibiotic name at the time of study (Figure 1). A significant association ( $p < 0.001$ ) between the ability to name antibiotics and older age, educational level, and medical job was found, but an association was not found with gender.

The majority of participants (71%,  $n = 360$ ) used antibiotics over the past 12 months; 21% ( $n = 109$ ) did not use an antibiotic, and 7% ( $n = 35$ ) did not know whether they had used an antibiotic or not. There was no response to this question from 1% of the participants ( $n = 4$ ). Whether antibiotics were used or not over the past 12 months was seen more frequently in younger than older age groups ( $p < 0.001$ ), and was not affected by the respondents' insurance status. The frequency of antibiotic use (once, twice, thrice or

more) over the past 12 months varied across the sample (Figure 2) and was seen more often in insured than in non-insured participants ( $p < 0.001$ ).

Two-thirds of participants (62%) agreed with buying antibiotics from a pharmacy without a prescription, 29% agreed with obtaining antibiotics from a friend or relative, and 46% agreed with keeping leftover antibiotics for future use. Insurance status was not associated with keeping leftover antibiotics for future use, nor with obtaining them from relatives. Twenty-eight percent of the sample agreed with discontinuing therapy when they felt better; this was significantly evident in less educated participants ( $p < 0.05$ ) (Table 3). Participants of higher educational levels significantly disagreed with reading leaflets to learn about antibiotics without asking a physician or a pharmacist ( $p < 0.05$ ).

### *Awareness of antibiotic actions and indications*

Twenty-nine percent of participants ( $n = 148$ ) knew that antibiotics were effective against bacteria, 14% ( $n = 71$ ) believed they were effective against viruses only, and 38% ( $n = 195$ ) believed that antibiotics were effective against both bacteria and viruses. Eleven percent ( $n = 58$ ) did not know the action of antibiotics, and there was no response from 7% ( $n = 36$ ) of the participants. Although educational level and medical jobs were significantly associated with knowing that the action of antibiotics was antibacterial rather than antiviral ( $p < 0.001$ ), neither education, job, nor any other demographical factor was associated with knowing the diseases for which antibiotics should be used. The majority of participants (87%,  $n = 440$ ) chose viral diseases (primarily bronchitis, fever, cold) as an indication for antibiotics, 6.1% ( $n = 31$ ) didn't know which diseases warranted antibiotic use, and 6.7% ( $n = 34$ ) had no response (Figure 3). Forty-four percent of the participants ( $n = 225$ ) agreed with the statement "antibiotics speed up cure from colds", 33% ( $n = 169$ ) disagreed with it, 10% ( $n = 49$ ) didn't know, and 7% ( $n = 35$ ) had no response. This was significantly associated with educational level ( $p < 0.001$ ).

Seventy-five percent of participants ( $n = 382$ ) agreed with the statement "antibiotics used differ from one disease to another", 6% ( $n = 29$ ) disagreed with it, 12% ( $n = 62$ ) didn't know, and no response was given by 7% ( $n = 35$ ).

**Table 1.** Participants' capturing sites, number and percentage

Site of capturing sample	No. of participants (%)
Community pharmacies	140 (28)
University	246 (48)
Iraqi cultural attaché	35 (7)
Health care centers	38 (7)
Community development centers	40 (8)
Cafes	9 (2)
Total sample size	508 (100)

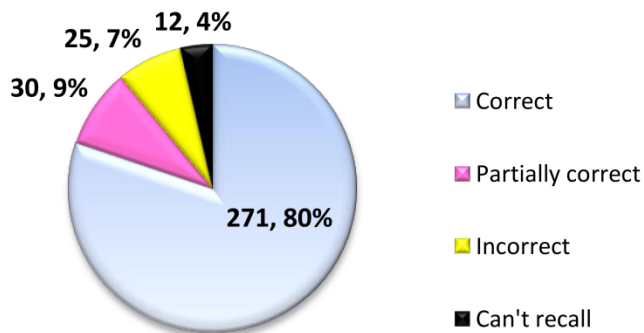
**Table 2.** Study sample demographics

Demographic variable	Number (%)
<b>Gender</b>	
Male	262 (52)
Female	245 (48)
Total	507 (99.8)
Missing	1 (0.2)
<b>Age group</b>	
18-25	219 (43)
26-45	191 (38)
46-65	78 (15)
Above 65 years	11 (2)
Total	499 (98)
Missing	9(2)
<b>Education</b>	
High school or less	87 (17)
College	56 (11)
University	322 (63)
Postgraduate studies	38 (8)
Total	503 (99)
Missing	5 (1)
<b>Insurance status</b>	
Insured, private	112 (22)
Insured, UN	81 (16)
Uninsured	307 (60)
Total	500 (98)
Missing	8 (2)
<b>Job</b>	
Medical jobs	37 (7)
Non-medical jobs	148 (29)
Students	155 (30.5)
Don't work	145 (29)
Total	485 (95.5)
Missing	23 (4.5)

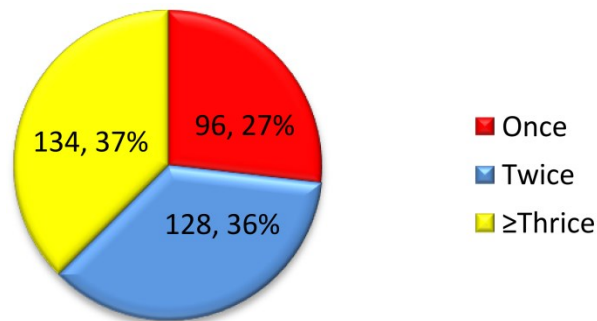
**Table 3.** Participants' perceptions regarding use of antibiotics

Variable	Agree (%)	Don't agree (%)	Don't know (%)	Missing (%)
Buy antibiotic from pharmacy without a prescription	317 (62)	141 (28)	17 (3)	33 (7)
Buy antibiotic despite disapproval of physician	74 (15)	370 (73)	26 (5)	38 (7)
Obtain antibiotic from a friend or a relative	149 (29)	335 (66)	21 (4)	3 (1)
Keep leftover antibiotic for later use	233 (46)	228 (45)	38 (7)	9 (2)
Refer to drug leaflet for instructions on use without asking a physician or a pharmacist	179 (35)	260 (51)	30 (6)	39 (8)
Discontinue antibiotic course once feeling better	141 (28)	307 (60)	25 (5)	35 (7)

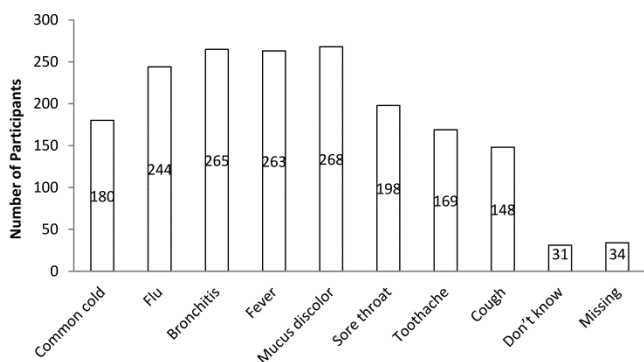
**Figure 1.** Participants' ability to name an antibiotic (n, %)



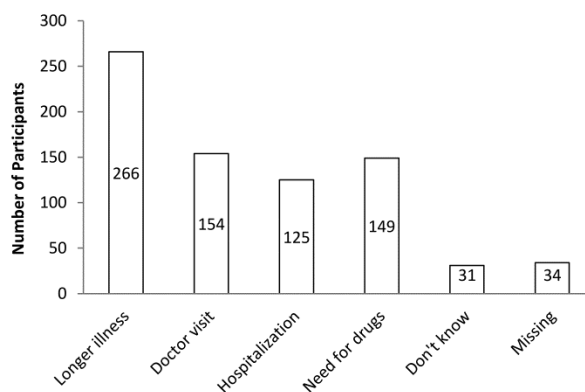
**Figure 2.** Frequency of antibiotic use over the past 12 months (n, %)



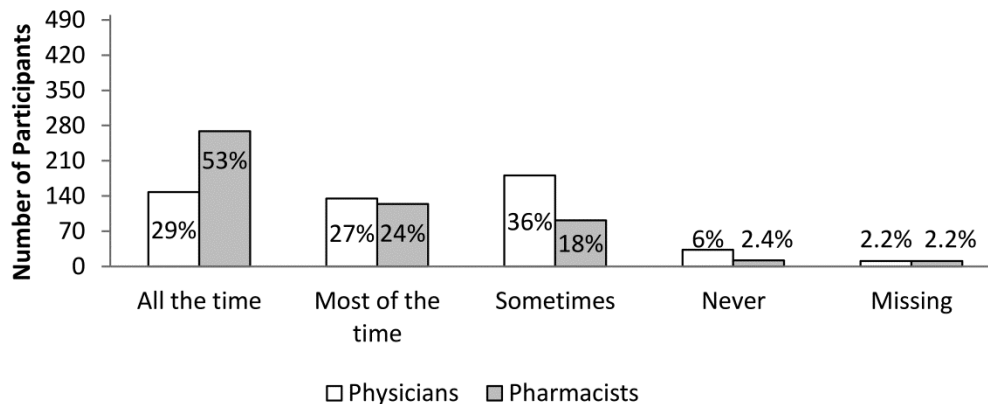
**Figure 3.** Participants' perceptions of indications for antibiotics



**Figure 4:** Perceptions of implications of microbial resistance



**Figure 5.** Participants' perceptions of provision of instructions on antibiotic use by physicians vs. pharmacists



*Awareness of antimicrobial resistance and its causes*

Half of participants (n = 261) agreed with the statement “excessive use of antibiotics increases likelihood of developing resistance”, 25% (n = 125) disagreed, 16% (n = 83) didn’t know, and 8% of the participants (n = 39) had no response. This was significantly associated with medical jobs and educational level (p < 0.001). The sample’s perceptions of the consequences of antimicrobial resistance included mainly longer illness, more doctor visits, and the need for more expensive antibiotics (Figure 4).

Regarding awareness of how big the issue of antimicrobial resistance was, 31% (n = 160) and 38% (n = 192) believed it was a problem in Jordan and worldwide, respectively. In contrast, 20% (n = 100) and 17% (n = 88) didn’t believe it was a problem, and 47% (n = 240) and 43% (n = 219) didn’t know whether antimicrobial resistance was an issue or not in Jordan and worldwide, respectively.

*Patient-health professional interaction relevant to antibiotic use*

Forty-four percent of participants (n = 226) indicated they abided by physicians’ instructions on antibiotic use all the time, 26% (n = 130) reported most of the time, 18% (n = 92) sometimes, and 2% (n = 8) never abided by physicians’ instructions. Forty percent (n = 204) agreed with and 54% (n = 277) disagreed with requesting an antibiotic if their physician did not prescribe one.

Seventy-six percent (n = 387) of participants agreed with the statement “I trust the physician’s decision whether he/she did or didn’t prescribe an antibiotic”, and 19% (n = 98) disagreed with it. In harmony with this, 67% (n = 340) disagreed with the statement “A physician who does not prescribe an antibiotic – against patient’s preference – is not a good one”, whereas 24% (n = 121) agreed with it and 7% (n = 38) answered “I don’t know”.

Educational level, but not age, was significantly associated with abiding by doctors’ instructions. Also, higher educational level was more strongly associated with trusting doctors’ decisions and not demanding an antibiotic when not prescribed compared to lower educational level (p < 0.001).

Half of the sample (n = 269) believed that pharmacists provide instructions on antibiotic use all the time, whereas physicians were perceived to do so by 29% (n = 148) of the sample (Figure 5).

Half of the sample (n = 261, 51%) believed that a wider range of antibiotics is available in Jordan than in

Iraq; 25% did not believe so, and 22% didn’t know. Nonetheless, this did not seem to impact the frequency of antibiotic use. Forty-five percent of the sample (n = 230) responded negatively when asked if they used antibiotics in Jordan more than in Iraq, compared to 48% (n = 245) who responded positively to the same question.

**Discussion**

The level of awareness of antibiotic use and causes of antimicrobial resistance in this study shows gaps. These are particularly related to self-medication and to the misconceptions about indications for antibiotics; the absolute majority of the study sample reported using antibiotics for viral rather than bacterial infections. The fact that the majority of our sample reported buying antibiotics without a prescription conforms with several previous studies from Jordan [6-9,13], from Iraq [14,15], and from other countries [16-18]. This indicates that self-medication practices of the Iraqi community residing in Jordan are not much different from that of the Jordanians, nor the Iraqis residing in Iraq.

The literature highlights an array of factors that foster self-medication. Several of these are evident in our societies. First, low economic status pushes individuals towards finding ways to save on costs – for example, saving on costs of medical consultations by directly approaching pharmacists, or saving on costs of drugs by obtaining them from relatives or keeping leftover drugs for future use. This study does not discuss the income per capita and its implications on antimicrobial use; however, the economic constraints in Jordan are well established [19]. Economic limitations are anticipated to be even more in the expatriate Iraqi communities, whose majority depends on resources jeopardized by the ongoing turmoil in their country [10]. Second, there is a lack of public awareness of how serious the issue of antimicrobial resistance is [20], which was also evident in the responses from the majority of our sample. Third, there is a perception of appropriateness of antibiotic use in viral infections and minor ailments [20,21], which was clearly proven in our study as well. Other reasons for self-medication involve previous experience with the efficacy of a treatment, saving the wait time at the doctor’s clinic, and wide availability of antibiotics [7,21]. The latter factor has been frequently addressed in previous local studies, which all emphasized the enforcement of the already existing laws that prohibit the purchase of antibiotics without a prescription. Nonetheless, none of these

recommendations on law enforcement have been put into action yet.

Awareness of the importance of completing an antibiotic course even when feeling better and knowledge that antibiotics do not affect the speed of cure from cold reported herein were better than those reported in other studies [16-18]. Similarly, the knowledge of antibiotic resistance and abiding by physicians' instructions were higher than what had been reported from neighboring countries such as Syria [18]. Conversely, aspects related to keeping leftover antibiotics for future use and awareness of antimicrobial resistance associated with antibiotic misuse were lower in our sample than in other studies [16,17].

The practice of overtly requesting antibiotics from physicians when not prescribed reported in this study has been also highlighted in other studies [22,23]. Moreover, having a considerable number of participants perceiving physicians' provision of instructions on antibiotic use to occur occasionally could reflect patient dissatisfaction with medical care. At the same time, having the majority of the sample stating that pharmacists explain about antibiotics all the time emphasizes the pivotal role that could be played by pharmacists in patient education and rationalizing antibiotic use, a role which, in reality, is far from achieving its full potential. In fact, claims that pharmacists, among other HCPs, are responsible for the extensive antibiotic misuse in our society were explicitly stated (personal communication with HCPs attending World Health Day: Antimicrobial resistance: no action today, no cure tomorrow. 7 April 2011, Amman, Jordan).

As for use of antibiotics in Jordan versus Iraq, the long-term sanctions imposed on Iraq resulting in severe shortages of drugs [24] validate what the majority of our sample believed – that a wider range of antibiotics were available in Jordan compared to Iraq.

Difficulties were faced in data collection, particularly in pharmacies and cafes. The initial response rate from pharmacies was 12%. This was enhanced by involving active personnel from the Jordanian Pharmaceutical Association in the study team who visited pharmacies in person, which enhanced pharmacies' levels of participation. It is the lack of interest in research activities to which we attribute low rate of participation.

Sometimes, some questions were left unanswered by a minority of the participants. This could not be explained by the research team, especially considering "I don't know" was an option among the answers.

Furthermore, the length of the questionnaire was reasonable compared to other similar questionnaire-based studies. Unanswered questions were considered missing and did not affect the analysis of the rest of data.

The impact of insurance status on antibiotics use could not be fully characterized in this study, as it measured awareness of participants and not actual purchase of antibiotics. Moreover, antibiotics purchased without a prescription are not covered by insurance, whether the patient is insured or not.

## Conclusions

The identified gaps in public awareness and practices pertaining to antibiotics should serve in the design of educational campaigns to tackle the problem of antibiotic misuse. The literature advises to focus on activities that aim at changing the behavior of both public and health care professionals rather than mere provision of information [25]. So far, the studies conducted in Jordan have been relatively small, descriptive ones. Large-scale studies to quantify the magnitude of antibiotic purchase and interventional studies to minimize the level of misuse and to measure the impact of interventions on actual practices are needed. If any change to the current situation is to materialize, the health authorities must take serious steps towards restricting access to antibiotics and raising the community's awareness of the responsible use of these drugs.

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**Conflict of interests:** No conflict of interests is declared.