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Journal of Infection and Public Health

journal homepage: <http://www.elsevier.com/locate/jiph>



Antibiotic resistance: Italian awareness survey 2016

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ARTICLE INFO

Article history:

Received 28 July 2016
Received in revised form 21 February 2017
Accepted 22 February 2017

Keywords:

Antibiotic resistance
Italy
Awareness survey

ABSTRACT

Antimicrobial resistance has become a public health priority worldwide. The WHO conducted a survey concerning the personal use of antibiotics, knowledge of appropriate use and awareness of the issue of resistance. A similar survey was conducted in Italy involving 666 young university students and 131 seniors attending courses of the University of the third age.

Antibiotics seem to be taken with moderate frequency and appropriately: 30% of respondents took them in the past six months and 94% took these drugs only prescribed by a doctor, in the correct dose and for the proper duration. Notable confusion concerning the conditions treatable with antibiotics was detected (only 30% indicated gonorrhoea, and 30–40% believed that antibiotics should be employed for fever, cold, and flu), while 94% of participants seemed aware of the problem of antibiotic resistance. Most of the respondents identified the behaviors that can reduce the phenomenon of resistance (regular handwashing and use of antibiotics only when prescribed and needed).

The results of our survey, that involved people of high level of instruction and living in urban areas of northern regions, cannot be extended to all the Italian population. However, they provide valid elements to promote initiatives aimed to a more aware use of antibiotics.

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Introduction

Antibiotic resistance has become a public health priority worldwide and its spread is currently faster compared to the development of new molecules [1–3]. A multidrug resistance increases patient treatment failures and mortality, and healthcare costs [1–4].

An excessive use and a misuse of antibiotics increase the selective pressure favoring the emergence, multiplication and spread of resistant strains. In addition, the transmission of resistant organisms between humans in all kinds of healthcare facilities as well as in the community, between animals and between humans, animals and environment contributes to the occurrence and spread of the antibiotic resistance [3].

Three-quarter of the antimicrobials agents used in livestock overlaps with antimicrobials used in humans [5]. The amount of antibiotics used for crops is relatively low in comparison to the quantities used in livestock. However the manure from farm animals is often used on crops as a fertilizer, contributing to the emergence, selection and spread of antimicrobial resistant bacteria [5–7].

The severity of the phenomenon and its global spread have prompted the World Health Organization (WHO) and the European Union (EU) to activate several surveillance systems [8–10]. The European Parliament has launched the “European Action Plan 2011–2015 on resistance to antibiotics”, a series of strategic actions to preserve the effectiveness of the antibiotics, and ensure they remain an effective tool against disease [10]. An European network of national surveillance systems on antimicrobial resistance (EARS-Net), coordinated and financed by European Centre for Disease Prevention and Control (ECDC), has been created to collect data from 29 European countries and to analyze temporal and spatial trends of the phenomenon [3]. European data confirm the increase of the resistance to third-generation cephalosporins, fluoroquinolones and aminoglycosides especially in *Escherichia coli* and in *Klebsiella pneumoniae*, responsible for urinary tract infections, sepsis and other health-care related infections [3]. These resistances are often combined generating multi-resistant bacteria [3]. In the recent years, the resistance to the carbapenems has been added making some infections untreatable [3].

The antibiotic resistance situation is not uniform in EU, and in general higher resistance frequencies are reported by countries in eastern and southern Europe [3].

Data collected during the Antibiotic Resistance-Istituto Superiore di Sanità (AR-ISS) project confirmed that Italy is one of countries with highest levels of resistance in most pathogenic species under surveillance, namely 32.9% of *K. pneumoniae* iso-

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<http://dx.doi.org/10.1016/j.jiph.2017.02.010>

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lates were resistant to carbapenems, 33.6% of *Staphylococcus aureus* to methicillin, and 28.7% and 43.9% of *E. coli* isolates to third-generation cephalosporins and fluoroquinolones respectively [2,3].

In addition, the AR-ISS project reported high levels of resistance in the central and southern regions of Italy, probably related to the high consumption of antibiotics in these geographic areas [2].

The increasing trend of resistance could be reversed by a combination of interventions focused on control strategies to stop the spread of multi-resistant bacteria in healthcare facilities, and on education and promotion of prudent use of antibiotics, as the European Day of Antibiotics or the Day of handwashing. A central point of these campaigns is that everyone, both private citizen and health care worker, can contribute to stop the antibiotic resistance [9]. Recently, in line with these objectives, WHO developed a plan to improve awareness and understanding of antimicrobial resistance. During 2015, WHO conducted a survey involving 9772 adults from 12 member States, two from each WHO Region, concerning the personal use of antibiotics, the knowledge of the appropriate use of antibiotics and the awareness of the issue of antibiotic resistance [9]. Italy was not included in this survey.

We conducted a similar survey in Italy involving young students of the Università di Milano and seniors attending courses of the University of the third age, in order to have a snapshot of the situation to implement educational initiatives in these two populations.

Methods

The original WHO questionnaire “Antibiotic resistance: multi-country public awareness survey” [9] was translated into Italian and modified in some parts (see Supplementary material).

The survey included nine questions – five with multiple choice, three with true/false, and one with rating scale responses – looking at three areas: personal use of antibiotics, knowledge about antibiotics and about their resistance.

The questionnaire was anonymous and included demographic information, year and degree course (only for university students). The participants were asked to self-complete the survey during lesson time.

The survey was carried out between November 2015 and May 2016 in Lombardy, a region in the north part of Italy.

For statistical analysis, chi-square test was employed to compare the frequencies in two population categories. *p*-Values less than 0.05 were regarded as significant.

Results

The questionnaire was administered to a total 797 persons, divided in two different groups, namely 666 young university students (25% males; age: median 20 years, range 18–48), and 131 senior students (27% males; age: median 68 years, range 51–87).

Among the young university students, 50 (8%) were enrolled in the first year of medical school, 502 (75%) in the other medical area courses (dental medicine, orthotic and ophthalmologic assistance, nursing, health promotion, dietetics, environmental and workplace prevention techniques) and the remaining 114 (17%) were students of the social/law area of the Università degli Studi di Milano.

The senior students attended two different Universities of the third age, located in the area of Milano.

Personal use of antibiotics

A total of 243 respondents (30%) reported antibiotic use within the past six months, of these 10% having taken within the last month (question # 1). No differences emerged between the two groups of

participants, except 1% of young people that never taken antibiotics while all seniors claimed a use at least once in their life.

Most individuals (85%) had taken an antibiotic prescribed by a doctor (question # 2) and 84% said they had received advice on dosage and timing by a doctor, a nurse or a pharmacist (question # 3). No statistically significant differences were observed between surveyed categories of participants.

Knowledge about antibiotics

The vast majority of respondents (94%) answered that all doses of prescribed antibiotics have to be taken and only 4% believed to stop treatment when they feel better (question # 4).

Most of the respondents (90%) believed that they should not use the antibiotics prescribed for other people (as friends or relatives) to treat the same illness, and only 3% thought that this behavior is correct (question # 5).

Question # 6 asked if it is correct buy or request to the doctor the same antibiotic that solved symptoms in a previous occasion: 42% answered correctly that it is false, and 21% did not know. Senior students were most likely than young students to agree that this statement is false (55% vs 39%; $p = 0.0007$). In addition, young people were more uncertain in the response than the older group (24% vs 7%; $p < 0.0001$).

Question # 7 proposed a list of different medical conditions asking if they can be treated with antibiotics. Pathologies to treat with antibiotics were gonorrhoea, bladder/urinary tract infection, skin infection and traumatic wound. Others were infections caused by viruses (HIV/AIDS, cold and flu, measles), by *Plasmodium* (malaria) or different medical conditions, such as sore throat, diarrhea, fever, body aches, headache. Fig. 1 shows the answers of young and old students to each medical condition. As reported, the majority of respondents correctly indicated bladder/urinary tract (84%) and skin (66%) infection as condition treatable by antibiotics. However, there was a significant difference between young students and seniors (68% vs 52%; $p = 0.0003$), who believed correct to treat skin infections with antibiotics. Traumatic wound and gonorrhoea were correctly identified as diseases treatable with antibiotics only by 30% of the responders. No significant differences were observed between young students and seniors, as well as between students of medical area and students of law area. On the contrary, first-year students were more frequently unaware of the bacterial origin of gonorrhoea than other colleagues (22% vs 41%, $p < 0.0001$). Some of respondents were unaware of the pathogens involved in other pathologies, suggesting antimicrobial treatment for sore throats (39%), fever (36%), cold and flu (28%), measles (22%) (Fig. 1). Old people incorrectly indicated more frequently than students HIV/AIDS (18% vs 7%, $p < 0.0001$). On the contrary, seniors seemed to be more informed on the correct management of cold and flu, fever, diarrhea, sore throat, body aches, headaches, measles. Among the young students, those of medical area less frequently than those of law area supported the need of antibiotics for treatment of fever and measles (37% vs 51%, $p = 0.0056$ and 22% vs 41%, $p < 0.0001$, respectively) (Fig. 1).

Knowledge about antibiotic resistance

The participants had to answer nine statements regarding antibiotic resistance with a true or false reply (question # 8).

A large proportion of the total of participants (more than 70%) identified correctly seven out of the nine statements (Fig. 2). Specifically, 89% of the respondents acknowledged that many infections are becoming increasingly resistant to treatment and as a consequence represent major risks for some medical procedures, such as surgery, organ transplants and cancer treatment (88%).

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