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DOCUMENT TITLE: THE ROLE OF PHARMACIST IN ENCOURAGING PRUDENT USE OF ANTIBIOTICS AND AVERTING ANTIMICROBIAL RESISTANCE: A REVIEW OF POLICY AND EXPERIENCE IN EUROPE

The role of pharmacist in encouraging prudent use of antibiotics and averting antimicrobial resistance: a review of policy and experience

World Health Organization
Regional Office for Europe
UN City, Marmorvej 51, DK-2100 Copenhagen Ø, Denmark
Tel.: +45 45 33 70 00 Fax: +45 45 33 70 01 Email: contact@euro.who.int
Website: http://www.euro.who.int/en/health-topics/Health-systems/medicines
The role of pharmacist in encouraging prudent use of antibiotics and averting antimicrobial resistance: a review of policy and experience in Europe
ABSTRACT

The good pharmacy practice (GPP) Joint FIP/WHO guidelines on GPP: standards for quality of pharmacy services states, “The mission of pharmacy practice is to contribute to health improvement and to help patients with health problems to make the best use of their medicines”. Based on the results of a literature review of the GPP roles relating to AMR and a survey conducted in the WHO European Member States, this report outlines the roles of pharmacists in this mission and, since they are often the first point of contact for patients, their potential as important allies in the fight against antimicrobial resistance (AMR). The report illustrates that pharmacists already have experience in treating patients with antibiotics, both responsibly and within an appropriate legal framework. It also indicates, however, that in many countries the general public can still buy antibiotics over the counter without a diagnosis or prescription and use them at will. According to the survey, pharmacists are among the best positioned to influence the appropriate use of antibiotics and, therefore, have a crucial role to play in combating AMR alongside policy-makers and general practitioners: every player is key.

KEYWORDS

Antimicrobial drug resistance
Medicine, evidence-based
Non-prescription drugs
Pharmaceutical services
Data collection

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Executive summary

Antimicrobial medicines play a major role in controlling infectious diseases. However, their widespread use – often overuse and misuse – is seeing a growing resistance to their efficacy. Therefore, one of the key challenges facing countries is to ensure the best use of antibiotics. In this connection, it is important that any concerted action involve the examination and, where necessary, improvement of the role of the pharmacist (including those working in clinics and hospitals) as the main supplier and regulator of these medicines. This report provides an independent assessment of the current policy and guidance on the role of the community pharmacy/pharmacist, maps their key roles in relation to antimicrobial resistance (AMR), and summarizes existing guidance for pharmacies/pharmacists and recent research on the performance of pharmacy systems in Europe.

The findings presented in the report are the result of a combination of primary and secondary research, namely a survey conducted in the 53 Member States of the WHO European Region through a questionnaire addressed to pharmacy associations on current national pharmaceutical services/initiatives linked to prudent use of antibiotic medicines. This was complemented by a targeted literature review of academic articles, grey literature and guidance materials referring to the role of the pharmacist. The literature identified has been categorized according to document type: patient information material; focus on the pharmacists’ role; policy documents on tackling AMR; and research articles (Annex 1).

Survey responses from 44 countries have been analysed and are presented in the report. The findings show that access to antibiotics is regulated in most national contexts in Europe to a greater or lesser degree. Therefore, while in some countries access to antibiotics without a prescription is only possible in emergency situations, the regulations in others allow for a higher level of over-the-counter (OTC) sales. Most countries reported pharmacy-level activities or initiatives to foster the prudent use of antibiotics, such as educational campaigns and the development of guidelines for consumers. Additionally, while the role and impact of the pharmacist differ by country, an overwhelming majority of respondents were of the opinion that pharmacists are best placed to help combat AMR given their positions of interface between the health-care system and the patient. At the same time, it was reported that the doctor’s role vis-à-vis antibiotic guidance, in partnership with pharmacists, could be strengthened.

In taking the discussion on the specific role of the pharmacist forward, the report looks at the survey results in detail and links these to the 4 pharmacist roles defined in the Joint FIP/WHO guidelines on GPP: standards for quality of pharmacy services (the GPP guidelines) (1). Though it clear that the pharmacist’s role is crucial, the GPP guidelines place it in a wider context. Greater antibiotic stewardship and a strengthening of the medical and pharmacy curricula were identified as important considerations for the future.

The report presents a number of issues, which policy-makers may wish to consider with a view to strengthening their efforts to tackle AMR, such as enhancing the prudent use of antibiotics. In this connection, the role of the pharmacist is seen as key and collaboration between pharmacists and prescribers as particularly important.

The report was developed by the Health Technology and Pharmaceutical Programme in collaboration with the Pharmaceutical Group of the European Union (PGEU), Europharm
Forum, and the WHO Collaborating Centre for Drug Development and Pharmacy Practice at Pharmakon (Denmark).
INTRODUCTION

Background

As long as they have existed, antimicrobial medicines have played a major role in controlling infectious diseases. However, their increasing widespread use has resulted in the development of resistant microorganisms, which are causing disease in community and hospital settings, resulting in increased morbidity and mortality, and higher health-care costs. The failure to develop innovative antibiotic molecules over the last few decades has made the task of combating resistant organisms more difficult (2).

The major cause of antimicrobial resistance (AMR) is the inappropriate use of antibiotics. Various studies carried out in and outside Europe revealed that over 40% of prescriptions for antibiotics were more or less inappropriate. This was found to be directly related to the tendency towards self-medication and the unnecessary use of antibiotics for common sore throats and colds that most frequently are caused by viral infections on which antibiotics have no effect. (3,4). As well as self-medication by patients (including the use of left-over medicines), the studies identified problems, such as the illegal dispensing of antimicrobials by pharmacists in some European countries, as well as inappropriate prescribing by physicians (3,5,6,7).

The spread of AMR cannot be combated at the national level alone. It is a global problem that requires a coordinated effort.

Both European Union (EU) and WHO strategies for the control of AMR have been applied in countries of the WHO European Region (7,8,9,10)).

The WHO health policy framework and strategy, Health 2020: the European policy for health and well-being (11), identifies AMR as a major health challenge under priority area 2, “Tackling Europe’s major health challenges: noncommunicable and communicable diseases”.

The European strategic action plan on antibiotic resistance (8), adopted by the WHO European Member States in September 2011, was developed on the basis of Health 2020 (11). It sets out 7 key actions to address the problem of AMR (Box 1) (8).

The World Health Assembly, at its Sixty-seventh session in 2014, adopted resolution WHA67.25 (12) requesting the Director-General to develop a draft global action plan to combat AMR, including antibiotic resistance, for submission to the Sixty-eighth session of the World Health Assembly in 2015. This plan is currently under development.
The overall goal must be to preserve our ability to treat serious infections. In some contexts, preserving the effectiveness of antimicrobial medicines means to use them less. The appropriate use of antibiotics is essential in the face of increasing AMR, and it is the collective responsibility of all sectors of health care to cooperate on and tackle this issue. This is important in relation to both human and animal health and action is required in both sectors; this report focuses on human-related action.

Although multidrug-resistant strains of pathogens are increasing in hospital settings, an overall reduction of AMR can only be obtained by addressing the outpatient use of antibiotics. Thus, the role of the community pharmacist is key to reducing the threat of AMR (13). It is the pharmacist who has the last contact with the patient before he or she receives an antibiotic medicine and, thus, the pharmacist acts as the gatekeeper (14).

It is clear that a number of issues need to be addressed in the context of the pharmacist’s role in combating AMR. These include:

• dispensing antimicrobials without a prescription;
• enforcing rules relevant to unauthorized dispensing;
• developing appropriate regulations, where necessary;
• using repeat prescriptions for antimicrobials;
• adjusting quantity dispensed vs quantity prescribed;
• managing waste (used antibiotics);
• using pharmacies in campaigns to promote and conduct awareness on the use of antimicrobials;
• providing information (pharmacist to patient) on antimicrobials, AMR and AMR-related issues;
• training pharmacy students and pharmacists in AMR and AMR-related issues;
• cooperating with prescribing physicians;
• providing antibiotic stewardship in primary-care settings.

Many countries and organizations have developed strategies for and guidance on AMR (15,16). However, most of the related policy documents do not include guidance on the role of pharmacists and pharmacies, or do so only to a very limited extent.

With this background in mind, there was a need to create an overview of the roles and activities of pharmacists, pharmacies and pharmacy systems that can contribute to the prudent use of antimicrobial medicines (17).

**Objectives**

The objectives of this report are to present the outcome of a review of the policy and guidance existing in Europe in relation to the role of the community pharmacy/pharmacist and the results of a survey to investigate and map the current availability and consumption of antibiotics. The report also maps the roles of the pharmacist described in the GPP guidelines (1) at both global and country levels, and outlines potential AMR-related action or policy options that countries may wish to consider in promoting the prudent use of antibiotics.
METHODOLOGY

A targeted literature review was undertaken to analyse the status quo regarding the use of antibiotics and strategies to combat the growing AMR epidemic, as well as the role of the pharmacist in this respect. In addition, relevant guidance documents of various European countries and global organizations were collected and analysed. The results were categorized on the basis of the GPP guidelines (1) and grouped according to the 4 key responsibilities of the pharmacist outlined in their conceptual framework.

In addition, a survey was carried out in the 53 WHO European Member States with the aim of capturing the perception of pharmacists, patients, policy-makers and prescribers regarding the availability and consumption of antibiotics, as well as their views on how to tackle the growing AMR crisis and ways in which stakeholders could contribute to doing so.

Literature search

A literature map was conducted in September 2014 to identify evidence of the roles of pharmacists and pharmacies in the use of antibiotics. A search of the National Center for Biotechnology Information Pubmed Central (NCBI-PMC) was carried out using the following combinations of key words (the numbers of articles found are mentioned in brackets):

1. prudent use antibiotics pharmacist (9)
2. prudent use antibiotics pharmacy (42)
3. prudent use antimicrobials pharmacist (11)
4. prudent use antimicrobials pharmacy (47)
5. antibiotic resistance pharmacists role (40)
6. antimicrobial resistance pharmacists role (54)
7. antibiotics irrational use pharmacist (10)
8. antibiotics rational use pharmacist (49)
9. reasonable use of antibiotics pharmacist (7)
10. inappropriate use of antibiotics pharmacist (125)
11. unreasonable use of antibiotics pharmacist (0)
12. role of pharmacist antibiotics prescription (45).

A search using the term “pharmacy” instead of “pharmacist” gave less relevant results or results that were also covered in the above-mentioned search.

Strict inclusion and exclusion criteria were set up for the document screening. Documents were included if (judging from abstracts or summaries) they contained guidelines or recommendations on AMR-related activities in community-pharmacy practice relevant to the European setting. Documents related to hospital settings were not included. The language of the publications was restricted to English but, since Russian-language publications were also found, these were included because of their relevance to the European Region. The literature search focused only on human antimicrobial resistance problems, although veterinary issues also have a great impact on the overall problem. Material referring to resistance to certain types of antibiotics or certain types of microorganisms was also excluded.

In order to include all policy documents relating to AMR in the European Region, in September 2014, a search was made in Google using the same key words as in the above-mentioned search.
This led to documents from organizations, such as the European Centre for Disease Prevention and Control (ECDC), the International Pharmaceutical Federation (FIP), the Pharmaceutical Group of the European Union (PGEU), and the WHO Regional Office for Europe, as well as to country-specific strategies.

**Good pharmacy practice**

The GPP guidelines (1) were chosen as the framework for analysing the literature on pharmacy roles and activities in relation to AMR. They describe the standards necessary to ensure the quality of pharmacy services, stating that “the mission of pharmacy practice is to contribute to health improvement and to help patients with health problems to make the best use of their medicines”. They identify 4 main roles with underlying functions in connection with which the involvement of or supervision by pharmacists is expected by society and the individuals they serve (Fig. 1). In this report, the activities of pharmacists/pharmacies are described according to these 4 roles.

Fig. 1. The roles of the pharmacist according to the GPP guidelines

Source: Joint FIP/WHO guidelines on good pharmacy practice: standards for quality of pharmacy services (1).
Global – FIP

In 2008, FIP published a revised statement on AMR entitled, *FIP Statement of policy – control of antimicrobial medicines resistance (AMR)* (18), whereby FIP takes responsibility for the professional leadership through a range of activities. It urges pharmacists to:

- provide proper counselling and appropriate written information when dispensing antimicrobials;
- encourage patients to take the full prescribed regimen and, if not possible, to dispose of any unused antimicrobial medicines appropriately;
- work with prescribers so that dosages prescribed are sufficient for the completion or continuation of a course of therapy;
- recommend therapies other than antimicrobials for minor ailments;
- provide updated information on antimicrobial medicines to prescribers as well as health-care professionals who administer or otherwise influence the use of medicines;
- be actively involved in matters of hygiene and infection control in all health-care settings;
- effectively monitor the supply and use of antimicrobials by their patients.

At the health-system level, FIP urges governments and health authorities to take the following action directly related to community pharmacy:

- develop and implement measures for the appropriate use of antimicrobials and prohibit the dispensing and sale or supply of these medicines without a prescription from or order of a qualified health-care professional;
- strengthen the legislative and regulatory control of authorizations to market, import, export, prescribe, dispense and otherwise supply antimicrobial medicines, and enhance the enforcement of statutes and regulations;
- ensure that only authorized channels of distribution are used to minimize the availability of counterfeit and substandard medicines, thus assuring that available antimicrobials meet the required standards of safety, quality and efficacy;
- conduct health-education campaigns that promote the appropriate use of antimicrobials;
- collaborate with health-professional societies and associations to develop and facilitate the implementation of educational and behavioural interventions that will assist prescribers in appropriate antimicrobial prescribing.

Survey methodology

A survey questionnaire was developed for the collection of primary data and distributed to pharmacy and pharmacist associations in all 53 Member States of the WHO European Region (Annex 3). The questions related to:

- the capacity (including human resources and funding) of the respondents to carry out activities related to antibiotic medicines;
- the opinion of the respondents as to whether antibiotic medicines are prescribed, dispensed and used appropriately in their countries;
- the opinion of the respondents regarding actors capable of improving the use of antibiotic medicines in their countries;
- the question of whether over-the-counter (OTC) antibiotics are legally available, whether they are being sold or supplied to the public illegally, and whether antibiotic medicines are available outside the pharmacy;
• collaboration between the physician and the pharmacist on the appropriate use of medicines;
• monitoring of consumption of antibiotic medicines;
• educational activities relating to the prudent use of antibiotic medicines and the availability/use of standard treatment guidelines;
• country-specific activities on the prudent use of antibiotic medicines, which give the pharmacist a specific role and responsibility;
• patient information related to the prudent use of antimicrobial medicines.

The questionnaire was developed in English and translated into Russian. The data was collected in the countries during the period June–September 2014, using an electronic collection instrument. Europharm Forum and PGEU requested their members to complete the questionnaire. In the case of the Republic of Serbia and countries where Europharm Forum and PGEU are not represented, the Regional Office approached the ministries of health or the national medicines regulatory agencies through its country offices in these countries. Responses received in Russian were translated and entered into the electronic survey tool by the Regional Office.

Descriptive analyses of the responses and frequency calculations were carried out.

RESULTS

AMR-related pharmacy roles: mapping the literature

The relevant literature was read and listed in 4 categories chosen for their importance in identifying and better understanding ways of strengthening the prudent use of antibiotics:

1. patient information;
2. the professional role of the pharmacist;
3. recommendations of organizations or institutions on how to handle the problem of AMR;
4. research articles describing and evaluating concrete activities or efforts in this area (Annex 1).

The results were further analysed and categorized according to the 4 four roles of the pharmacist outlined in the GPP guidelines (Boxes 2-5) (Annex 2) (/).
Box 2. GPP role 1: prepare, obtain, store, secure, distribute, administer, dispense and dispose

The following activities were identified as relevant to role 1 of the GPP guidelines (1):

- establishment of internal quality procedures to prevent contamination whereby all antibiotics are properly labelled, dated and stored;
- ensuring the regular and fast supply of all antibiotics to avoid undertreatment, in connection with which the pharmacy describes the best dispensing practice, including the non-sale of partial doses and antibiotics without a prescription;
- provision of information – verbally (in a patient-friendly message) and/or in writing (in a legible, understandable message) – on the appropriate use of antibiotic medicines (for example, when and for how long), side effects, adverse reactions and interactions, and resistance issues;
- provision of facilities conducive to encouraging patients to ask for advice, such as a display of leaflets and posters on AMR;
- provision of a medicine-waste-collection service to avoid misuse of antimicrobials.

Sources: Self-medication with antibiotics in rural population in Greece: a cross-sectional multicenter study (7); FIP Statement of Policy Control of Antimicrobial Medicines Resistance (AMR) (18); Preventing antibiotic resistance – we all have a role to play (19); EPSA Statement of Support for ANEPF (20); Irrational use of antibiotics and role of the pharmacists: an insight from a qualitative study in New Delhi, India (21); Foundation in pharmacy practice (22); Attitudes of community pharmacists to antibiotic dispensing and microbial resistance: a qualitative study in Portugal (23); Self-medication with antibiotics in the Republic of Srpska community pharmacies: pharmacy staff (24); ASHP statement on the pharmacist’s role in antimicrobial stewardship and infection prevention and control (25); PGEU statement: community pharmacists’ contribution to the control of antibiotic resistance (26).

Box 3. GPP role 2: provide effective medication therapy management

The following activities were identified as relevant to role 2 of the GPP guidelines (1):

- development of guidelines or a clinical decision-support system, including:
  - directions for pharmacists on prescribing and when to refer to the doctor;
  - recommendations on choice of drugs (one drug per bacteria, narrow-spectrum antibiotics) based on tests;
  - recommendations on choice of drugs, based on interactions;
  - recommendations on dosage, based on pharmacokinetic/pharmacodynamic (PK/PD) parameters and the dynamics of the individual antibiotics (avoidance of overdosage)
  - avoidance of duplicate therapy;
- development of a test system (bacterial culture), re-evaluation of the need for antibiotics after 48–72 hours and discussion with the doctor;
- follow-up with patients over the telephone to ensure adherence;
- encouragement of vaccination to avoid infections;
- avoidance of long-term antibiotic prophylaxis;
- counselling patients on symptomatic therapy and OTC medicines;
- educating and counselling patients and families about storage, handling devices and waste disposal.

Sources: The pharmacist’s role in promoting optimal antimicrobial use (13); FIP Statement of Policy Control of Antimicrobial Medicines Resistance (AMR) (18); Preventing antibiotic resistance – we all have a role to play (19); EPSA Statement of Support for ANEPF (20); Irrational use of antibiotics and role of the pharmacists: an insight from a qualitative study in New Delhi, India (21); Foundation in pharmacy practice (22); Self-medication with antibiotics in the Republic of Srpska community pharmacies: pharmacy staff (24); ASHP statement on the pharmacist’s role in antimicrobial stewardship and infection prevention and control (25); PGEU statement: community pharmacists’ contribution to the control of antibiotic resistance (26); ECDC corporate strategies for disease-specific programmes (27); The pharmacist’s role in preventing antibiotic resistance (28); The role of pharmacist in limiting the spread of antibiotic resistance in India (29); Experience with a clinical decision support system in community pharmacies to recommend narrow-spectrum antimicrobials, nonantimicrobial prescriptions and OTC products to decrease broad-spectrum antimicrobial use (30); Antimicrobial stewardship: what’s it all about? (31).
Box 4. GPP role 3: maintain and improve professional performance

The following were identified as relevant to role 3 of the GPP guidelines (1):

- education of the pharmacy profession:
  - symposia, self-study, e-learning, congresses, articles in professional journals, national campaigns;
  - undergraduate education (include AMR awareness);
  - postgraduate education (for example, therapeutic drug monitoring).

- focus on inappropriate dispensing through:
  - financial incentives to dispense only according to prescription and standards/procedures;
  - professional attitude (recognition of pharmacists’ responsibility).

- Collaboration between:
  - pharmacists and doctors in the interpretation of culture results and compliance with standards/procedures;
  - primary care and hospitals on follow-up of prescriptions.

Sources: The pharmacist’s role in promoting optimal antimicrobial use (13); UK five year antimicrobial resistance strategy 2013 to 2018 (15); Strategy for tackling antimicrobial resistance (STAR) 2012-2017 (16); FIP Statement of Policy Control of Antimicrobial Medicines Resistance (AMR) (18); EPSA statement of support for ANEPF (20); Irrational use of antibiotics and role of the pharmacists: an insight from a qualitative study in New Delhi, India (21); Foundation in pharmacy practice (22); Attitudes of community pharmacists to antibiotic dispensing and microbial resistance: a qualitative study in Portugal (23); ASHP statement on the pharmacist’s role in antimicrobial stewardship and infection prevention and control (25); The pharmacist’s role in preventing antibiotic resistance (28); The role of pharmacist in limiting the spread of antibiotic resistance in India (29); Antimicrobial stewardship: what’s it all about? (31); Sale of regulated antibiotics without prescription. Research on the pharmacists’ attitudes and patterns of economic behaviour (32); Antibiotic resistance (33); Impact of a program to reduce the dispensing of antibiotics without a prescription in Spain (34); Availability and dispensing practices for antimalarials and antimicrobials in western Kenyan pharmacies (35).

Box 5. GPP role 4: contribute to improving effectiveness of the health-care system and public health

The following were identified as relevant to role 4 of the GPP guidelines (1):

- public campaigns focusing on:
  - the problem of AMR;
  - prevention (for example, hand hygiene in schools);
  - action by the individual (for example, in connection with antibiotic waste).

- development and innovation (related mainly to pharmacists working in research):
  - new treatments that meet the required standards;
  - better diagnostic tools;
  - collection of data on consumption and interventions;

- development of national policy with the involvement of pharmacists:
  - legislative action (for example, to prevent dispensing without prescription, or prescribing and dispensing at the same time by doctors);
  - implementation of surveillance systems and development of indicators;
  - ensuring safety of medicines;
  - minimizing the drug industry’s influence on prescribing and dispensing;
  - implementation of policies on and programmes for the marketing authorization process;

- professional stewardship:
  - development of national policy with the involvement of pharmacists and other health-care professionals;
  - monitoring and providing feedback to government and payers (for example, health-insurance funds).

Sources: The pharmacist’s role in promoting optimal antimicrobial use (13); Strategy for tackling antimicrobial resistance (STAR) 2012-2017 (16); FIP Statement of Policy Control of Antimicrobial Medicines Resistance (AMR) (18); EPSA Statement of Support for ANEPF (20); Irrational use of antibiotics and role of the pharmacists: an insight from a qualitative study in New Delhi, India (21); Attitudes of community pharmacists to antibiotic dispensing and microbial resistance: a qualitative study in Portugal (23); ASHP statement on the pharmacist’s role in antimicrobial stewardship and infection prevention and control (25); PGEU statement: community pharmacists’ contribution to the control of antibiotic resistance (26); The pharmacist’s role in preventing antibiotic resistance (28); The role of pharmacist in limiting the spread of antibiotic resistance in India (29); Sale of regulated antibiotics without prescription. Research on the pharmacists’ attitudes and patterns of economic behaviour (32); Impact of a program to reduce the dispensing of antibiotics without a prescription in Spain (34); A survey of public knowledge and awareness related to antibiotic use and resistance in Sweden (36); Examining influences of pharmacists’ communication with consumers about antibiotics (37); Fact sheet. Fighting antibiotic resistance by ensuring the rational use of medicines (38).
The literature search also revealed policy documents by global and country-specific players, which include reference to the key roles and responsibilities of the pharmacist in relation to AMR.

**Global - GPP guidelines**

The GPP guidelines (1) provide some guidance to pharmacies regarding AMR.

- The focus on AMR is expressed in role 1, for example, in the mention of safe storage of medicines, dispensing and counselling according to national guidelines, and the safe disposal of unused medicines. Function 1.D – “Administration of medicines, vaccines and other injectable medications” – specifies that “pharmacists should have an educator, facilitator and immunizer role, thus contributing to the prevention of diseases through participation in vaccination programmes, by ensuring vaccination coverage and by also ensuring vaccine safety”.

- Role 2 relates to pharmacist support to patients and prescribers in the appropriate use or non-use of medicines, according to the patient’s individual situation. Function 2.D – “Provide information about medicines and health-related issues” – specifies that “pharmacists should be proactive in reducing antimicrobial resistance by providing information about the appropriate use of antimicrobials to consumers and prescribers”.

- Role 3 focuses on the importance of pharmacists maintaining a high level of knowledge, skills and performance through continuing education and is generally relevant to all professional tasks. There is no specific mention of functions relating to AMR in connection with role 3.

- The focus of role 4 is on improving the effectiveness of health-care systems and public health. Function 4.B – “Engage in preventive care activities and services” – specifies that pharmacists should engage in preventive-care activities that promote public health and prevent disease, for example, in areas, such as smoking cessation, infectious diseases and sexually transmitted diseases.

Country-specific examples, the organizations involved and policy recommendations on the role of the pharmacist in relation to AMR are listed in Annex 4.

**Survey results**

The survey response rate was 83% (44 countries out of 53), the majority of respondents representing pharmacist associations or pharmacy associations (Fig 2), and the majority of organizations having a national impact (82% (36 out of 44)).

**Characteristics of the respondents**

Fig. 2 shows the proportions of the respondents (total = 44) to the survey.
Views of the respondents on the potential of health professionals to influence the use of antibiotics

Most of the respondents felt that policy-makers, pharmacists and prescribers are in the best position to improve the situation related to the appropriate use of antibiotics in their countries followed by professional associations and patient communities (Fig. 3). It is thus evident that, along with the policy-makers, there were pharmacists who felt they had played a leading role in making a difference in the use and consumption of antibiotics. In fact, 93% of the respondents agreed that pharmacists, as a health-professional group, are in one of the best positions to help combat AMR and highlighted the key role pharmacists can play through their direct and frequent contact with consumers and patients.
Access to antibiotics

As discussed earlier in the report, there is a strong connection between the availability and use of antibiotics and resistance to them. Therefore, the survey included questions on the availability of antibiotics with or without a prescription and over the counter. It was found that in 43% of the responding countries (19 out of 44), it was legally possible to buy antibiotics over the counter (Fig. 4) and, therefore, pharmacists already have experience in treating patients with these medicines both responsibly and within an appropriate legal framework.

A number of respondents reported restrictions in OTC sales in their countries in that only a few antibiotics are legally available over the counter. These include erythromycin gel 3% (30gram) (Albania), fusafungin (Czech Republic), bacomycin (Norway), 24-hour dosage of any antibiotic medicines in emergency situations (Romania), antibiotics with local effect (eye and topical preparations) (Serbia and Slovakia), and chloramphenicol eye drops for the treatment of conjunctivitis and azithromycin for the treatment of chlamydia (United Kingdom). Some of the respondents who reported that OTC sale of antibiotics was legal in their countries did not mention any OTC sales restrictions.
At the same time, only 12% of the respondents (5 out of 44 countries) reported that it was possible to buy antibiotics without a prescription over the Internet (Fig. 5), indicating a potential difference between the regulation of Internet pharmacy sales and sales at physical pharmacies. It is not clear whether the online pharmacies in question are legal.

In 27% (12 out of 44) of the responding countries it is possible to buy antibiotics outside the pharmacy, such as on the black market or in veterinary clinics and/or pharmacies (Fig. 6) though
purchase from the latter is likely to be through a legitimate source with a veterinary prescription or directly from a veterinarian.

Fig. 6. Countries where it is possible to buy antibiotics outside the pharmacy

**Monitoring consumption of antimicrobial medicine**

Activities with great potential for reducing AMR include monitoring and mapping the consumption of antimicrobial medicine through the regular collection of data on sales, prescriptions and use. The data on antibiotic use (based on the collection of wholesale data) are monitored through ECDC and the European Surveillance of Antimicrobial Consumption Network (ESAC-net) (for European Union (EU) countries) and through the WHO Regional Office for Europe (for non-EU countries) (Fig. 7).
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Fig 7. Countries monitoring antmicrobial consumption, 2014 (total = 53)

The authority responsible for the collection of data on antibiotic consumption varies from one European country to another and an array of institutions is responsible (Fig. 8). However, ESAC-net methodology is used in all countries (39).
Antibiotic stewardship

Antibiotic stewardship is an effective way of ensuring the prudent use of antibiotics. The pharmacist plays a very important role in the antibiotic stewardship programme: this includes conducting therapeutic drug monitoring, consulting physicians and counselling patients, all of which contributes to the prudent use of antibiotics (40).

According to the results of the survey, antibiotic stewardship is included in the medical and pharmaceutical curricula in most of the responding countries (Fig. 9). In approximately 58% of them, pharmacists and medical professionals have been educated in antibiotic stewardship from the time of their undergraduate training and are, therefore, well equipped to collaborate on reducing AMR from the start of their careers.
Fig. 9. Responses on inclusion of antibiotic stewardship in medical/pharmaceutical undergraduate and postgraduate curricula (total = 44)

**Guidelines on antibiotic treatment**

In 81% of the responding countries (36 out of 44), guidelines on antibiotics are issued centrally (mainly) and/or separately by various institutions (Fig. 10). Most of the guidelines are developed by professional associations, policy-makers, prescribers and pharmacists (Fig. 11). Professional associations are a significant stakeholder group in the development of such guidelines and pharmacists have an opportunity here to become more involved, as has been demonstrated by responses indicating that pharmacists are in one of the best positions to combat AMR.
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Fig. 10. Distribution of guidelines on antibiotic treatment in responding countries (total = 44)

Fig 11: Authorities responsible for the development of guidelines on antibiotic treatment (total= 44)
Other findings

The survey also revealed the following information.

- In 31 of the 44 responding countries (70%), there are some activities related to, or initiatives to foster, the prudent use of antibiotics at the pharmacy level, such as campaigns to increase awareness (including Antibiotic Awareness Day), AMR working groups and educational campaigns. In approximately half of the responding countries (21 out of 44 (49%)), the number of doses to be dispensed is adjusted for each patient in the pharmacy based on the quantity requested and the duration of treatment stated on the prescription. This avoids dispensing excess medication, which could potentially be used for self-medication later on.

- Close collaboration between pharmacists and doctors regarding medicines prescribed for patients was reported by 15 of the 44 responding countries; 20 respondents believed that, in their countries, doctors can be influenced by pharmacists to change prescriptions if the latter do not consider them appropriate.

- 13 respondents agreed that feedback from pharmacists to doctors is influential.

- 36 respondents agreed that pharmacists in their countries are in a position to provide patients with relevant advice on the use of antibiotics; 30 agreed that pharmacists provide patients with detailed information on the use of antibiotics; and only 25 respondents agreed that doctors provide patients with detailed information on this issue.

DISCUSSION

The survey shows that regulations on access to antibiotics at the pharmacy, including OTC and Internet-based sales, are in place in most European countries. Wide access to antibiotics should not be allowed and in countries where there are no restrictions to OTC and Internet-based sales of antibiotics, regulations need to be introduced, particularly in view of the growing popularity of purchasing medicine online. Lack of regulations pertaining to the availability, dispensing of and access to antibiotics can lead to excessive consumption and an increase in AMR. In countries where antibiotics are provided over the counter in emergencies, as well as in topical forms, ways should be considered of avoiding the negative effects of the overuse of these options in terms of AMR. Strict government policy and law enforcement related to the sale of antibiotics in pharmacies are, along with public-awareness campaigns, essential to addressing the crisis linked to AMR.

In terms of global and European guidance, this is available in the form of the GPP guidelines (I) and the FIP statement on AMR (18), which outline the contributions pharmacists can make to combating AMR and ways in which governments and health authorities can enhance the use of the community pharmacy to this end. These include using the pharmacist in the roles of educator, facilitator and immunizer, and as a resource in ensuring the appropriate use or non-use of medicines and providing support to patients and prescribers alike. However, using the pharmacists in these roles could be pursued further at the national level (41). In particular, how best to motivate their providing proper counselling and information on the appropriate use of medicines to consumers and other health professionals, as well as their active engagement in matters of hygiene and infections control in all health-care settings which would promote the use of pharmaceutical services in the area of antibiotics rather than sales.

Point-of-care testing (PoCT) is now possible in many areas of clinical medicine, including screening for bacterial infections. Many new forms of PoCT are being developed that will
provide inexpensive and simple-to-use methods of deoxyribonucleic acid/ribonucleic acid (DNA/RNA)-based identification of potentially multiple pathogens from a single sample. When they become available, these new forms of PoCT will make it possible to start correct treatment immediately. A new activity is being piloted in the United Kingdom whereby certain pharmacies in the London area are carrying out PoCT linked to sore throat and, if bacterial tonsillitis infection is detected, are supplying penicillin-V (or in case of allergy, clarithromycin). This is made possible though pharmacy-based patient group direction (PGD). PGDs provide a legal framework that allows certain registered health professionals to supply and/or administer specified medicine(s) to a predefined group of patients, without their having to see a doctor. However, supplying and/or administering medicines under PGD should be reserved for situations in which doing so offers the advantage of patient care without compromising patient safety. This pilot project is an example of how the role of the community pharmacist in the appropriate use of antibiotics for bacterial tonsillitis infection is being explored. In the United States, a similar pharmaceutical service is in use.

Evaluations on the role of rapid diagnostics/PoCT in other countries where these methods are used would be welcome. The usefulness of novel diagnostic tests is clearly that they offer the opportunity of swiftly distinguishing cases for which antibiotics are not needed and, therefore, can safely be withheld. Information about new patient-centred models for the prudent use of antibiotics, including the use of PoCT in a variety of relevant settings, is also of interest. They could pave the way to a more efficient, targeted use of antibiotics and would likely contribute to reversing the AMR trend. Better diagnoses would lead to an important reduction in the use of antibiotics.

To tackle the issue of AMR, multiple interventions are needed, also by pharmacists. The community pharmacist must engage in various public-health initiatives relating, for example, to the appropriate dispensing of antibiotics, the restriction of irrational dispensing, and bringing about greater patient awareness of the importance of avoiding self-medication without correct diagnosis and of the increasing problem of AMR.

Surveillance of the use of antibiotics can be strengthened. There is a long tradition of monitoring the use of medicines in most EU countries but efforts to this end should be increased in parts of eastern Europe. WHO has supported related activities in non-EU countries: a network was created in 2011 to complement ECDC activities to monitor the use of antimicrobial medicines through wholesale data. Data from 42 countries and regions in the WHO European Region on wholesale of antimicrobial medicines in 2011 indicate an almost fourfold difference between the lowest and highest numbers of antibiotic users. Mapping consumption is the first step towards identifying and tackling the growing public problem of AMR. Action to gain a clearer overview of the online prescription and use of antibiotics should also be considered, as well as ways to support follow-up of the data gathered.

The increased use of antibiotics is related to the socioeconomic situation, which explains the status quo as regards the use of antibiotics in some eastern European countries. Furthermore, the lack of stringent government policies and regulations and their enforcement, for example, through efficient decentralization, is also accountable for the increase in AMR in some of these countries.

The survey results indicate that more effort is needed in encouraging the prudent use of antibiotics and that the role of the pharmacist needs to be clearly recognized and enhanced. In this connection, while the survey revealed that efforts are being made to include courses on antibiotic stewardship in the medical and pharmaceutical undergraduate and postgraduate
curricula, it is crucial that the information provided in these courses is timely and stresses the importance of the roles of the medical and pharmaceutical professions in promoting the prudent use of antibiotics. Also, as 8 countries did not respond to the questionnaire, the current situation for the whole Region in this respect is not yet clear. The Regional Office is endeavouring to complete the mapping exercise through follow up with the countries in question.

National and local efforts are needed to enhance the antibiotic stewardship programme in Europe. With reference to research on undergraduate and postgraduate medical education, a wide variation was found among the countries with respect to the principles of prudent prescribing of antibiotics (40,47). There is a need to optimize knowledge about choice of antibiotics, dosage regimens, monitoring adverse effects, and limiting collateral damage in the use of antibiotics. With AMR increasing worldwide, the role of the pharmacist is manifold in terms of influencing the choice of antibiotics administered, ensuring access, and carrying out therapeutic drug monitoring. If practised effectively, pharmacists in antibiotic stewardship programmes can go far to ensure the rational use of antibiotics.

Shaping the behaviour of all health professionals – as has been done, for example, in the Netherlands – could be useful in all countries. Generally, this is most easily achieved by starting at an early stage, hence the importance of updating undergraduate curricula. This should be done in combination with postgraduate educational strategies and interventions on behavioural change aimed at all health professionals and through awareness-raising campaigns and communication with the public on the importance of the prudent use of antimicrobials.

CONCLUSIONS

This report identifies multiple activities related to the prevention of AMR in the Region in which community pharmacists could be involved and indicates that pharmacists have many relevant suggestions and initiatives regarding the prudent use of antibiotics and the reduction of AMR. Based on the examples identified, the potential of the pharmacist in this respect has not been explored to a great extent. However, pharmacy organizations have developed basic guidance documents. At the policy level (EU or national), the pharmacist is seen as an essential player in the health system which, in many countries, provides the funding for pharmacist-led pharmaceutical-care services.

In some countries, there is scope at the national level to address adherence to current regulations and guidance on the use of antibiotic medicines from the perspectives of the prescriber and the community pharmacist. Pharmacists have taken on the role of providing relevant information to patients, which includes ensuring their compliance with a prescribed course of medicine (for example, through the “Treat Yourself Better with Pharmacist Advice” campaign and the “New Medicines Service” in the United Kingdom (England and Wales), “Medisinstart” in Norway, the Belgian Asthma Service, the French “Therapeutic Patient Education” service and “Adhiérete” in Spain). Thus, there is scope to increase the level and quality of information being provided to patients on the use of medicines and, in this case, the use of antibiotics (10,45). In addition, quantity dispensed vs quantity prescribed and the responsible disposal of unused antibiotics could be investigated at the European level.

The time is opportune to address the need to increase collaboration between pharmacists and prescribers and, thus, decrease the level of inappropriate prescribing, building – at the same time – stronger relations, respect and mutual trust between the two groups. In the process of encouraging the prudent use of antibiotics, full advantage must be taken of the position of the
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The pharmacist as an effective liaison between prescriber and patient. Improved communication between the two in relation to diagnosis, type of antibiotics prescribed and dosage is one way to ensure appropriate prescribing. In addition, patients should be well counselled on the need for and use of antibiotics, adverse effects, consequences of incomplete dosage and the growing problem of AMR. Thus, a team-based approach to patient care is needed.

We must recognize the ability of pharmacist feedback (especially within the framework of national/regional guidelines) to influence prescribing positively and, thus, combat AMR (49).

The search for information on AMR and action taken in community pharmacy to combat it revealed many examples of antimicrobial stewardship programmes for hospitals. However, it is in primary care that the greatest proportion of antibiotics is prescribed and, therefore, antimicrobial stewardship programmes need to be extended to and integrated with primary care. The analysis of the role of the pharmacist on the basis of the 4 GPP roles and the assessment of pharmacy systems show that countries could utilize their pharmacy systems much more to combat AMR and improve the health of their populations.

The capacity of the pharmacist is underestimated. Pharmacists are key health professionals with the skills and training required to contribute to the reduction of AMR. It is important to recognize and use their potential. While, in many countries of Europe, pharmacists already have the capacity to take on additional roles and responsibilities to foster the prudent use of antibiotic medicine, in some, a special effort will be necessary to update the pharmacist curriculum and ensure that it includes antibiotic stewardship.

In terms of next steps, the results of the survey point to the need to:

1. ensure pharmacist input in the development of national plans on AMR;
2. develop a catalogue describing recommended action at the different levels (national, local and pharmacist-led);
3. encourage the sharing and adoption of good practices;
4. establish the community pharmacist’s role (and value) in general strategies for fighting AMR, thereby making it visible to health authorities, other health-care professionals and professional organizations;
5. increase efforts to tackle illegal online pharmacies and the illegal trade of pharmaceuticals on the black market, in pharmacies or from other outlets;
6. foster better collaboration between pharmacists and prescribers.

Improvements in these areas should be shared across and between countries of the Region to the extent possible. The Regional Office could facilitate this action.
References


1 Unless otherwise stated, URLs accessed 6 November 2014.


13. Dickerson LM, Carek PJ. The pharmacist’s role in promoting optimal antimicrobial use. Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy. 2000;20(6):711–23 (http://onlinelibrary.wiley.com/doi/10.1592/phco.20.7.711.35171/abstract;jsessionid=10B907D5AF670DEFDA488C2D220CE2DD.04t04?systemMessage=Wiley+Online+Library+will+be+disrupted+on+the+18th+October+from+10%3A00+BST+%2B%2805%3A00+EDT%29+for+essential+maintenance+for+approximately+two+hours+as+we+make+upgrades+to+improve+our+services+to+you).


35. Wafula, F. Availability and dispensing practices for antimalarials and antimicrobials in western Kenyan pharmacies. Pharmaceutical Regulatory Affairs. 2013;2(106) (http://www.omicsgroup.org/journals/availability-and-dispensing-practices-for-antimalarials-


ANNEXES

Annex 1. List of documents with reference to the role of pharmacist in relation to AMR

<table>
<thead>
<tr>
<th>Category¹ and no. of document</th>
<th>Document reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2</td>
<td>Preventing antibiotic resistance – we all have a role to play. Dehli: Indian Pharmacist Association (IPA); 2011 (<a href="http://ipa.medlineindia.com/2011/11/25/preventing-antibiotic-resistance-%E2%80%93-we-all-have-a-role-to-play/">http://ipa.medlineindia.com/2011/11/25/preventing-antibiotic-resistance-%E2%80%93-we-all-have-a-role-to-play/</a>, accessed 20 October 2014).</td>
</tr>
<tr>
<td>2.1</td>
<td>Survey on activities related to antibiotic awareness, internal note from PGEU. Ref 13,03,21E 008FS. 2013.</td>
</tr>
</tbody>
</table>

¹ Category 1: patient information; Category 2: the professional role of the pharmacist; Category 3: recommendations of organizations or institutions on how to handle the problem of AMR; Category 4: research articles describing and evaluating concrete activities or efforts in this area.


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## Annex 2. Pharmacy roles in antimicrobial resistance - literature map

<table>
<thead>
<tr>
<th>Category and no.</th>
<th>Document reference</th>
<th>Country/region (year)</th>
<th>Action, practices, recommendations described relating to the four roles of pharmacists described in Joint FIP/WHO guidelines on GPP: standards for quality of pharmacy services (^5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2</td>
<td>Preventing antibiotic resistance – we all have a role to play. Dehli: Indian Pharmacist Association (IPA); 2011 (<a href="http://ipa.medlineindia.com/2011/11/25/preventing-antibiotic-resistance-%E2%80%93-we-all-have-a-role-to-play/">http://ipa.medlineindia.com/2011/11/25/preventing-antibiotic-resistance-%E2%80%93-we-all-have-a-role-to-play/</a>, accessed 20 October 2014).</td>
<td>India (2011)</td>
<td>Counselling on appropriate use, resistance and adverse effects. Only one antibiotic per bacteria.</td>
</tr>
</tbody>
</table>

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\(^4\) The references are categorized according to the main focus of the documents in question: (1) patient information materials; (2) the professional role of the pharmacist; (3) policy related to handling the problem; (4) research articles.

## 2.1 Survey on activities related to antibiotic awareness, internal note from PGEU. Ref 13,03,21E 008FS. 2013.

<table>
<thead>
<tr>
<th>Europe (2013)</th>
<th>Over-the-counter information to patients on proper use. Leaflets and posters on antimicrobial resistance.</th>
<th>Phone app for guidelines on prescribing antibiotics.</th>
<th>Symposium on antibiotic awareness. Articles in national professional journals. Self-study educational materials. Pharmacist congress on antimicrobial resistance. Postgraduate education.</th>
<th>Pharmacists support national campaigns by discouraging patients from keeping left-over antibiotics. Public debate broadcast on national TV.</th>
</tr>
</thead>
</table>


| Europe (2013) | Ensure a regular quick supply of all types of antibiotics in pharmacies to maximize access. Provide complete information about drug treatment. Collect and dispose of unused antibiotics. | Ensure patient compliance (counselling; follow-up assistance for disabled). | Include antimicrobial resistance in higher education and postgraduate education programmes. Develop prescription-only guidelines according to standards. Strive for better collaboration among stakeholders. | Need for: innovative treatments capable of tackling antimicrobial resistance; development of new effective antibiotics; better diagnosis; avoidance of doctors prescribing and dispensing at the same time; regulation and surveillance systems; public campaigns; basic level of microbiology and hygiene in schools. |


| Europe (2010) | Antibiotics prescribed by pharmacists according to guidelines. Enhancing the awareness of patients about AMR and hygiene. | | | |

<p>| 2.6 | McCoy D, Toussaint K, Gallagher JC. The pharmacist's role in preventing antibiotic resistance. US Pharmacist. 2011;36(7):42–9 [<a href="http://www.uspharmacist.com/content/d/feature/c/29137/">http://www.uspharmacist.com/content/d/feature/c/29137/</a> accessed 21 October 2014). | USA (2011) | Re-evaluate continued need for antibiotics after 48–72 hours. Stop antibiotics stopped if cultures are negative or if infection unlikely or resolved. Screen for drug–drug interactions or duplicate therapy maximizing pharmacokinetic/pharmacodynamic (PK/PD) parameters for dose optimization of antibiotics. Switch therapy to most appropriate antibiotic on basis of results. Minimize use of broad-spectrum antibiotics. Avoid chronic or long-term antibiotic prophylaxis. Provide proper over-the-counter (OTC) counselling of | Assisting in the interpretation of results from diagnostic tests or cultures (colonization vs. contamination vs. infection). Working in conjunction with the microbiology laboratory to aid in the selection of diagnostic tools or tailoring susceptibility reports based on available formulary antibiotics and susceptibility patterns. Educating the public regarding: general hygiene, hand hygiene, coughs etiquette, immunizations, and importance of staying home when sick. |</p>
<table>
<thead>
<tr>
<th>Reference</th>
<th>Sources</th>
<th>Year</th>
<th>Country</th>
<th>Activity</th>
</tr>
</thead>
</table>

Restrict antibiotics via pharmaceutical benefits scheme. Provide feedback on patterns of antibiotics consumption to track use.
| 3.2 | **PGEU statement: community pharmacists’ contribution to the control of antibiotic resistance.** Approved by the General Assembly on 17 November 2009. Brussels: Pharmaceutical Group of the European Union; 2009 | **Europe (2009)** | Information on: best dispensing practice; use (when, how long), side effects, adverse reactions and interactions; waste-collection services. | Identify non-adherence. Treat minor ailments. Refer to doctors when necessary. | | **Health campaign; health promotion in schools and the community.** |
| --- | --- |
| Global (2008) | Give proper counselling advice and provide appropriate written information when dispensing antimicrobials. Encourage patients to dispose of any unused antimicrobial medicines. |
|  | Effectively monitor the supply of antimicrobials and patients’ use of them. Recommend therapies other than antimicrobials for minor ailments. Work with prescribers to order sufficient doses to complete or continue a course of therapy. |
|  | Provide updated information on antimicrobials to prescribers, as well as to health-care professionals who administer or otherwise influence the use of medicines. |
|  | Professional organizations are working to: promote surveillance systems and the development and use of indicators; establish policies and programmes for the market authorization process; support educational campaigns aimed at the public and health-care professionals; promote the discovery and development of new cost-effective antimicrobial agents and alternative treatments and vaccines; support the development of rapid and reliable diagnostic and susceptibility tests; promote the role of the pharmacist in the selection, procurement, distribution and use of antimicrobials; impose restrictions on prescribing antimicrobial medicines; strengthen the legislative and... |
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<table>
<thead>
<tr>
<th>Source</th>
<th>Study Title</th>
<th>Country/Year</th>
<th>Key Points</th>
</tr>
</thead>
</table>

regulatory control of authorizations to market, import, export, prescribe, dispense and otherwise supply antimicrobial medicines; ensure that the available antimicrobials meet the required standards of safety, quality and efficacy; develop appropriate adult and child vaccination programmes; be actively involved in matters of hygiene and infection control in all health-care settings.
|---|---|---|---|
Annex 3. Antibiotic-medicines-related questionnaire for European pharmacy/pharmacist association

Section 1: General information

Name:

Name of Authority/Department/institution/Organization:

City/State/Country/ E-mail address/Phone/Website

Type of organization:

- Pharmacist association
- Pharmacy association
- Other

Funding:

- Public
- Private
- Fees from members
- Both

Yearly budget for rational use of medicines/ prudent use of AB medicines related activities

Impact:

- International
- National
- State/regional
- County councils/lands/municipalities

Size of organization’s related activities:

- No. of professional staff
- No. of support staff

Annual budget for the organization’s related activities:

Section 2: Situation overview
1. Do you think antibiotics in your country are:
   a) Prescribed appropriately?
      
      [ ] Yes  [ ] No

   b) Dispensed appropriately with a valid prescription?
      
      [ ] Yes  [ ] No

   c) Used correctly by patients?
      
      [ ] Yes  [ ] No

2. If yes, who do you feel is in a position to improve the situation with the use of antibiotics (check as many boxes as needed)?

   Policy makers  [ ]
   Pharmacists  [ ]
   Prescribers  [ ]
   Patient community  [ ]
   Professional associations e.g. medical microbiologists or infectious disease specialists  [ ]
   Other (please specify)_________________

3. Are antibiotics legitimately available over-the-counter in your country?

   [ ] Yes  [ ] No

4. Are antibiotics available without a prescription in your country?

   [ ] Yes  [ ] No

5. Are antibiotics available without a prescription, by any other means in your country?

   [ ] Yes  [ ] No

6. If Yes, please describe by which other means antibiotics are available without a prescription?

   For example: in eye-drops, etc.
7. Do you feel that antibiotics are mostly prescribed appropriately in your country?
   - [ ] Yes
   - [ ] No

8. Is it possible to buy antibiotics:
   a) Online with a prescription from your country?
      - [ ] Yes
      - [ ] No
   b) Online without a prescription from your country?
      - [ ] Yes
      - [ ] No
   c) Online with a prescription from another country?
      - [ ] Yes
      - [ ] No
   d) Online without a prescription from another country?
      - [ ] Yes
      - [ ] No
   e) Somewhere else than a pharmacy in your country?
      - [ ] Yes
      - [ ] No

9. Is there close collaboration (feedback) between pharmacists and doctors in your country?
   - [ ] Yes
   - [ ] No

10. Can the pharmacist in your country influence the doctor to change the prescription if he/she does not consider it appropriate?
    - [ ] Yes
    - [ ] No

11. Are data on antibiotics use monitored in your country?
    - [ ] Yes
    - [ ] No

12. If yes, who is responsible for data collection and monitoring?
    Please describe:

13. Is prudent use of antibiotics a part of undergraduate curricula in your country?
    - [ ] For medical staff
    - [ ] For pharmaceutical staff
    - [ ] No
    - [ ] Don’t know
14. Is prudent use of antibiotics a part of postgraduate curricula in your country?

- [ ] For medical staff
- [ ] For pharmaceutical staff
- [ ] No
- [ ] Don’t know

15. Are there any guidelines on antibiotic treatment in your country?

- [ ] Yes
- [ ] No
- [ ] Don’t know

16. If yes, are they issued

- [ ] Centrally
- [ ] Separately by various institutions for own use

17. Who is involved in the development of these guidelines?

- Policy makers
- Pharmacists
- Prescribers
- Patient community
- Professional associations e.g. medical microbiologists or infectious disease specialists
- Other (please specify) ____________

18. If issued centrally, have the guidelines on antibiotic treatment in your country been updated in the last 5 years?

- [ ] Yes
- [ ] No
- [ ] Don’t know

Section 3: The role of pharmacists

19. Are you aware of any activities or initiatives in your country to foster prudent use of antibiotics at the pharmacy level?

- [ ] Yes
- [ ] No

20. If yes, please describe the activities and the institutions responsible for them?


21. Are you aware of any collaboration between pharmacists and health professional societies/associations to develop and facilitate the implementation of educational and behavioural interventions that will assist prescribers in appropriate antimicrobial prescribing?
22. If yes, please describe the activities and the institutions responsible for them?


23. Are the number of pills dispensed in pharmacy adjusted for every patient based on the quantity requested/duration of treatment stated on their prescription?

☐ Yes  ☐ No

24. Are waste collection services provided by pharmacies in your countries?

☐ Yes  ☐ No  ☐ Don’t know  ☐ Other_________

25. Do you think pharmacists in your country are in a good position (in terms of skills and knowledge) to provide advice on the use of antibiotics to patients?

☐ Yes  ☐ No

26. Detailed information on the use of antibiotics provided by pharmacists to patients

☐ Strongly agree  ☐ Agree  ☐ Neither agree nor disagree  ☐ Disagree  ☐ Strongly disagree

27. Detailed information on the use of antibiotics provided by doctors to patients

☐ Strongly agree  ☐ Agree  ☐ Neither agree nor disagree  ☐ Disagree  ☐ Strongly disagree
### Annex 4. Country-specific policy recommendations

<table>
<thead>
<tr>
<th>Country / Region</th>
<th>Organization</th>
<th>Policy</th>
</tr>
</thead>
</table>
| Europe           | PGEU         | The following pharmacy tasks are identified:  
|                  |              | • informing patients how to take the medicines correctly and for how long, as well as on possible side effects, adverse reactions and drug interactions;  
|                  |              | • advising patients on minor ailments and referring them, when required, to their doctor;  
|                  |              | • providing waste-collection services to avoid self-treatment;  
|                  |              | • promoting health campaigns in local communities, schools and other community organizations.  
|                  |              | At the national level, pharmacists were also identified as contributors, which can be seen from the following examples. |
| Belgium          | Belgian Antibiotic Policy Coordination Committee (Babcoc) | Includes a multidisciplinary work group, including pharmacists, to handle identified activities. One of these activities is a campaign to facilitate discussion between patients, doctors and pharmacists on the need for the appropriate use of antibiotics. |
| Germany          | Bundesministerium für Ernährung und Landwirtschaft | Mentions education and post education relating to antibiotic resistance and patient communication. |
| Latvia           | ECDC         | The report on a country mission to Latvia describes the situation vis-à-vis antimicrobial resistance in 2011 and the action taken in the country in this area. No activity at community pharmacy level is mentioned. According to websites of the pharmacy chains, they provide information on preventive measures of avoiding infections. |
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<table>
<thead>
<tr>
<th>Country</th>
<th>Institution/Agency</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Netherlands</td>
<td>ECDC</td>
<td>Guidelines on prescribing antibiotics exist and pharmacists react to prescriptions that do not adhere to them. This is linked to a bonus agreement. The dispensing data is collected by foundations, such as the Dutch Foundation for Pharmaceutical Statistics. When GP’s prescribe according to the guidelines (a certain percentage of them), they receive a bonus paid by insurance companies. Accordingly, when pharmacists dispense according to the guidelines, they also receive a bonus and this motivates them to help GPs who do not respect the guidelines to prescribe better.</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>Department of Health</td>
<td>In the UK 5 year antimicrobial resistance strategy 2013 to 2018, the focus is on education and post education to “improve the knowledge and understanding of AMR by incorporating antimicrobial resistance awareness, responsible prescribing, dispensing and administration practice, as well as effective prevention, management and control of infection”. The strategy also mentions the need for “exploring how to encourage patients to use community pharmacies for advice” is needed.</td>
</tr>
</tbody>
</table>
The WHO Regional Office for Europe

The World Health Organization (WHO) is a specialized agency of the United Nations created in 1948 with the primary responsibility for international health matters and public health. The WHO Regional Office for Europe is one of six regional offices throughout the world, each with its own programme geared to the particular health conditions of the countries it serves.

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World Health Organization
Regional Office for Europe

UN City, Marmorvej 51, DK-2100 Copenhagen Ø, Denmark
Tel.: +45 45 33 70 00 Fax: +45 45 33 70 01 Email: contact@euro.who.int
Website: http://www.euro.who.int/en/health-topics/Health-systems/medicines