



Enabling factors for antibiotic prescribing for upper respiratory tract infections: Perspectives of Lithuanian and Russian general practitioners

Lina Jaruseviciene, Ruta Radzeviciene Jurgute, Lars Bjerrum, Arnoldas Jurgutis, Gediminas Jarusevicius & Jeffrey V. Lazarus

To cite this article: Lina Jaruseviciene, Ruta Radzeviciene Jurgute, Lars Bjerrum, Arnoldas Jurgutis, Gediminas Jarusevicius & Jeffrey V. Lazarus (2013) Enabling factors for antibiotic prescribing for upper respiratory tract infections: Perspectives of Lithuanian and Russian general practitioners , Upsala Journal of Medical Sciences, 118:2, 98-104, DOI: [10.3109/03009734.2013.778925](https://doi.org/10.3109/03009734.2013.778925)

To link to this article: <https://doi.org/10.3109/03009734.2013.778925>



© Informa Healthcare



Published online: 22 Mar 2013.



Submit your article to this journal [↗](#)



Article views: 450



View related articles [↗](#)



Citing articles: 7 View citing articles [↗](#)

ORIGINAL ARTICLE

Enabling factors for antibiotic prescribing for upper respiratory tract infections: Perspectives of Lithuanian and Russian general practitioners

LINA JARUSEVICIENE¹, RUTA RADZEVICIENE JURGUTE², LARS BJERRUM³,
ARNOLDAS JURGUTIS², GEDIMINAS JARUSEVICIUS⁴ & JEFFREY V. LAZARUS⁵

¹Department of Family Medicine, Lithuanian University of Health Sciences, Kaunas, Lithuania, ²Department of Public Health, Klaipeda University, Kaunas, Lithuania, ³Department of Public Health, University of Copenhagen, Section and Research Unit of General Practice, Copenhagen, Denmark, ⁴Department of Cardiology, Lithuanian University of Health Sciences, Kaunas, Lithuania, and ⁵Copenhagen HIV Programme, University of Copenhagen, Copenhagen, Denmark

Abstract

Introduction. General practitioners (GPs) write about 80% of all antibiotic prescriptions, the greatest number of them for patients with respiratory tract infections. However, there is a lack of research targeting the influence of external factors on antibiotic prescribing by physicians. This study aimed to explore experiences of GPs in Lithuania and the Russian Federation with regard to antibiotic prescription for upper respiratory tract infections. By such means it might be possible to reveal external enabling factors that influence antibiotic prescribing in these countries.

Method. Five focus groups were performed with 22 GPs from Lithuania and 29 GPs from the Kaliningrad Region of the Russian Federation; then, thematic analysis of data was performed.

Results. Six thematic categories were identified that are related to external forces enabling antibiotic prescription: the necessity for political leadership to encourage clinically grounded antibiotic use; over-the-counter sale of antibiotics; designation of antibiotics as reimbursable medications; supervision by external oversight institutions; lack of guidelines for the treatment of upper respiratory tract infections; and pharmaceutical company activities.

Conclusions. Comprehensive efforts to reduce the burden of non-clinically grounded antibiotic prescription should go beyond addressing factors at the physician–patient level and take into account important factors in the enabling environment as well.

Key words: Antibiotic prescribing, general practitioners, Lithuania, Russian Federation, upper respiratory tract infections

Introduction

General practitioners (GPs) write about 80% of all antibiotic prescriptions, the greatest number of them for patients with respiratory tract infections (1,2). As it is estimated that around half of all prescriptions are unnecessary (3), the antibiotic prescribing practices of GPs (4–9) have major implications for bacterial resistance, which is associated with longer hospital stays, greater morbidity and mortality, and increased health care costs (4).

Physician decision-making about antibiotics typically occurs within consultations between individual

physicians and patients, and non-pharmacological factors can be pivotal in determining whether or not antibiotics are prescribed. Factors identified in the literature include physicians' uncertainty about optimal diagnosis and treatment (10,11); fear of legal action if the patient's health deteriorates (12); the patients' expectation that antibiotics will be prescribed (13); physicians' use of communication skills to identify and address patient expectations (14); patients' misconceptions regarding the efficacy of antibiotics (15,16); and physicians' ability and willingness to address those misconceptions (17). The complex interaction that shapes physician decision-

Correspondence: Lina Jaruseviciene, Department of Family Medicine, Lithuanian University of Health Sciences, Mickeviciaus 9, LT-44307, Kaunas, Lithuania.
E-mail: ljaruseviciene@gmail.com

(Received 28 December 2012; accepted 18 February 2013)

ISSN 0300-9734 print/ISSN 2000-1967 online © 2013 Informa Healthcare
DOI: 10.3109/03009734.2013.778925

making about antibiotics is also informed by a particular cultural context (18). Research has identified several external 'enabling' factors that impact on antibiotic prescribing practices, including the dispensing of antibiotics without prescription at pharmacies (19); good patient access to physicians (11); direct patient payment for medical consultations (20); antibiotic reimbursement policies (21); and visits from pharmaceutical sales representatives (19,22).

There is very little research on how non-clinical factors influence antibiotic prescribing practices in post-Soviet countries. Research performed in Lithuania and the Russian Federation has primarily addressed the antibiotic use profile (23–26); the relationship between antibiotic use and bacterial resistance (27,28); and the public's beliefs and knowledge about antibiotic use and self-medication (29,30). Studies have revealed that antibiotics are imprudently used among the general population both in Lithuania and the Russian Federation (30,31), and that perceived availability of antibiotics without a prescription coupled with pharmacies not providing the exact quantities of the prescribed tablets are associated with a higher likelihood of self-medication (32).

However, there is a lack of research targeting the influence of external factors on antibiotic prescribing by physicians. In order better to understand how external enabling factors influence antibiotic prescribing in Lithuania and the Russian Federation, we conducted a qualitative study of the experiences of GPs in those countries in relation to antibiotic prescription for upper respiratory tract infections.

Methods

This paper reports on one component of a European Union-funded project known as the Health Alliance for Prudent Prescribing, Yield and Use of Antimicrobial Drugs in the Treatment of Respiratory Tract Infections (HAPPY AUDIT) (33). The overall goal of the HAPPY AUDIT was to combat the development of antibiotic resistance by reducing antibiotic overprescribing for respiratory tract infections. From 2007 to 2010, the HAPPY AUDIT implemented the Audit Project Odense (APO) method among GPs and their patients in Argentina, Denmark, Lithuania, the Russian Federation, Spain, and Sweden. The countries were chosen in part for their varying prevalence of antibiotic resistance.

This paper focuses on data from Lithuania and the Russian Federation, the two project countries with the highest prescription rates for respiratory tract infections (34). A total of 31 GPs from Lithuania and

39 GPs from the Kaliningrad Region of the Russian Federation took part in the HAPPY AUDIT project. Researchers invited all Lithuanian and Russian GPs who assisted in periodic project educational meetings to enrol in a qualitative study, explaining that the study would utilize focus groups to explore physician experiences and attitudes regarding antibiotic prescribing in general practice. Prospective study participants were assured that their input would be confidential. All of the 22 Lithuanian GPs who were invited agreed to enrol, and 29 of the 30 Russian GPs who were invited agreed to enrol. (One Russian GP declined for personal reasons.) All study participants provided written informed consent. The study received ethical approval from the Kaliningrad Association of Family Doctors (the Russian Federation) and the Bioethics Committee of Klaipeda University (Lithuania).

All focus groups participants had known each other for at least 1 year as a result of their involvement in HAPPY AUDIT activities. It was anticipated that participants' familiarity with each other might encourage them to engage more readily in discussions (35).

We conducted two focus group discussions with Lithuanian GPs (11 people each) and three with Russian GPs (9–11 people each). Two research team members, both GPs themselves, facilitated each discussion, with one moderating and the other taking notes. Lithuanian was spoken with the Lithuanian focus group participants, and Russian with the Russian focus group participants. Each focus group discussion lasted approximately 2 hours. The discussions were audiotaped with participants' permission.

Focus groups discussions followed a semi-structured topic guide. Typically, discussions addressed participants' experiences with antibiotic prescriptions that were not grounded in clinical necessity, their attitudes about prescribing antibiotics for upper respiratory tract infections, the criteria they used to choose specific types of antibiotics for these infections, and their thoughts about interventions that could improve antibiotic prescribing practices. The moderator encouraged experiential narratives. After each discussion, the two facilitators considered whether the topic guide should be refined in light of points made by focus group participants. Although the core areas of inquiry remained the same throughout the study, the format of each focus group discussion differed as the facilitators incorporated issues identified by participants into subsequent discussions.

The two facilitators transcribed each focus group discussion verbatim, and then initiated a thematic analysis of all data (36). As both of these researchers were bilingual, the transcripts were analysed in the original languages. They both systematically

Table 1. Socio-demographic data of participants of the focus groups.

Indicator	Number of participants		
	Lithuanians	Russians	Total
Age groups			
Younger than 50 years	13	15	28
50 years and older	9	14	23
Gender			
Male	5	5	10
Female	17	24	41
Type of training			
Residency in general practice	9	0	9
Vocational training in general practice	13	29	42
Location of practice			
Urban	15	17	32
Rural	7	12	19
Size of practice			
Solo	2	9	11
Group	20	20	40
Type of practice			
Public	12	29	41
Private	10	0	10

reviewed the transcripts line by line and separately generated codes for the entire data set. Codes were named using words that matched the participants' own words as closely as possible. The facilitators then identified and compared similarities and divergences in the coding of the different transcripts, discussing each theme that emerged until they could agree upon its suitability for inclusion in the study findings. Themes were grouped into categories, and then relevant data were translated from Lithuanian and Russian into English.

The thematic findings were then reviewed and summarized in terms of what they revealed about external enabling factors related to antibiotic prescribing. In the quotations presented below, we have used a bracketed ellipsis, or [...], to indicate the omission of words. Where we have tried to clarify participants' meaning, our interpretations appear in brackets, e.g. [prescription].

This paper analyses only the non-pharmacological aspects of antibiotic prescription that are not related directly to physician–patient relationships. Revealed non-pharmacological factors for antibiotic prescriptions that affect physician–patient communication about antibiotic prescription have been discussed elsewhere (37).

Results

Respondents

Although Lithuanian and Russian study participants were similar in terms of age, gender, and practice location (urban versus rural), they differed in other ways (Table I; also published in ref. 37). A larger proportion of Russian GPs were solo practitioners (31% versus 9%). Slightly more than half of the Lithuanian GPs worked in privately owned primary health care centres with contracts with Lithuanian National Health Insurance, while all Russian GPs worked in public health care settings (there were no privately owned primary health care centres with contracts with insurance companies in the Russian study region). All Russian GPs had undergone vocational training in general practice, but only 60% of the Lithuanian GPs had followed this course of professional development. The other Lithuanian GPs had joined a family practice after residency.

External enabling factors that relate to physician decision-making about antibiotic prescribing

The data analysis led researchers to identify six thematic categories. The first category relates to a perceived necessity for political leadership to encourage clinically grounded antibiotic use. The other five categories address the following issues identified by GPs as factors in their antibiotic prescription decision-making: over-the-counter sale of antibiotics; designation of antibiotics as reimbursable medications; supervision by external oversight institutions; lack of guidelines for the treatment of upper respiratory tract infections; and pharmaceutical company activities.

The perceived necessity for political leadership to encourage clinically grounded antibiotic use

Study participants from both countries emphasized the necessity of political measures aimed at limiting antibiotic over-use, expressing strong doubt about whether interventions oriented exclusively towards physicians can be effective without political support. In fact, the concept of delegating overall responsibility for clinically grounded antibiotic use exclusively to physicians seemed rather irritating to study participants. However, they considered policy-makers to be indifferent to the need for clinically grounded antibiotic use.

Over-the-counter sale of antibiotics

Policies regarding the over-the-counter sale of antibiotics differed between the two countries, with a

physician's prescription required in Lithuania but not in the Russian Federation. Study participants from the Russian Federation expressed concern about whether the over-the-counter sale of antibiotics in pharmacies encouraged antibiotic over-use.

The patient starts treatment in the pharmacy, not at the doctor. That's why 90% of patients have antibiotics at home. (Russia)

Lithuanian GPs expressed the belief that their country's ban on the over-the-counter sale of antibiotics had favourable consequences on the antibiotic use habits of their patients.

I hope they will not decide to change the law, that antibiotics are available only with prescriptions. [...] Because the patients used to come after taking three tablets of all sorts of antibiotics, then you really [...] didn't know what to do with him and what treatment to give. (Lithuania)

Designation of antibiotics as reimbursable medications

Study participants from both countries reported that the addition of an antibiotic to the list of medications reimbursable by state or health insurance makes it more accessible and triggers an increase in its use. Moreover, the prescription of a reimbursable antibiotic was perceived to be a more legitimate decision than the prescription of a non-reimbursable antibiotic.

Thus, from the viewpoint of study participants, reducing non-clinically grounded antibiotic use will require the development of rigorous criteria for prescribing reimbursable antibiotics, and will also require efforts to ensure the inclusion of wide-spectrum antibiotics on the list of reimbursable drugs.

The reimbursement would be more helpful, if there were no reimbursement [of antibiotics] at all. Some [wide-spectrum] of antibiotics shouldn't be reimbursed at all, we do not need them at our level [in the out-patient care]. (Lithuania)

Supervision by external oversight institutions

Study participants from both countries had a belief that their practices were strongly supervised by external oversight institutions. According to the participants, the policy of some external oversight institutions is still based on the common belief that antibiotic use for upper respiratory tract infections helps patients recover faster and cuts insurance expenditures. Thus, the over-prescription of antibiotics is perceived by physicians as a sort of shield from external auditors.

Prescribing antibiotics is [like] some kind of insurance ... You can say it's like insurance against complications. It's also protection from groundless discussions, inspectors, audits, etc. (Lithuania)

The effort to avoid potential problems with external auditors and at the same time to follow clinical guidelines sometimes results in the falsification of medical records: the prescription is registered, but in fact is not given to the patient.

If you feel it's a virus, but prolonged, you record the antibiotic prescription on the medical card, but in reality do not prescribe it for the patient. This is the situation [...] when the patient is on sick leave. (Russia)

Such a strategy, GPs acknowledged, can hurt their professional credibility and cause patients to trust them less.

Sometimes the patient can take his medical records, read them and say, 'I haven't taken this medication – it was not prescribed to me.' (Russia)

Lack of guidelines for treatment of upper respiratory tract infections

Study participants expressed a need for national clinical guidelines for treatment of upper respiratory tract infections. They thought that approved national guidelines would help overcome the confusion they feel about being faced with contradictory information from different sources, and anticipated that the guidelines would serve as a shield against medical liability.

There should be a methodology, which protects us, which guides us. (Lithuania)

They also thought that such guidelines could serve as a tool for the harmonization of oversight institutions' activities.

The same guidelines for all – the lawyers, the ministry, paediatricians, otorhinolaryngologists, family doctors – all of them. (Lithuania)

Study participants furthermore expressed the belief that GPs would show a willingness to be represented during the development of national guidelines.

Pharmaceutical company activities

Study participants reported that pharmaceutical companies influence antibiotic prescribing in two ways: directly through visits to medical practitioners and indirectly through support of continuing medical education for physicians.

Study participants often criticized the information provided by pharmaceutical representatives and at sponsored educational events.

Now we have a lot of lectures – professors are coming from Moscow, Saint Petersburg. They are paid by [pharmaceutical] companies. There are honest lecturers who advertise a drug, but say that in this concrete situation they would choose another drug, but there are some who advertise the drug and talk just about it. (Russia)

However, GPs admitted that by providing support for educational events pharmaceutical companies are very influential in continuing medical education in both countries ‘and, as I see, all our education is in the hands of [pharmaceutical] companies’ (Lithuania).

Discussion

This qualitative investigation provided insight into physician decision-making about antibiotic prescribing in Lithuania and the Russian Federation by exploring GPs’ perspectives regarding several external enabling factors. GPs who participated in the focus groups perceived a need for political leadership to encourage clinically grounded antibiotic use. Russian GPs wanted over-the-counter sale of antibiotics in pharmacies to be restricted, and Lithuanian GPs wanted their country’s restriction to be maintained. According to the study participants, designating particular antibiotics as reimbursable medications encourages potential over-use. While the study participants reported strong supervision of their practices by external oversight institutions, they explained that such supervision does not necessarily curb antibiotic overprescription and in fact may encourage it. Finally, the study participants believed that the establishment of national guidelines for the treatment of upper respiratory tract infections would help them with decision-making and protect them from liability.

The over-the-counter sale of antibiotics was the only major factor that differed between the Russian Federation and Lithuania; however, GPs from both countries had similar attitudes towards this practice. Lithuanian GPs appreciated their country’s ban, while being able to buy antibiotics without a prescription was a matter of great concern for Russian GPs. The increased antibiotic use when antibiotics are directly accessible to patients without a prescription is a widely known phenomenon (38,39). Thus, the banning of over-the-counter sale of antibiotics is an essential component of comprehensive antibiotic use policies (39,40). In settings where over-the-counter sale of antibiotics remains a popular practice, pharmacist involvement in clinically grounded antibiotic use should be considered, along with the development of specific pharmacist training programmes (41).

Regarding antibiotic reimbursement, the views of the study participants are consistent with the findings of a Turkish study that showed a close correlation between the subsidization of antibiotic prescriptions by health insurance systems and increased use of antibiotics (21). Our study data suggest that the inclusion of the antibiotics on the list of reimbursable medication itself could ease the GPs’ decision-

making framework when prescribing antibiotics, although further research is needed to determine whether this is indeed the case. Our results do indicate that particular patient groups could be more vulnerable to unnecessary antibiotic prescription. For example, in Lithuania, children under the age of 16, retired people, and handicapped people are eligible for reimbursement of antibiotics for upper respiratory tract infections. One potential way to resolve this problem, as suggested by study participants, is to force physicians to document their justification for prescribing reimbursed antibiotics. It has been shown that there is a reduction in demand for antibiotics after implementation of such a strategy (42).

Restricting antibiotic prescription to approved indications might have the drawback of causing GPs to perceive a loss of autonomy (42). On the other hand, it appears that Russian and Lithuanian GPs have already experienced a lack of autonomy in relation to antibiotic prescribing – they even feel compelled to falsely report that they prescribed antibiotics in order to comply with the policies of external oversight institutions. It seems that in such circumstances, explicit guidelines for the treatment of upper respiratory tract infections would not only encourage clinically grounded antibiotic prescription, but would also provide Lithuanian and Russian GPs with more security.

This study called attention to the potentially strong influence of the pharmaceutical industry on antibiotic use in Lithuania and the Russian Federation. Research in other settings has shown that information shared by pharmaceutical sales representatives and at pharmaceutical-sponsored lectures can influence physician decision-making (43–45) and worsens the quality of drug prescribing (46). Thus it is alarming to note that Lithuanian and Russian GPs feel that continuing medical education is carried out mostly by pharmaceutical companies. There is an urgent need to discuss strategies to overcome this challenge, such as involving pharmaceutical sales representatives in the movement for clinically grounded antibiotic use (47) and promoting medical education events that are not sponsored by pharmaceutical companies (48).

Our study calls attention to the significance of a diversity of external factors affecting antibiotic prescribing practices, indicating a need for co-ordinated action to reduce overprescribing. Antibiotic prescription regulations, the role of pharmaceutical companies, harmonization among oversight institutions, and the development of national guidelines for the management of upper respiratory tract infections should all be addressed as components of comprehensive national policies for consistent antibiotic use. Study participants also stressed the imperative for leadership in encouraging clinically grounded antibiotic use.

Other countries' experiences also indicate the necessity for political leadership for consistent antibiotic use (42,49).

This study has several limitations. The views and experiences of study participants may not represent those of the greater general practice community since the study included only GPs who took part in the HAPPY AUDIT project. An assessment of antibiotic prescribing patterns for children with upper respiratory tract infections revealed that Lithuanian GPs who took part in the HAPPY AUDIT project prescribed fewer antibiotics at the outset than GPs from the same region who did not take part in this project (50). Another possible study limitation is related to the fact that the focus group facilitators were GPs. Although it is evident that the interaction of GPs with researchers from outside of their field would have been different, we believe that homogeneity between participants and facilitators increased participants' sense of security and encouraged candour in discussions of GP strategies that did not correspond with existing guidelines. While we recognize the aforementioned limitations, we determined that this approach was a promising one for exploring external factors enhancing antibiotic prescription by Lithuanian and Russian GPs for upper respiratory tract infections.

Our findings indicate that comprehensive efforts to reduce the burden of non-clinically grounded antibiotic prescription should go beyond addressing factors at the physician-patient level and take into account important factors in the enabling environment such as the lack of political leadership for clinically grounded antibiotic use and insufficient harmonization of the activity of external oversight institutions, inclusion of the antibiotics into the list of reimbursable medications and over-the-counter sale of antibiotics, lack of medical guidelines, and influence of pharmaceutical companies.

Acknowledgements

The authors thank all the general practitioners who participated in this study. The article is prepared as part of the HAPPY AUDIT project (Health Alliance for Prudent Prescribing, Yield and Use of Antimicrobial Drugs in the Treatment of Respiratory Tract Infections) that is a Specific Targeted Research Project (STREP) funded by The European Commission: DG SANCO under the Frame Program 6 (SP5A-CT-2007-044154). Contract Number 044154.

Declaration of interest: The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

References

1. Grimsmo A, Hagman E, Faiko E, Matthiessen L, Njalsson T. Patients, diagnoses and processes in general practice in the Nordic countries. An attempt to make data from computerised medical records available for comparable statistics. *Scand J Prim Health Care*. 2001;19:76-82.
2. André M, Odenholt I, Schwan A, Axelsson I, Eriksson M, Hoffman M, et al. Upper respiratory tract infections in general practice: diagnosis, antibiotic prescribing, duration of symptoms and use of diagnostic tests. *Scand J Infect Dis*. 2002;34:880-6.
3. Wise R, Hart T, Cars O, Streulens M, Helmuth R, Huovinen P, et al. Antimicrobial resistance: is a major threat to public health. *BMJ*. 1998;17:609-10.
4. The bacterial challenge: time to react. ECDC/EMEA joint technical report. European Centre for Disease Prevention and Control, Stockholm, 2009. Available at http://www.ecdc.europa.eu/en/publications/Publications/0909_TER_The_Bacterial_Challenge_Time_to_React.pdf. (accessed 30 September 2012).
5. Welschen I, Kuyvenhoven MM, Hoes AW, Verheij TJ. Effectiveness of a multiple intervention to reduce antibiotic prescribing for respiratory tract symptoms in primary care: randomised controlled trial. *BMJ*. 2004;329:431.
6. Llor C, Madurell J, Balagué-Corbella M, Gómez M, Cots JM. Impact on antibiotic prescription of rapid antigen detection testing in acute pharyngitis in adults: a randomised clinical trial. *Br J Gen Pract*. 2011;61:e244-51.
7. Gould IM, Mackenzie FM, Shepherd L. Use of the bacteriology laboratory to decrease general practitioners' antibiotic prescribing. *Eur J Gen Pract*. 2007;13:13-15.
8. van Driel ML, Coenen S, Dirven K, Lobbstaal J, Janssens I, Van Royen P, et al. What is the role of quality circles in strategies to optimise antibiotic prescribing? A pragmatic cluster-randomised controlled trial in primary care. *Qual Saf Health Care*. 2007;16:197-202.
9. Arnold SR, Straus SE. Interventions to improve antibiotic prescribing practices in ambulatory care. *Cochrane Database Syst Rev*. 2005;4:CD003539.
10. Petursson P. GPs' reasons for "non-pharmacological" prescribing of antibiotics. A phenomenological study. *Scand J Prim Health Care*. 2005;23:120-5.
11. Björnsdóttir I, Hansen EH. Intentions, strategies and uncertainty inherent in antibiotic prescribing. *Eur J Gen Pract*. 2002;8:18-24.
12. Butler CC, Rollnick S, Pill R, Maggs-Rapport F, Stott N. Understanding the culture of prescribing: qualitative study of general practitioners' and patients' perceptions of antibiotics for sore throats. *BMJ*. 1998;317:637-42.
13. Macfarlane J, Holmes W, Macfarlane R, Britten N. Influence of patients' expectations on antibiotic management of acute lower respiratory tract illness in general practice: questionnaire study. *BMJ*. 1997;315:1211-14.
14. Altiner A, Knauf A, Moebes J, Sielk M, Wilm S. Acute cough: a qualitative analysis of how GPs manage the consultation when patients explicitly or implicitly expect antibiotic prescriptions. *Fam Pract*. 2004;21:500-6.
15. Wilson AA, Crane LA, Barrett PH, Gonzales R. Public beliefs and use of antibiotics for acute respiratory illness. *J Gen Intern Med*. 1999;14:658-62.
16. Bagshaw SM, Kellner JD. Beliefs and behaviours of parents regarding antibiotic use by children. *Can J Infect Dis*. 2001;12:93-7.
17. Altiner A, Brockmann S, Sielk M, Wilm S, Wegscheider K, Abholz HH. Reducing antibiotic prescriptions for acute cough

- by motivating GPs to change their attitudes to communication and empowering patients: a cluster-randomized intervention study. *J Antimicrob Chemother.* 2007;60:638–44.
18. Deschepper R, Grigoryan L, Lundborg CS, Hofstede G, Cohen J, Kelen GV, et al. Are cultural dimensions relevant for explaining cross-national differences in antibiotic use in Europe? *BMC Health Serv Res.* 2008;8:123.
 19. Vazquez-Lago JM, Lopez-Vazquez P, López-Durán A, Taracido-Trunk M, Figueiras A. Attitudes of primary care physicians to the prescribing of antibiotics and antimicrobial resistance: a qualitative study from Spain. *Fam Pract.* 2012; 29:352–60.
 20. Murphy M, Byrne S, Bradley CP. Influence of patient payment on antibiotic prescribing in Irish general practice: a cohort study. *Br J Gen Pract.* 2011;61:e549–55.
 21. Karabay O, Hosoglu S. Increased antimicrobial consumption following reimbursement reform in Turkey. *J Antimicrob Chemother.* 2008;61:1169–71.
 22. Cleary JD. Impact of pharmaceutical sales representatives on physician antibiotic prescribing. *J Pharm Technol.* 1992;8:27–9.
 23. Vlahović-Palcevski V, Dumpis U, Mitt P, Gulbinovic J, Struwe J, Palcevski G, et al. Benchmarking antimicrobial drug use at university hospitals in five European countries. *Clin Microbiol Infect.* 2007;13:277–83.
 24. Dumpis U, Gulbinovic J, Struwe J, Lagergren A, Griskevicius L, Bergman U. Differences in antibiotic prescribing in three university hospitals in the Baltic region revealed by a simple protocol for quality assessment of therapeutic indications. *Int J Clin Pharmacol Ther.* 2007;45:568–76.
 25. Palcevski G, Ahel V, Vlahovic-Palcevski V, Ratchina S, Rosovic-Bazijanac V, Averchenkova L. Antibiotic use profile at paediatric clinics in two transitional countries. *Pharmacoepidemiol Drug Saf.* 2004;13:181–5.
 26. Sanz E, Hernández MA, Ratchina S, Stratchounsky L, Peiré MA, Lapeyre-Mestre M, et al. Drug utilisation in outpatient children. A comparison among Tenerife, Valencia, and Barcelona (Spain), Toulouse (France), Sofia (Bulgaria), Bratislava (Slovakia) and Smolensk (Russia). *Eur J Clin Pharmacol.* 2004; 60:127–34.
 27. Balabanova Y, Fedorin I, Kuznetsov S, Graham C, Ruddy M, Atun R, et al. Antimicrobial prescribing patterns for respiratory diseases including tuberculosis in Russia: a possible role in drug resistance? *J Antimicrob Chemother.* 2004;54:673–9.
 28. Galinyte D, Maciulaitis R, Budnikas V, Kubilius D, Varanaviciene B, Vitkauskienė A, et al. Antibiotiku vartojimo ir kai kuriu mikroorganizamu atsparumo pokyčiu analize [Analysis of antibiotic consumption and microorganism resistance changes]. *Medicina (Kaunas).* 2008;44:751–67; in Lithuanian.
 29. Grigoryan L, Burgerhof JG, Degener JE, Deschepper R, Lundborg CS, Monnet DL, et al. Attitudes, beliefs and knowledge concerning antibiotic use and self-medication: a comparative European study. *Pharmacoepidemiol Drug Saf.* 2007;16:1234–43.
 30. Stratchounski LS, Andreeva IV, Ratchina SA, Galkin DV, Petrotchenkova NA, Demin AA, et al. The inventory of antibiotics in Russian home medicine cabinets. *Clin Infect Dis.* 2003;37:498–505.
 31. Berzanskyte A, Valinteliene R, Haaijer-Ruskamp FM, Gurevicius R, Grigoryan L. Self-medication with antibiotics in Lithuania. *Int J Occup Med Environ Health.* 2006;19:246–53.
 32. Grigoryan L, Burgerhof JG, Degener JE, Deschepper R, Lundborg CS, Monnet DL, et al. Determinants of self-medication with antibiotics in Europe: the impact of beliefs, country wealth and the healthcare system. *J Antimicrob Chemother.* 2008;61:1172–9.
 33. Bjerrum L, Munck A, Gahrn-Hansen B, Hansen MP, Jarboel D, Llor C, et al. Health alliance for prudent prescribing, yield and use of antimicrobial drugs in the treatment of respiratory tract infections (HAPPY AUDIT). *BMC Fam Pract.* 2010;11:29.
 34. Bjerrum L, Munck A, Gahrn-Hansen B, Hansen MP, Jarbol DE, Cordoba G, et al. Health alliance for prudent antibiotic prescribing in patients with respiratory tract infections (HAPPY AUDIT) - impact of a non-randomised multifaceted intervention programme. *BMC Fam Pract.* 2011;12:52.
 35. Rabiee F. Focus-group interview and data analysis. *Proc Nutr Soc.* 2004;63:655–60.
 36. Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol.* 2006;3:77–101.
 37. Jaruseviciene L, Radzeviciene R, Lazarus JV, Jurgutis A, Ovhed I, Standberg EL, et al. A study of antibiotic prescribing: the experience of Lithuanian and Russian GPs. *Cent Eur J Med.* 2012;7:790–9.
 38. Togoobaatar G, Ikeda N, Ali M, Sonomjamts M, Dashdemberel S, Mori R, et al. Survey of non-prescribed use of antibiotics for children in an urban community in Mongolia. *Bull World Health Organ.* 2010;88:930–6.
 39. Davis H, Mant D, Scott C, Lasserson D, Rose PW. Relative impact of clinical evidence and over-the-counter prescribing on topical antibiotic use for acute infective conjunctivitis. *Br J Gen Pract.* 2009;59:897–900.
 40. Goossens H. Antibiotic resistance and policy in Belgium. *Verh K Acad Geneesk Belg.* 2000;62:439–69.
 41. Reeves D. The 2005 Garrod Lecture: The changing access of patients to antibiotics – for better or worse? *J Antimicrob Chemother.* 2007;59:333–4.
 42. MacDougall C, Polk RE. Antimicrobial stewardship programs in health care systems. *Clin Microbiol Rev.* 2005;18:638–56.
 43. Wazana A. Physicians and the pharmaceutical industry: is a gift ever just a gift? *JAMA.* 2000;283:373–80.
 44. Vancelik S, Beyhun NE, Acemoglu H, Calikoglu O. Impact of pharmaceutical promotion on prescribing decisions of general practitioners in Eastern Turkey. *BMC Public Health.* 2007;7: 122.
 45. McGettigan P, Golden J, Fryer J, Chan R, Feely J. Prescribers prefer people: the sources of information used by doctors for prescribing suggest that the medium is more important than the message. *Br J Clin Pharmacol.* 2001;51:184–9.
 46. Muijers PE, Grol RP, Sijbrandij J, Janknegt R, Knottnerus JA. Differences in prescribing between GPs: impact of the cooperation with pharmacists and impact of visits from pharmaceutical industry representatives. *Fam Pract.* 2005;22:624–30.
 47. Stewart J, Pilla J, Dunn L. Pilot study for appropriate anti-infective community therapy. Effect of a guideline-based strategy to optimize use of antibiotics. *Can Fam Physician.* 2000;46:851–9.
 48. Lieb K, Brandtonies S. A survey of German physicians in private practice about contacts with pharmaceutical sales representatives. *Dtsch Arztebl Int.* 2010;107:392–8.
 49. Nugent R, Okeke IN. When medicines fail: recommendations for curbing antibiotic resistance. *J Infect Dev Ctries.* 2010;4: 355–6.
 50. Jurgutis A, Martinkenas A, Radzeviciene R, Bumblys A, Jaruseviciene L, Bjerrum L. Patterns of prescription of antibiotics for children respiratory infections among primary health care physicians of Klaipeda region. Abstract book of 17th Nordic Congress of General Practice. 2011 Tromsø, Norway.