

Do Public Campaigns And Changes In Antibiotic Pricing Affect Antibiotic Consumption In The Community ? An Example From Belgium

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Abstract (edited)

Background

Public campaigns are considered useful to curb antibiotic overuse in the community [1] but lowering prices may have an opposite effect [2]. Belgium is the 6th larger “antibiotic user” country in Europe [3] and public campaigns have been launched yearly to reduce this. In parallel, cheap generics have been introduced (with government support). Our aim was to assess the impact of these actions on the prescription level of antibiotics in the community (about 10 million inhabitants), which accounts for about 80% of total antibiotic use in the country.

Methods

Prescription data (all antibiotics are under prescription in Belgium): (i) public annual reports (1999 to 2014) and non-public data (2015-2017) of the National Institute for Sickness and Invalidation and (ii) public data (2007-2017) of the European Centre for Disease Prevention and Control; using Defined Daily Doses (DDD, a widely-used WHO unit) as measure. Pricing data: from (i) the *Centre Belge d'Information Pharmacothérapeutique* for drug acquisition costs (most common oral formulation of the most widely used antibiotics) and (ii) from the National Institute for Sickness and Invalidation for actual expenses (both using € per DDD as measure (no inflation discount). Public campaigns: ran annually by the Belgian Antibiotic Coordination Policy [4] (National Ministry of Health) focusing on avoiding inappropriate antibiotic use (“use them only if needed”) in the community.

Results

The total amount of prescribed antibiotics increased slightly, with (i) beta-lactams showing a major increase in 2005-2017, (ii) quinolones showing a first increase followed by a return to pre-campaign levels, and (iii) macrolides showing a decrease (1999-2005) but then an increase (2005-2017). Prices decreased sharply for all antibiotics (temporal association with prescription increase for beta-lactams and macrolides but not for quinolones).

Conclusions

Public campaigns were not associated with marked and sustained decrease in antibiotic prescription, showing limited efficacy. Price decreases were associated with an increased prescription of some but not all antibiotics classes, suggesting that economic considerations may be more important to modulate antibiotic use in the community than public-addressed messages related to the appropriate use of antibiotics.

References

- [1] Tackling drug-resistant infections globally (Review on antimicrobial resistance; <https://amr-review.org/>)
- [2] Jensen *et al.* J Antimicrob Chemother 2010; 65:1286–1291
- [3] ECDC. Annual epidemiological report 2017. Stockholm, 2018 (<https://www.ecdc.europa.eu/en/antimicrobial-consumption>)
- [4] <https://organesdeconcertation.sante.belgique.be/fr/organe-d%27avis-et-de-concertation/commissions/bapcoc>
- [5] Bauraind *et al.* JAMA. 2004;292:2468-70.
- [6] Coenen *et al.* J Antimicrob Chemother 2014; 69: 529–34

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Background and Aims

Public campaigns are often presented as effective to curb antibiotic overuse in the community [1;5] but evidence for strong and sustained reduction is often missing or based on various manipulations of the metrics used to describe antibiotic consumption (for instance, using number of packages rather than absolute quantities [6]). Conversely, lowering antibiotic retail prices may have an opposite effect [2].

Belgium is the 6th larger “antibiotic user” country in Europe [3] and public campaigns have been launched yearly with government support to reduce this [4]. In parallel, generics have been introduced also with government support (including obligations for prescribers to reach a pre-set level of “cheap” drugs) with the clearly stated aim to reduce the financial burden to the Social Security (almost all systemic antibiotics are reimbursed in Belgium).

This combination of actions with potential opposite effects and applied to a single, well defined, and controlled market (about 10 million inhabitants; all antibiotics are under prescription in Belgium) gives the opportunity to measure their effects and to draw conclusions about global antibiotic exposure in the target population (antibiotic prescriptions in the community account for about 80% of total antibiotic use in the country).

Methods

1. Consumption data:

- Publicly available reimbursement statistics and reports of the National Institute for Sickness and Invalidation for the period 1999-2014 (see <http://www.inami.be>) and non-public data made available to the author from the same source for 2015-2017
- Publicly available consumption data from the European Centre for Diseases Prevention and Control (2007-2017) for Belgium (see <http://www.ecdc.europa.eu/>)
- All data were expressed as defined daily doses using definitions and values of the World Health Organization (see https://www.who.int/medicines/regulation/medicines-safety/toolkit_ddd/en/) using the last (2019) values throughout.

2. Price data:

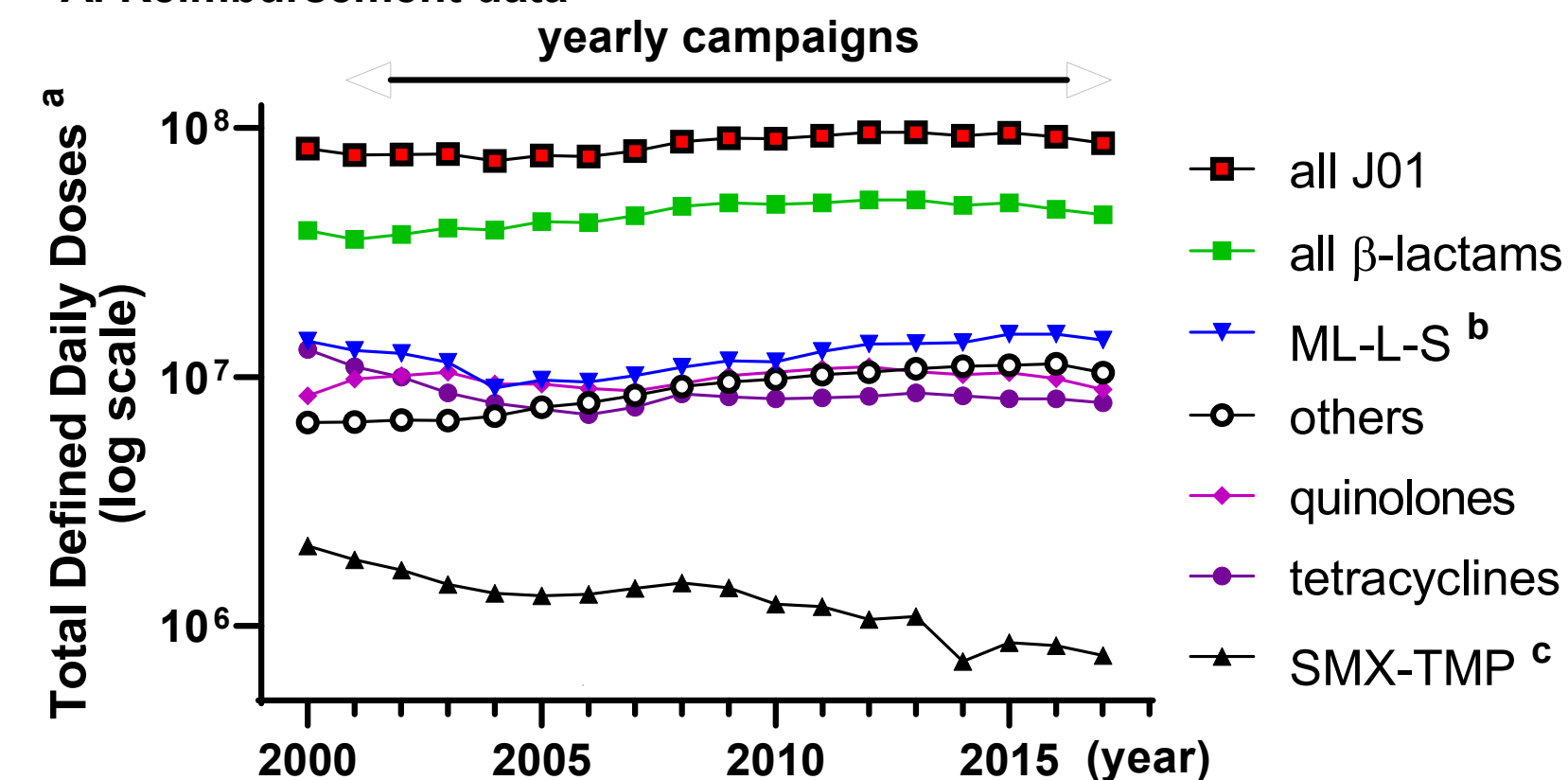
- Drug acquisition costs: Yearly census of all registered drugs in Belgium (with indication of public [compulsory] retail price) published by the *Centre Belge d'Information Pharmacothérapeutique* (see <https://www.cbip.be> for current electronic edition; paper edition available from the author for past editions); actual expenses: from the National Institute for Sickness and Invalidation (see above). All prices were expressed in Euros (1 € = 40.34 Belgian Frank) for the most popular form of each antibiotic (as used in the community) with no correction for inflation over the time period considered

3. Public campaigns:

- Ran annually in November since 2001 by and with the support of the Belgian Ministry of Health with the main and constant message: “Use antibiotics only when needed” – “Not for mild or viral infections” – “Antibiotics are not always necessary (...)” (see <https://www.usagecorrectantibiotiques.be/fr/les-antibiotiques-nagissent-pas-contre-toutes-les-maladies-prennent-les-uniquement-quand-il-le-faut> for the last campaign and documents from the author’s archives for the previous ones).

1. Antibiotic changes in consumption over time

A. Reimbursement data



^a using the last (2019) DDD value for each antibiotic throughout
^b M-L-S: macrolides - lincosaminides - streptogramins
^c sulfamides and trimethoprim

B. Other sources

- Data from ESAC confirmed
- (i) the large consumption per inhabitant in 2015 compared to other EU countries (e.g., about 2-3 times higher than in the Netherlands)
- (ii) the lack of major change over the 2007-2017 period

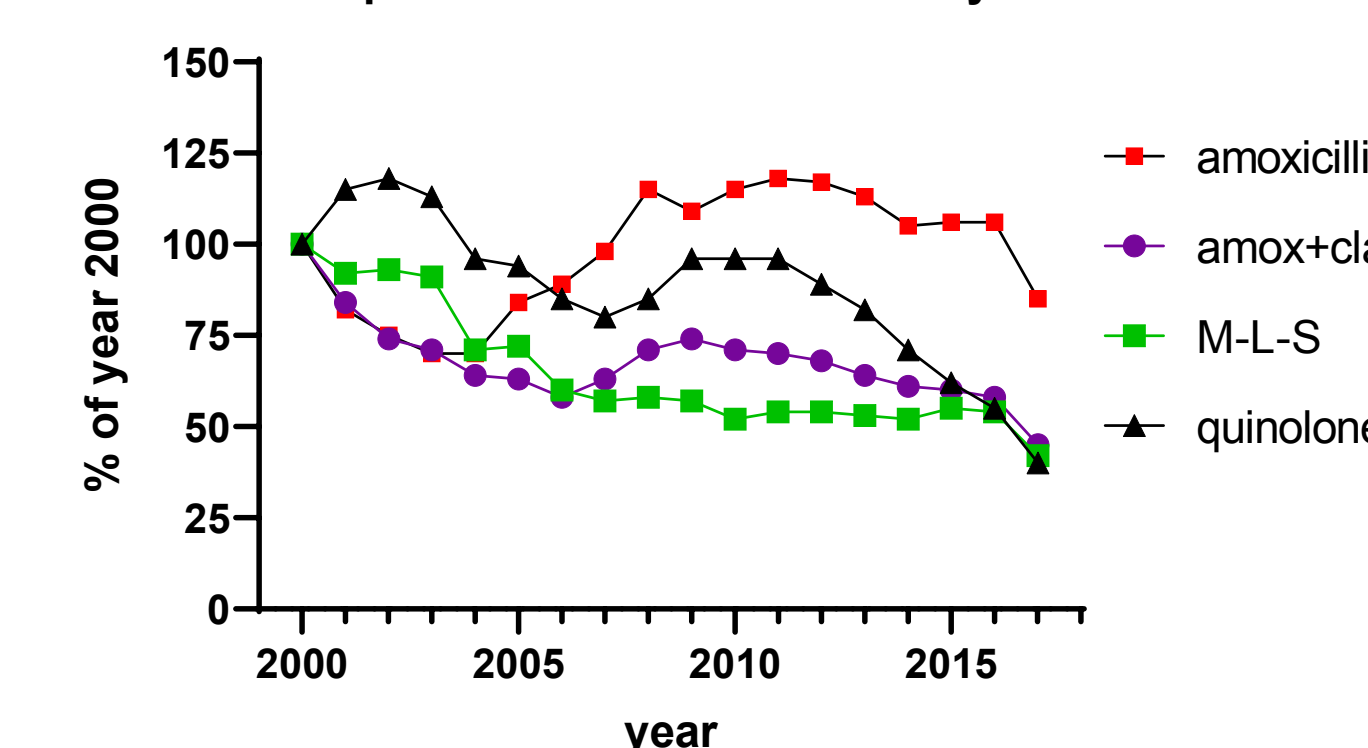
1. The overall consumption of antibiotics remains largely constant after a short but transient decline following the early campaigns;
2. β -lactams represent the largest pharmacological group and its rise over time largely explains the global increase in overall consumption;
3. Macrolides and quinolones (each about 10% of the total of antibiotics) show minor changes;
4. The use of sulfonamides (with trimethoprim) is marginal

Results

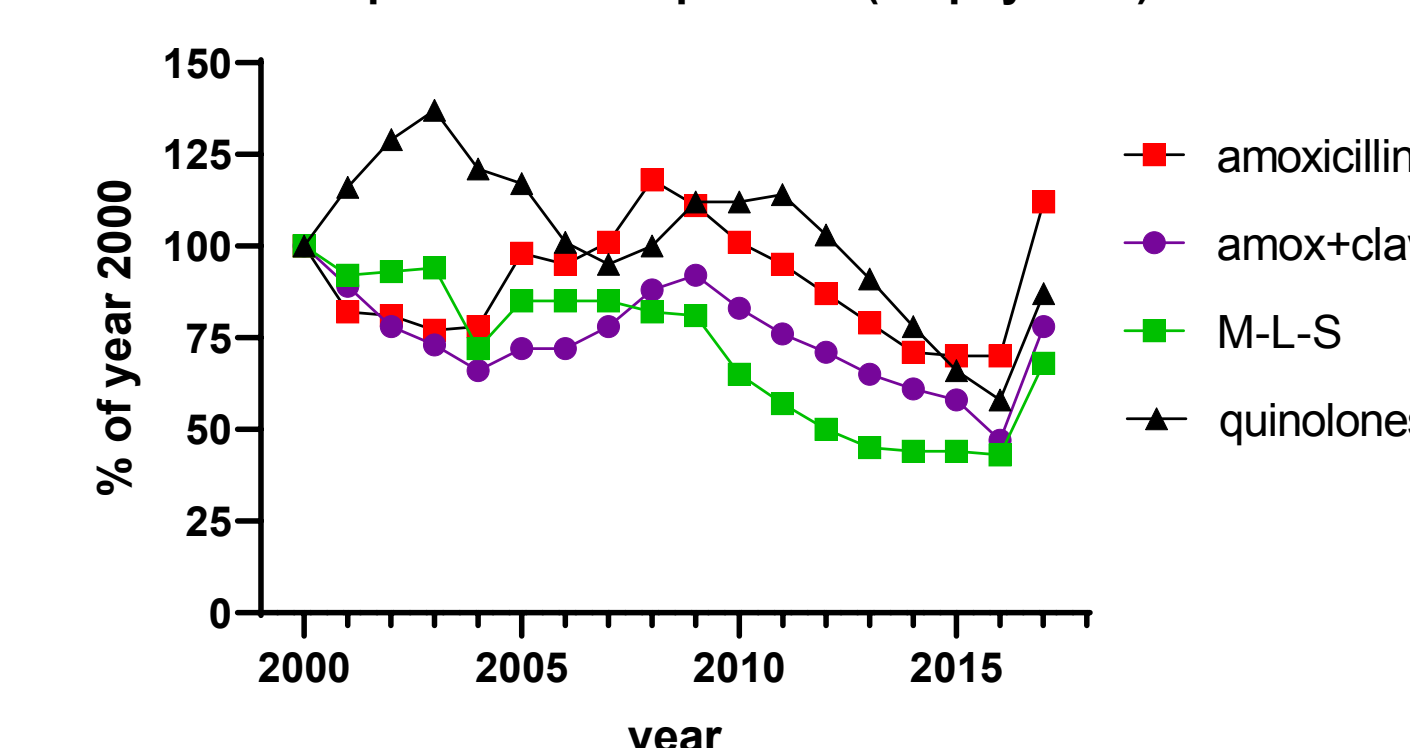
2. Antibiotic changes in expenses for classes with large usage

Drug acquisition costs declined of about 50% during the study period due to approval of generic forms for most common antibiotics. There were, however, important variations between pharmacological classes and between formulations. We present here the actual expenses as compiled from the data of the National Institute for Sickness and Invalidation for the most used formulation of each major pharmacological class.

A. Expenses of the Social Security



B. Expenses of the patients (co-payment)



1. The influx of generics and other government-supported actions have resulted in a variable (but often important; see e.g. amox+clav, M-L-S, quinolones) decrease of the overall cost of antibiotics both to the Social Security and to the patient (until 2017). Globally, antibiotic prices are low (typically between 5 to 50 € [total retail price] for a standard course).
2. Co-payment : about 25% of the total retail cost until 2016, and increased to about 77% in 2017 due to change of reimbursement class (this change, and the corresponding increase in co-payment, was presented by the authorities as a mean to curb unnecessary antibiotic prescription, but was also accompanied by a decrease of the price to the Social Security).

Independent analysis published after submission of the abstract

Leroy R, Christiaens W, Maertens de Noordhout C, Hanquet G. Proposals for a more effective antibiotic policy in Belgium. Health Services Research (HSR) Brussels: Belgian Health Care Knowledge Centre (KCE). 2019. KCE Reports 311. D/2019/10.273/26. This document is available on the website of the Belgian Health Care Knowledge Centre (<https://kce.fgov.be/en/all-reports>)



KCE REPORT 311
HEALTH SERVICES RESEARCH

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Belgian Health Care Knowledge Centre

PROPOSALS FOR A MORE EFFECTIVE ANTIBIOTIC POLICY IN BELGIUM

ROOS LEROY, WENDY CHRISTIAENS, CHARLINE MAERTENS DE NOORDHOUT, GERMAINE HANQUET

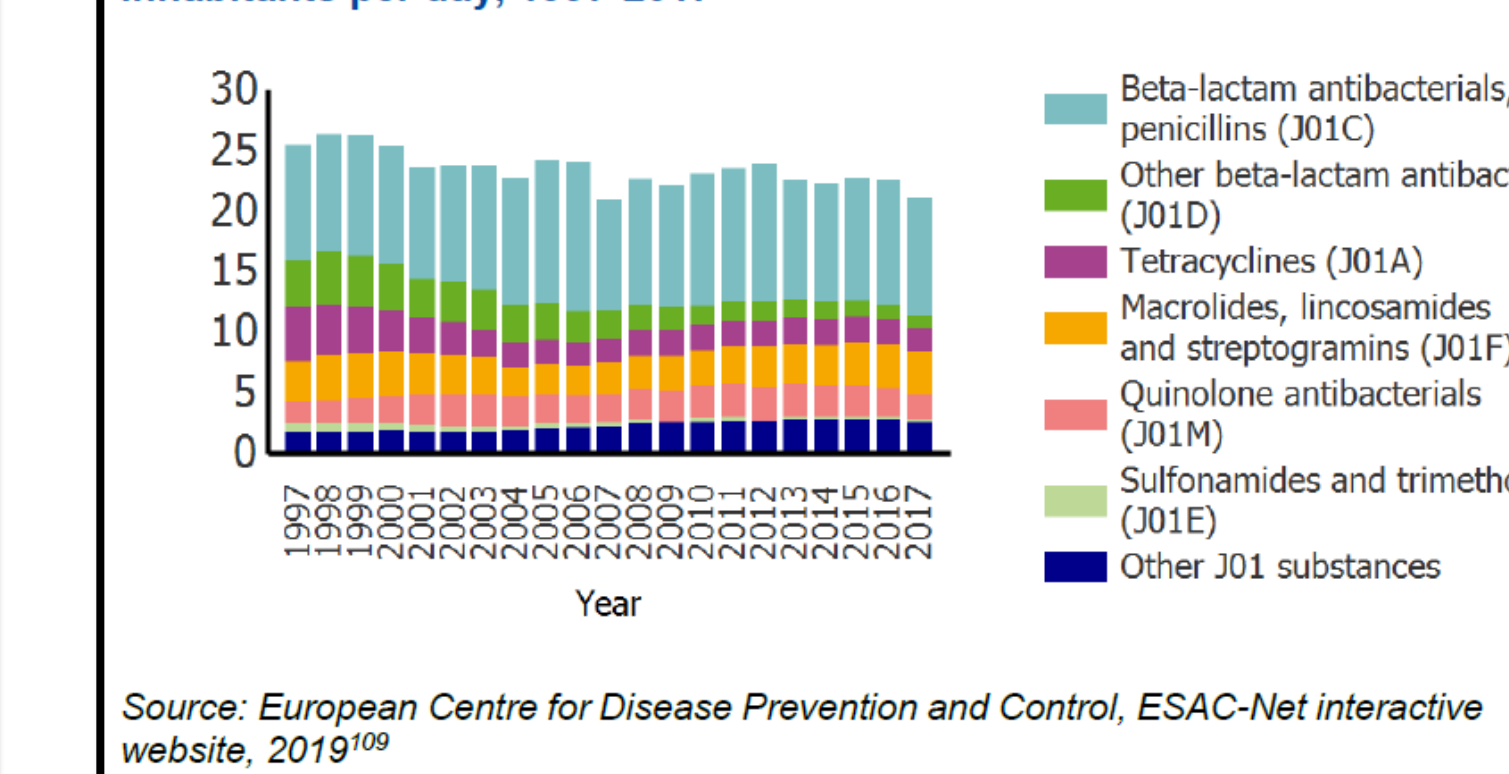
1.1.5 Belgian Antibiotic Policy Coordination Committee (BAPCOC)

In response to the high antibiotic use in the 90s - Belgium was in the top 3 of European countries - the Belgian Antibiotic Policy Coordination Committee (BAPCOC) was officially established in 1999. The overall objective of BAPCOC is to promote according to the One Health approach, the prudent use of antibiotics in humans and animals and to promote infection control and hospital hygiene, with the overall aim to reduce antibiotic resistance.⁷

1.1.6 Difficult to obtain significant improvements

Despite numerous initiatives taken at several levels (e.g. BAPCOC, RIZIV – INAMI, FOD VVVL – SPF SPSCAE, hospitals, ambulatory sector) and the large amount of money that is yearly spent on awareness about antibiotic prescribing and infection control, Belgium still ranks high in the use of antibiotics, especially in the ambulatory sector.⁸

Figure 9 – Trend in the use of antibiotics for systemic use (ATC group J01) in the Belgian ambulatory sector expressed as DDD per 1000 inhabitants per day, 1997-2017



Source: European Centre for Disease Prevention and Control, ESAC-Net interactive website, 2019¹⁰⁹

Key points and Outlook

- It is obvious that only small (negligible) changes in antibiotic consumption (estimated from the amount of DDD sales) took place over the long period during which public campaigns were undertaken yearly, suggesting that they are ineffective.
- The marked global decrease of antibiotic prices over the same period tended to slightly increase their consumption, but conversely, the marked increase in patient’s co-payment introduced in 2017 was without immediate effect (perhaps because antibiotics have remained globally cheap, but more longitudinal analyses are needed).
- Other means (probably more directed to the prescriber) need to be developed to more effectively curb the unnecessary antibiotic consumption in the community.

For presentation to the Press at ASM-Microbe 2019 (San Francisco, CA)

at the invitation of the ASM-Microbe Program Coordinator (Mrs **Jacquelyn Hannan**, American Society for Microbiology, 1752 N Street, NW | Washington, DC 20036)

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Important: due to current health problems, the author is unable to attend the meeting but can be contacted by e-mail or, if needed, by sending an SMS to 001-32-498-233826 with indication as how to call back (do not call right away due to time difference [+9h]).

The poster can be downloaded from Saturday June 22 from <http://www.facm.ucl.ac.be/posters.htm> .

ADDITIONAL AUTHORS: none

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POPULAR TITLE:

Are public campaigns and price changes influencing the over-prescription of antibiotics ? The answer is NO but the prices might...

TECHNICAL TITLE:

Do Public Campaigns and Changes in Antibiotic Pricing Affect Antibiotic Consumption in the Community ? An Example from Belgium

DATE AND TIME OF PRESENTATION:

Saturday, June 22, 2019: 11 am - 12 pm PST and 4 pm - 5 pm PST.
Session Title: AAR05 - Antimicrobial Stewardship 2

PRESENTATION SUMMARY:

Antibiotics are overprescribed in many countries, including the United States, triggering a series of action aiming at correcting this situation.

Taking Belgium (where the amount of antibiotic prescribed in the community is almost 3-time larger than in the Netherlands) as an example, we show that public campaigns, performed yearly since 2000, have been largely ineffective (no sustained decrease in the amount of antibiotics prescribed).

In parallel, the price of antibiotics has been almost halved (due to increasing sales of generics), but the reimbursement by Social Security has also decreased. Yet, globally, antibiotics have become cheaper over time. Here we show that lower prices are associated with an increase in prescriptions.

The study used publicly available and official data from the Belgian Social Security (prescription and delivery data for reimbursed antibiotics [all antibiotics are under prescription and reimbursed]), complemented and confirmed by other official sources such as the European Surveillance of Antimicrobial Consumption Network (for antibiotic prescriptions) and the Belgian Center for Pharmacotherapeutic Information (for prices).

The work was done by the author alone without financial support from any source.

Although limited to a single, small country (10 million inhabitants), the study may help understanding the situation prevailing in many other countries where antibiotics are also under prescription, and be, therefore, normative.

How can we explain this situation? The current work and previous investigations suggest the following reasons:

1. Public campaigns aim largely at the general population. While being viewed with sympathy by healthy persons, they fail to gain acceptance by patients who seek medical help for minor illnesses but require antibiotics based on the belief that these will protect them from undue risk of developing a major infection... or simply curing them faster...
2. Prescribers have difficulty in resisting to such patient's pressure because of (i) uncertainties about the causal diagnostic of many "mild" infections; (ii) fear of complications and ensuing legal risks; (iii) the fee-for-service system prevailing in Belgium and the possibility for the patient to go and see another physician in case of being denied an antibiotic prescription...
3. Globally, antibiotics are quite cheap (typical drug acquisition cost is as low as approx. 6 to 60 US dollars for the treatment of a community-acquired pneumonia), making both prescribers and patients unwilling to run any risk while saving only small amounts of money if not prescribing an antibiotic.

An important limitation in this study is that we assessed the amount of antibiotics consumed based on prescriptions and delivery (by the pharmacist) reimbursement data. We do not know what proportion was actually taken by the patient.

We suggest that actions directed to the prescribers rather than to the public are definitely needed and should be complemented with specific aids for improved diagnostic, protection(s) against legal issues in case of unexpected complications, and, perhaps, a significant increase in prices (as is the case for many other life-saving drugs).

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