Do Public Campaigns Decrease Antibiotic Prescription in the Community? Evidence from a 14-Years Reimbursement Data Survey in Belgium

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Disclosures

• The work presented here was made without support from any source and uses information and data that are publicly available and at no cost.

• I have been (and still am) member of the subcommittee of the Belgian Antibiotic Policy Committee (BAPCOC) responsible for the organization of the public campaigns in Belgium since 2000, but have received no financial support in this context.

• My laboratory work, unrelated with the topic of this presentation (and dealing mainly with *in vitro* pharmacodynamics and toxicodynamics of existing and novel antibiotics) has been supported by various non-profit and profit-making organizations (see poster SATURDAY-581 Session 188 for a complete listing).
Why public campaigns for less use of antibiotics in the community in Belgium?

The message was clear and understood:
- Belgium consumes too much antibiotics in the community, which creates resistance…
- If you reduce antibiotic pressure (DDDs) in the community, you will reduce resistance!

Cars et al. Lancet. 2001;357:1851-3 - PMID: 11410197

So, we started public campaigns targeted to the community…

2000-2003

And these first campaigns were modestly but significantly successful in reducing the number of DDD's per month in the winter periods of 2000-2001 and 2001-2002

http://www.red-antibiotica.org/ (Dutch)
http://www.antibiotiques.org/ (French)

Figure 2. Monthly Change in Antibiotic Sales Controlled for Influenza-like Illnesses During Each Campaign (December-February) and the Following Month (March)

Residual seasonal autoregressive terms: lag period, 12 months; estimated coefficient: 0.83 [SE, 0.06]; constant: 7459075 (SD, 431387) defined daily doses/mo. The P values are indicated for the months and campaigns for which the changes were statistically significant.

So, public campaigns targeted to the community were repeated each year with various themes... but what are the results?


http://www.gebruikantibioticacorrect.be/nl/lees-tante-biotica-online

http://www.usagecorrectantibiotiques.be/fr
What and how did we analyze the antibiotic pressure in the community?

What is a Defined Daily Dose and why did we use it?

[Diagram showing defined daily dose per 1,000 inhabitants per day for Belgium and the Netherlands in 1997]

The use of DDD / 1,000 inhabitants / day allows for direct comparisons between countries, regions and health facilities without confounding factors such as:

- differences in size of packages (prescription drugs are mostly sold as packages, NOT as units in Europe)
- differences in prices (markedly influenced by the introduction of generics, taking place to an increased extent since 2005 in Europe)

http://www.whocc.no/ddd/definition_and_general_considerations/

Public data from the National Institute for Health and Disability Insurance (NIHDI [INAMI / RIZIV]* )

Tiny URL: http://tinyurl.com/hwu74sf
Full URL: http://www.inami.fgov.be/fr/statistiques/medicament/Pages/statistiques-medicaments-pharmanet-01.aspx#.V1wBn6JYyE0 (French)
Full URL: http://www.inami.fgov.be/nl/statistieken/geneesmiddel/Paginas/statistieken-geneesmiddelen-farmanet-01.aspx#.V1wDHKJYyE0 (Dutch)

Data are available from 1997 through 2014

prescription profiles of general practitioners, dentists, and specialists (in the community)

volume (measured as DDD's (defined daily doses))
Public data from the National Institute for Sickness and Invalidity Insurance (INAMI / RIZIV*)

Important prolegomena:

- All antibiotics are under prescription in Belgium (negligible "over the counter" or Internet sales)
- All prescribed antibiotics are reimbursed in Belgium (negligible amount of non-reimbursed forms)
- ~ 83% of DDDs in the community are prescribed by General Practitioners (stable over years)
- Data from the Institute are considered correct to > 96.9% (and to 100% in the last 3 years).

Tiny URL: [http://tinyurl.com/hwu74sf](http://tinyurl.com/hwu74sf)
Full URL: [http://www.inami.fgov.be/fr/statistiques/medicament/Pages/statistiques-medicaments-pharmanet-01.aspx#.V1wBn6JYyE0](http://www.inami.fgov.be/fr/statistiques/medicament/Pages/statistiques-medicaments-pharmanet-01.aspx#.V1wBn6JYyE0) (French)
Full URL: [http://www.inami.fgov.be/nl/statistieken/geneesmiddel/Paginas/statistieken-geneesmiddelen-farmanet-01.aspx#.V1wDHKJYyE0](http://www.inami.fgov.be/nl/statistieken/geneesmiddel/Paginas/statistieken-geneesmiddelen-farmanet-01.aspx#.V1wDHKJYyE0) (Dutch)

* Institut national d'assurance maladie-invalidité / Rijksinstituut voor ziekte- en invaliditeit verzekering
What did we find?

* defined as DDD's of ATC class J drugs (anti-infectives for systemic use) reimbursed in the community (~ 85% antibiotics)

But which antibiotics?

* pre-campaign level (1997; Cars et al. 2001)

13.9 % increase
What did we find?

* defined as DDD's of ATC class J drugs (anti-infectives for systemic use) reimbursed in the community (~ 85% antibiotics)

But which antibiotics (in log2 scale)?
1. *S. pneumoniae* full resistance to macrolides in clinically confirmed CAP and clinically-confirmed confirmed COPD is ~ 25% in Belgium * and is, therefore, no longer recommended as first line …

* Pressure has returned to the slightly above the pre-campaign level after a transient decrease

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Were targeted efforts rewarded?

2. Many actions were taken to reduce what was considered as an exaggerated prescription of quinolones in Belgium * (31% of total DDDs in 2000)

![Graph showing total antibiotic pressure (annual) for quinolones from 2000 to 2015.](image)

* after a short burst (due to the introduction of the so-called "respiratory quinolones", pressure has returned to baseline

* see, for example,
  - the limited recommendations of fluoroquinolones in the antibiotic guidelines for GPs
A problem of metrics?

- DDDs are not perfect and may not represent actual prescribed doses …
  → but they are the metric used to trigger actions about resistance…

Other metrics are available… but may have other problems

- **packages** (in Europe): assumed to better represent prescriptions … and showing a decrease of 17% between 2002 and 2009 vs. an increase in DDDs of 12 %
  but package sizes change over time … as mainly decided by Industry …
  (e.g., major changes for amoxicillin and amoxi-clav in Belgium, largely but not only for commercial positioning…)
  and may not express the overall antibiotic pressure and risk of resistance…

- **prices**: useful for business and some politicians … but highly variable between countries … and markedly influenced by the introduction of generics…
  (e.g., the price of levofloxacin was halved (incl. for the original) upon introduction of generics in Belgium)
At the end, the real questions…

- Why do we do public campaigns?

→ To reduce unnecessary usage of antibiotics?

If such, would a decreased number of packages explain the large differences in DDDs between Belgium and the Netherlands?

Or, is the antibiotic pressure really different?

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in 2014 European Center for Disease Prevention and Control (ESAC net) available at:
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Or, is the antibiotic pressure really different?

→ To reduce the rate of emergence of resistance?

→ To save money?
And why could campaigns be ineffective? *

• Did we address the REAL questions for the doctor?
  
  → What is the diagnostic?
  
  → What are the risks of not giving an antibiotic?
  
  → Will the patient go and see another doctor?

• and for the patient…

  → am I going to take a risk for my-self?
  
  → what for my child, my elder parent, … ?

* Based on surveys with Belgian GP's (Feron et al. Pathologie Biologie (Paris), 2009: 57:61-64 – PMID: 18848403 and papers in preparation)
To sum up...

- Public campaigns targeting the public are potentially interesting actions for trying to curb exaggerate use of antibiotics and, thereby, for reducing antibiotic resistance in the community...

- However, there is so far little demonstration of real, important, and long-lasting effects of public antibiotic campaigns on actual antibiotic pressure, and, more critically, on resistance levels...

- The main reasons for failure may be that public campaigns
  
  (i) miss the real targets, i.e. the sick patient and the attending physician...

  (ii) do not address the real questions of importance for these two key actors, such as uncertainty of diagnostic and risk of missing what could be a real threat…
Back-up
Comparison of DDDs and PIDs in Belgium (2002-2009)

Figure 1. Outpatient antibiotic use in Belgium per July–June year expressed as the number of DDDs (diamonds), packages (circles), treatments (squares) and insured individuals (triangles) reimbursed per 1000 inhabitants per day.