The economic consequences of the use of antibiotics in Belgium

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Introduction

Antibiotic resistance, the situation in which antibiotics lose their ability to kill or stop growth of a specific bacterium, may occur naturally as a result of mutations in a bacterium's genes (acquired resistance). However, excessive and inappropriate use of antibiotics may accelerate the emergence and spread of antibiotic-resistant bacteria. In Belgium, several national programs have been launched since 2000 in order to increase the awareness of incorrect antibiotic use and problems of bacterial resistance. Since then, outpatient antibiotic use (based on the number of packages) decreased by 36%. Despite this reduction, outpatient use of antibiotics is still high in Belgium compared to other European countries. And, the use has not been declined since 2006-2007. Meanwhile, between 2007 and 2013, the use of antibiotics in hospitals increased by 5.6%.

Objectives

Set against this background, our aim was to determine whether antibiotics are over-prescribed in Belgium, and if so, what the costs and health consequences of this are. It was the aim to evaluate the potential savings that could be realized in case prescription behavior in Belgium would be similar to the Netherlands, a country known for its strict antibiotic use.

Methods

Quantification approach:

The total antibiotics consumption (number of pills sold) was determined using IMS Health Belgian Retail Data for the year 2013, available to IMS Health in both countries (Belgium/the Netherlands) via the IMS MIDAS platform. The corresponding total spending was determined taking into account public prices.

Number of pills consumed per inhabitant:

Total number of pills sold/Total country population

In order to eliminate the impact of differences in unit prices between countries, we calculated a cost per pill in Belgium by: Total public spending/total number of pills consumed

Cost per pill in Belgium \times \text{ the number of pills per person consumed in the Netherlands} = \text{ the total Belgian population}

Estimation of the potential public spending under a lower use of antibiotics

The difference between current and estimated spending represented potential cost savings through more conscious prescribing and use of antibiotics.

Results and discussion

In 2013, individual consumption of antibiotics was 5.93 pills per person in the Netherlands and approximately two times higher in Belgium (12.66 pills/person). With a 30% smaller population than the Netherlands, spending in Belgium is 3 times higher.

Table 1: Antibiotics consumption in Belgium and the Netherlands in 2013

<table>
<thead>
<tr>
<th>Country</th>
<th>Total population</th>
<th>Total pills consumed</th>
<th>Total costs</th>
<th>Pills/Person</th>
<th>Cost/Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>11,140,000</td>
<td>141,000,070</td>
<td>€134,524,191</td>
<td>12.66</td>
<td>€12.08</td>
</tr>
<tr>
<td>Netherlands</td>
<td>16,770,000</td>
<td>99,476,775</td>
<td>€43,046,397</td>
<td>5.93</td>
<td>€2.57</td>
</tr>
</tbody>
</table>

Source: IMS Health MIDAS; IMS Health Belgian National Retail Data

The low use of antibiotics in the Netherlands compared to Belgium was confirmed by a WHO report ("Four-fold difference in antibiotic consumption across the European region" - new WHO report, available on website WHO: http://www.euro.who.int). In this report, the total antibiotics use for 2011 was listed (expressed in number of DDD (daily defined doses) per 1,000 inhabitants per day) for European countries and Kosovo as compared to 29 ESAC-Net countries. Rates are shown in Figure 1. The lowest antibiotics consumption was observed in the Netherlands. In contrast, Belgium antibiotic use, at more than double that of the Netherlands, fell into the high usage category – a result that agrees with our own findings.

The status of antibiotics resistance in both Belgium and the Netherlands was also evaluated using the most recent data on the prevalence of acquired bacterial resistance in Europe available from the "2013 Report Priority Medicines for Europe and the World". Rates of antibiotics resistant pseudomonas aerugiosa and staphylococcus aureas are higher in Belgium (10-25%) compared to the Netherlands (1-5%), while the prevalence of resistant E.Coli and Klebsiella pneumonia were comparable.

Figure 1: Total antibiotics used in 2011, expressed in number of DDD per 1,000 inhabitants per day in 12 European countries and Kosovo as compared to 29 ESAC-Net countries

By comparing Belgium’s prescription patterns to the Netherlands, we estimated important potential savings due to antibiotic mis-use/over-use (€71 Mn). The additional health and cost implications of antibiotics resistance were not taken into account. These savings could then be reinvested in innovative drugs.

Conclusions

Despite the high use of antibiotics outside of hospitals in Belgium, a high number of hospitalizations attributable to infections and infections were recorded (2011, data from RIZIV/INAMI, Technische Cell, https://p寇vheims.be/implatie_top/)

17,514 hospitalizations attributable to renal and urinary tract infections (APR-DRG 463)

6,523 hospitalizations attributable to inflammations and infections in the respiratory system (APR-DRG 137)

34,456 hospitalizations attributable to non-viral pneumonia (APR-DRG 139)

Additional data show that the incidence of hospital-acquired bacterial infections within internal care units in Belgium was 1.4 per 1,000 patient days for primary bloodstream infections, and 17.9 per 1000 intubation days for ventilation-associated pneumonia (NSH, 2012).

The Great influenza Survey (GIS) was implemented in Several European countries to assess influenza like illness (ILI) incidence level in the community. GIS is an internet-based monitoring system that collects data from individuals voluntarily participating in an internet survey. Figures from the influenza season 2013-2014 indicate that ILI incidence in Belgium and the Netherlands is comparable.

To analyze general practitioners’ prescription trends for antibiotics, we used data available from the IMS Health LHPD. The table below shows the indications for which antibiotics were most often used by GPs. Almost 50% of antibiotic use was in cases where antibiotics are often not needed because the condition is of a viral nature.

Figure 2: Indications for which antibiotics are prescribed in Belgium

Source: IMS Health Longitudinal Patient Database

Finally, looking at infection-related death rates, there were 22.9 deaths per 100,000 inhabitants in Belgium due to infectious and parasitic diseases (ICD10 A00-899), compared to an average of 13.9/100,000 in the European Union, and a rate of 12.7/100,000 in the Netherlands (Eurostat data for 2010, Causes of Deaths by Region).

The evidence reported above (higher antibiotics consumption in Belgium compared to the Netherlands; a high number of infection-related hospitalizations in Belgium; comparable ambulatory infections in Belgium & the Netherlands; and higher infection-related death rates in Belgium compared to the Netherlands) suggest that antibiotics are likely misused and over prescribed in Belgium.

Based on the current antibiotics consumption in the Netherlands, potentially €71Mn (€71,478,576) in costs could be avoided annually in Belgium (applying the usage (pills/person) of the Netherlands and current cost/pill in Belgium) if antibiotics were to be prescribed more consciously.

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