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Economic analysis of outpatient antibiotic consumption in Switzerland

Objectives This study contributes to the debate on appropriate antibiotic use by improving the understanding of its determinants and may help to define more effective health care policies to reduce the resistance phenomenon.

Conclusions Switzerland exhibits a relatively low level of per capita outpatient antibiotic consumption among European countries. There are substantial differences across cantons and local areas in the use of antibiotics in the community. These differences can mainly be explained by socio-economic, demographic and epidemiological factors, access to practices and antibiotic treatment (densities of physicians and pharmacies). Unexplained variations in local consumption represent a rough measure of the welfare loss due to bacterial resistance (11% of the total spending). Self-dispensing practices improve access to antibiotic treatment but may also be responsible for higher levels of antibiotic use.

The empirical framework developed in this project has been applied in the study of outpatient antibiotic consumption in other European countries within the European Surveillance of Antimicrobial Consumption (ESAC) project (project financed by the European Union).

To conclude, appropriate policies affecting antibiotic consumption in the community must therefore take into account local determinants and their related impact. It is mainly the responsibility of regional authorities to promote local guidelines or economic incentives to induce efficient levels of antibiotic consumption.

Main results and findings

Socioeconomic determinants of regional differences in outpatients' antibiotic consumption:

Evidence from Switzerland Comparison of Switzerland consumption data with the data of other European countries as well as between European countries of the ESAC study (please note that data must be taken with caution because of possible differences related to the collection data, since not all of the countries derive data from the same source) revealed that:

- Switzerland exhibits the lowest volume of antibiotic use (9 days of treatment per 1,000 inhabitants per day, DID) in contrast to the higher rates observed in Germany (13 DID), Italy (24 DID) and France (32 DID).
- Switzerland is characterized by:
 - A high proportion of use of quinolones in the community as compared to other European countries.
 - Consumption of penicillins, cephalosporins and macrolides is below the European average both in DID and share in total consumption.
 - In 2002 in Switzerland, combination with β -lactamase inhibitors represented 63% of the total penicillin consumption, a proportion similar to Belgium and Portugal and above the European average.

An empirical analysis of the cantonal and local determinants of outpatient antibiotic consumption in Switzerland (data from IHA-IMS market research: all sales from transactions between wholesalers and pharmacies and physicians, 5% collection error), quarterly data, 240 Swiss regions, 23 cantons, period 2002-2004) revealed the following:

- The average cantonal consumption has been roughly stable over the three last years (slight increase in 2003 and then reduction in 2004).
- There are significant differences among cantons. In fact, cantons with the highest consumption are generally located in southwestern Switzerland (i.e. Geneva, Vaud, Neuchatel and Valais), whereas cantons with the lowest consumption are located in the northeastern part of the country.
- There are clear differences in cantonal antibiotic consumption by main antibiotic classes. The proportion of penicillin use varies between a minimum of 33.5% and a maximum of 44.8%; the range for macrolide is 12.7% to 22.1%, and the range for quinolones is 17.2% to 23.1%. These differences may be related to local variables, such as prevalence of infections, patients' and doctors' preferences, pharmaceutical marketing strategies, cantonal regulation and incidence of bacterial resistance.

Small area variations and welfare loss in the use of antibiotics in the community Using quarterly wholesale data on outpatient antibiotics in 2002 for 240 small areas in Switzerland (obtained from IHA-IMS) and a model in which antibiotic use varies according to population characteristics, incidence of infections, income and local health care supply, the following could be shown:

- The most important determinants of variations in outpatient antibiotics use in the community are income, demographic structure of the population, cultural differences and local supply and price of antibiotic treatment.
- The assessment of welfare loss due to unexplained variations suggests that resistance may account for around 11% of the total spending in antibiotics in the community, thus leading to a CHF 10 million loss in 2002.
- Self-dispensing practices improve access to antibiotic treatment but may also be responsible for higher levels of antibiotic use.
- The structure of antibiotic consumption can be partially explained by the structure of the population and the price of antibiotics. In terms of demand price elasticity, the results can be summarised as follows:
 - Complementary effects between old generations of cephalosporins (less expensive) and new generations of cephalosporins and quinolones (more expensive).
 - Substitution effects between all the other categories of antibiotics mainly used for respiratory infections.
 - The use of more expensive antibiotics is associated with the availability of self-dispensing practices in the area, *ceteris paribus*.

These results throw light upon the pharmaceutical purchasing process and doctors' behaviour. The incentives to prescribe different antibiotic components could be taken into account by policy makers to shape effective reforms. For instance, the introduction of a local tax on antibiotic components that are responsible for higher levels of bacterial resistance may contribute to change of the antibiotic mix and, therefore, improve efficiency in antibiotic consumption.

Publications of the NRP 49 project

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