

## Increased antimicrobial consumption following reimbursement reform in Turkey

Oguz Karabay<sup>1\*</sup> and Salih Hosoglu<sup>2</sup>

<sup>1</sup>Department of Clinical Microbiology and Infectious Diseases, Abant Izzet Baysal University Hospital, Bolu, Turkey; <sup>2</sup>Department of Clinical Microbiology and Infectious Diseases, Dicle University Hospital, Diyarbakir, Turkey

Received 9 August 2007; returned 28 October 2007; revised 22 January 2008; accepted 23 January 2008

**Objectives:** This study examined antibiotic utilization patterns in Turkey between 2001 and 2006.

**Methods:** A comprehensive collection and analysis of Turkish antibiotic data from 2001 to 2006 was conducted. The anatomical therapeutic chemical (ATC) classification and the defined daily dose (DDD) methodology were used to calculate antibiotic consumption. Data were presented as DDD/1000 inhabitant-days, and the relation between antimicrobial consumption and governmental reimbursement policy was evaluated.

**Results:** Total utilization of antibiotics increased from 14.62 to 31.36 DDD/1000 inhabitant-days between 2001 and 2006. The largest increase took place after the implementation of social insurance reform (SIR) in 2005, as evidenced by the DDD ratio increasing 1.87-fold after SIR went into effect. The largest increase occurred in the prescription of penicillins, from 7.13 in 2001 to 14.09 in 2006.

**Conclusions:** In Turkey, antibiotic consumption increased markedly in recent years, in a close relationship, to a new reimbursement policy following the implementation of the SIR, which facilitated the prescription and consumption of drugs compared with the earlier SIR conditions.

Keywords: antibiotic policy, antibacterial drug screening policy, antimicrobial agents, antimicrobial resistance surveillance

### Introduction

Surveillance of antimicrobial consumption is important in improving the quality of antimicrobial use.<sup>1</sup> It has a key role in establishing the rationale for the use of antimicrobials. Antimicrobials are among the most costly drug expenditures in Turkey, accounting for ~24% of total spending on medicines, and the rate of antimicrobial use has previously been found to be increasing.<sup>2</sup>

Turkey has a total population of 71.3 million. Pharmaceuticals accounted for up to 33.5% of the total health expenditure in 2000.<sup>3</sup> An effective social insurance reform (SIR), including substantial changes in drug reimbursement, was implemented by the Turkish Government in 2005. Before the implementation of the SIR, there were various restrictions and limitations for drug reimbursements in the healthcare refund system, which affected almost 70% of the population. Notably, Workers Insurance Organization (SSK), a quasi-governmental insurance organization, did not provide sufficient medicines. Low-income earners, known as green card holders and who make up 14% of the

population were not reimbursed for outpatient prescriptions. The more uniform and broader SIR made the prescription and consumption of drugs easier for the governmental and quasi-governmental insurance holders. After the reform, all people insured were provided with full insurance and obtained the right to buy their medicine from any pharmacy,<sup>4</sup> and SSK members began to purchase their prescriptions from private pharmacies.

Limited surveillance data exist on antimicrobial utilization and prescribing patterns in Turkey. The primary aim of this study was to estimate the intensity and pattern of antibiotic consumption in Turkey between 2001 and 2006. Secondly, the study sought to assess the impact of reimbursement policy on antibiotic consumption.

### Methods

Annual data on antibiotic sales were provided by the Intercontinental Medical Statistics (IMS) Health Turkey Office.<sup>5</sup> IMS is a trade market research organization that obtains drug sales

\*Corresponding author. Tel: +90-3742534656; Fax: +90-3742534615; E-mail: drkarabay@yahoo.com

**Table 1.** Antibacterial consumption in Turkey between 2001 and 2006

Antibacterial class	DDD/1000 inhabitant-days					
	2001	2002	2003	2004	2005	2006
Tetracyclines (J01)	0.850	0.911	0.929	0.917	1.261	1.203
Amphenicols (J01B)	0.015	0.012	0.011	0.009	0.010	0.008
Penicillins (J01C)	7.126	7.666	8.115	9.734	14.043	14.087
Cephalosporins (J01DA)	1.984	2.402	2.510	3.223	5.640	6.213
Carbapenems (J01DH)	0.003	0.003	0.003	0.003	0.006	0.007
Macrolides and lincosamides (J01F)	2.833	2.587	2.914	3.446	5.848	5.515
Aminoglycosides (J01G)	0.176	0.155	0.155	0.138	0.171	0.157
Quinolones (J01M)	1.543	1.682	1.809	2.173	3.409	3.823
Glycopeptides (J01XA)	0.003	0.003	0.003	0.003	0.006	0.007
Antibacterials for systemic use (total) (J01)	14.620	15.500	16.530	19.740	30.560	31.360

data from many countries. These data were collected between 2001 and 2006 in accordance with the anatomical therapeutic chemical (ATC) classification and the defined daily dose (DDD) measurement units. Antibiotic utilization data (antimicrobials for systemic use, ATC Group J01) were reported as DDD per 1000 inhabitants per day (DID).<sup>6</sup>

**Results**

Our study showed that nationwide total antibiotic consumption increased systematically and total antibiotic sales increased from 14.62 to 31.36 DDD/1000 inhabitant-days between 2001 and 2006 (Table 1). In terms of consumption, penicillins, cephalosporins, macrolides and lincosamides, fluoroquinolones, quinolones and tetracyclines had the highest consumption rates over the 5 year study period. Penicillins were the most prescribed antibiotics in Turkey between 2001 and 2006. Reductions were seen only for amphenicols and these were minimal. When we examined consumption changes in the various classes of antibiotics using ratios, cephalosporin consumption was the greatest, showing a 2.34-fold increase. The cephalosporin group was followed by quinolones and macrolides and lincosamides with 2.01- and 1.93-fold increases, respectively.

It is clear that the antibiotic consumption increased substantially after the implementation of the SIR in 2005. The mean total antibiotic consumption was 16.598 DDD/1000 inhabitant-days prior to 2005 and increased to 30.960 after 2005, compatible with a 1.85-fold increase following implementation of the SIR. The greatest increases in consumption were seen in penicillins (5.905 DDD), cephalosporins (3.397 DDD) and macrolides (2.735 DDD) (Table 2).

**Discussion**

In Turkey, antibiotics are the most extensively used drugs. Unfortunately, consumption is frequently inappropriate. Enhanced antimicrobial surveillance is a key strategy that can be used to monitor inappropriate antimicrobial use. To the best of our knowledge, this is the first national report of antibiotic consumption in Turkey. This report represents a critical first step in a programme to limit the emergence of antimicrobial resistance through measurement and guidance of antimicrobial prescribing.

After the implementation of the new SIR, almost 70% of the Turkish population was given the opportunity to have a much easier access to prescription drugs including antibiotics.

**Table 2.** Effects of SIR on antibiotic consumption in Turkey

Antibiotic class	Mean consumption (DDD)		Ratio (after/before SIR)	Difference in DDD
	before SIR (2001–04)	after SIR (2005–06)		
Aminoglycosides (J01G)	0.156	0.164	1.051	0.008
Amphenicols (J01B)	0.012	0.009	0.766	-0.003
Cephalosporins (J01DA)	2.530	5.927	2.343	3.397
Macrolides and lincosamides (J01F)	2.945	5.682	1.929	2.735
Penicillins (J01C)	8.160	14.065	1.724	5.905
Quinolones (J01M)	1.802	3.616	2.007	1.814
Tetracyclines (J01)	0.902	1.232	1.366	0.330
Antibacterials for systemic use (total) (J01)	16.598	30.960	1.865	14.363

## Antibacterial drug consumption in Turkey

The consumption of antibiotics increased substantially in Turkey after 2005, compared with 2001. The data show that subsidization of antibiotic prescriptions by health insurance systems correlates closely with increased consumption. Restrictions to antibiotic reimbursement as a policy can reduce antibiotic consumption and reverse increasing resistance rates.<sup>7</sup> Therefore, a more restrictive policy and rational antibiotic guides are required.

The antibiotic consumption rate is higher in Turkey than in many European countries (such as Sweden, Denmark, Germany, and Hungary).<sup>8</sup> Penicillin consumption is higher in Turkey, and compared with other European countries, cephalosporin, fluoroquinolone and macrolide consumption rates are also very high in Turkey. The increasing use of fluoroquinolones and cephalosporins is alarming, given that it may increase the risk for emergence of resistant microorganisms.<sup>9</sup>

A country's healthcare financing system can directly influence prescribing practice. The Turkish Government's support of prescription drugs greatly influences antibiotic consumption. For example, there are major differences between Turkey and European countries such as Denmark in the use of fluoroquinolones and cephalosporins. Their use was not subsidized by the Danish National Healthcare Service in 1997.<sup>10</sup> Quinolone and cephalosporin consumption in Denmark in the same year was measured to be 0.2 and <0.05 DDD/1000 inhabitant-days, respectively. However, in our study, consumption of these drugs was estimated to be 3.89 and 6.29 DDD/1000 inhabitant-days, respectively. The reduction in amphenicols we found may be related to decreasing promotion (or lack of promotion) by the pharmaceutical industry of these drugs. In Turkey, no company promoted amphenicols between 2001 and 2006. Given these data, a comprehensive education on the use of antimicrobials should be given to medical students/doctors and strict rules should be enforced to regulate activities of drug companies.<sup>11</sup>

This study has several limitations. First, it did not differentiate between consumption in the primary care setting consumption from that in the hospital setting. Our data source did not allow for such differentiation. Countrywide antimicrobial consumption patterns can be affected by many factors. In our study, we tried to show the effects of government policy including a reimbursement system and restrictions in antibiotic prescriptions. However, the implementation of such policies may be uneven such that the impact may be different in the parts of the country. Some hospitals may buy drugs from drug factories and sales are not recorded by the IMS system. As a result, the total antimicrobial utilization in Turkey may be higher than that reported.

In conclusion, antibiotic consumption in Turkey increased substantially in recent years and this was closely related to a new reimbursement policy following the implementation of an SIR.

## Acknowledgements

Data for this work were supplied by the IMS Health Turkey Office. We thank IMS Health Turkey Office and Ms Berfu Sevisoglu for their valuable assistance. We also thank Professor Mark Loeb (Hamilton, Ontario, Canada) for his assistance in editing the manuscript.

## Funding

We did not receive any ongoing funding for this study.

## Transparency declarations

None to declare.

## References

1. Papova M. Consumption of anti-infective drugs in Bulgaria for the period from 1979 to 1994. *Pharm world Sci* 1997; **19**: 93–100.
2. Hosoglu S, Esen S, Ozturk R *et al*. The effect of a restriction policy on the antimicrobial consumption in Turkey: a country-wide study. *Eur J Clin Pharmacol* 2005; **61**: 727–31.
3. Semin S, Guldal D, Demiral Y. Globalization and the trends of medical technology trade in Turkey. *Health Policy* 2007; **81**: 320–7.
4. Pharmaceutical Pricing and Reimbursement Information, Turkey, June 2007. [http://ppri.oebig.at/Downloads/Results/Turkey\\_PPRI\\_2007.pdf](http://ppri.oebig.at/Downloads/Results/Turkey_PPRI_2007.pdf) (18 November 2007, date last accessed).
5. IMS Health Turkey Database. Istanbul-Turkey, 2007.
6. Anatomical Therapeutic Chemical (ATC) Classification Index with Defined Daily Doses (DDD). January 2002. Oslo: WHO Collaborating Centre for Drug Statistics Methodology, 2002.
7. Price D. Impact of antibiotic restrictions: the physician's perspective. *Clin Microbiol Infect* 2006; **12** Suppl 5: 3–9.
8. Muller A, Coenen S, Monnet D *et al*. European Surveillance of Antimicrobial Consumption (ESAC): outpatient antibiotic use in Europe, 1998–2005. *Euro Surveill* 2007; **12**: E071011.1 (<http://www.eurosurveillance.org/ew/2007/071011.asp#1>).
9. Sener B, Tunçkanat F, Ulusoy S *et al*. A survey of antibiotic resistance in *Streptococcus pneumoniae* and *Haemophilus influenzae* in Turkey, 2004–2005. *J Antimicrob Chemother* 2007; **60**: 587–93.
10. Llor C, Bjerrum L. Background for different use of antibiotics in different countries. *Clin Infect Dis* 2005; **40**: 333.
11. Amidi S, Ajamee G, Sadeghi HR *et al*. Dispensing drugs without prescription and treating patients by pharmacy attendants in Shiraz, Iran. *Am J Public Health* 1978; **68**: 495–7.