

Decrease in Penicillin Sales in Brazil after Over-the-Counter Restrictions

Rogério Lopes-Júnior,^a Fernando de Sá Del Fiol,^a João Leopoldo Oliveira Araujo,^a Maria Inês de Toledo,^b Silvio Barberato-Filho^a

Graduate Program in Pharmaceutical Sciences, University of Sorocaba, Sorocaba, São Paulo State, Brazil^a; Faculty of Health Sciences, University of Brasília, Brasília, DF, Brazil^b

We read with great interest the recently published paper by Santa-Ana-Tellez et al. (1). In that work, the authors measured the changes in the seasonal variation in penicillin use before and after the restrictions on over-the-counter (OTC) antibiotic sales went into effect in Mexico and Brazil in 2010.

Santa-Ana-Tellez et al. (1) found that following the implementation of policies to restrict OTC sales of antibiotics, the seasonal variation in antibiotic usage decreased in Mexico but not in Brazil. On the basis of these findings, the authors concluded that in Mexico, the inappropriate use of penicillin may have diminished after the restrictions were enforced. However, the authors suggested that in Brazil, the increased use of penicillin with no change in the seasonal variation of penicillin use might indicate that further efforts are needed to reduce inappropriate antibiotic use.

We would like to further discuss the results related to Brazil. We also evaluated the repercussions of antimicrobial control in Brazil (2). The unpublished data were collected from approximately 3,000 pharmacies (4.5% of Brazilian pharmacies) located in approximately 1,500 municipalities (27% of Brazilian municipalities). The information regarding pharmacy antibiotic sales was obtained from the Acode Electronic System, which is used by pharmacies associated with the Brazilian Pharmaceutical Federation (Febrafar), Sao Paulo, Brazil, to monitor the data on the acquisition and sale of medicines by these pharmacies.

Amoxicillin, cephalexin, and azithromycin were the most commonly sold antibiotics in both the precontrol (December 2009 to November 2010) and postcontrol (December 2010 to November 2011) periods. The most significant reductions in the number of units sold were observed for the following classes of antibiotics: tetracyclines (−30.47%), sulfonamides (−28.54%), macrolides (−24.99%), and penicillins (−20.46%). There was a reduction in the number of units sold by the pharmaceutical establishments for all penicillins except amoxicillin in combination with clavulanic acid (Table 1).

The trend of increased sales of penicillins observed in Brazil even after the implementation of restrictive measures reflects the

growth of the Brazilian pharmaceutical market as a whole. Thus, it should not be understood as reflecting the ineffectiveness of the restrictive measures.

In our study, the sale of amoxicillin was reduced by approximately 30% despite the pharmaceutical market growth. This change clearly shows that the restriction of sales in pharmacies resulted in decreased amoxicillin consumption, often associated with self-medication and OTC sales for the treatment of upper respiratory infections.

In our study, the number of units of amoxicillin in combination with clavulanic acid sold increased by 9%, similar to the results reported by Santa-Ana-Tellez et al. (1); however, the increase was not statistically significant. A possible explanation is that this combination is more frequently associated with the use of prescribed antibiotics than self-medication, perhaps because of the higher price of this specific drug.

We agree with the authors on the importance of the implementation of information campaigns aimed at the general population to avoid self-medication. However, we add the need to improve the quality of antibiotic prescribing in Brazil through efforts to sensitize physicians to the risks and improve their practice.

The need for control measures on the prescription, sale, dispensation, and use of antimicrobials is clear. Furthermore, as stated by Barberato-Filho and Lopes (3), in a country in which market rules are often opposed to social, ethical, and legal measures, commitments are necessary to characterize Brazilian pharmacies as health care facilities and monitor the

Citation Lopes-Júnior R, de Sá Del Fiol F, Araujo JLO, de Toledo MI, Barberato-Filho S. 2015. Decrease in penicillin sales in Brazil after over-the-counter restrictions. *Antimicrob Agents Chemother* 59:5862–5863. doi:10.1128/AAC.01030-15.

Address correspondence to Silvio Barberato-Filho, silvio.barberato@prof.uniso.br.

For the author reply, see doi:10.1128/AAC.01128-15.

Copyright © 2015, American Society for Microbiology. All Rights Reserved.

doi:10.1128/AAC.01030-15

TABLE 1 Penicillin sales in Brazil after new control legislation^a

Antibiotic(s)	Total no. of commercial units sold	Avg no. of units sold/mo/pharmacy (SD)		Change (%)	P value
		Precontrol ^b	Postcontrol ^c		
Amoxicillin	1,455,556	28.95 (2.77)	20.52 (1.80)	−29.11	0.0006
Amoxicillin + potassium clavulanate	525,303	8.22 (0.02)	8.97 (0.01)	9.14	0.2195
Ampicillin	108,259	2.06 (1.25)	1.6 (0.69)	−22.41	0.0188
Phenoxymethylpenicillin	44,825	0.83 (0.22)	0.67 (0.12)	−18.68	0.1828
Benzathine benzylpenicillin	18,955	0.32 (0.03)	0.3 (0.02)	−5.72	0.7029
Amoxicillin + sulbactam	15,105	0.25 (3.23)	0.25 (1.37)	−1.42	0.7815
Ampicillin + probenecid	4,432	0.08 (0.35)	0.07 (0.24)	−18.6	0.0194

^a December 2009 to November 2011. Source of data: Febrafar, 2011.

^b From December 2009 to November 2010.

^c From December 2010 to November 2011.

results achieved with the implementation of new measures to control antibiotic sales.

ACKNOWLEDGMENT

We have no financial support or potential conflicts of interest to declare.

REFERENCES

1. Santa-Ana-Tellez Y, Mantel-Teeuwisse AK, Leufkens HGM, Wirtz VJ. 2015. Seasonal variation in penicillin use in Mexico and Brazil: an analysis of the impact of over-the-counter restrictions. *Antimicrob Agents Chemother* 59:105–110. <http://dx.doi.org/10.1128/AAC.03629-14>.
2. Lopes-Junior R. 2011. Controle de medicamentos antimicrobianos no Brasil: repercursões sobre farmácias e drogarias. M.S. thesis. University of Sorocaba, Sorocaba, Brazil. (In Portuguese.) http://farmacia.uniso.br/prod_discente/2011.asp.
3. Barberato-Filho S, Lopes LC. 2007. A influência da margem de lucro na comercialização de medicamentos. *Rev Ciênc Farm Básica Apl* 28:99–106. (In Portuguese.)