Letters

RESEARCH LETTER

HEALTH CARE REFORM

Effect of Public Disclosure on Antibiotic Prescription Rate for Upper Respiratory Tract Infections

Although antibiotics are not required for treating uncomplicated upper respiratory tract infection (URTI),[1] which is mostly viral, they are often prescribed, fueling antibiotic resistance and loss of protective flora. Accordingly, many studies worldwide have tried to decrease inappropriate antibiotic prescribing behavior.[2]

In South Korea, where the National Health Insurance provides universal coverage, the Health Insurance Review & Assessment Service (HIRA) oversees claims reviews, quality assessment, and benefits and coverage standards. Since 2001, HIRA has used claims data to assess the appropriateness of care based on various quality indicators, including the antibiotic prescription rate for URTIs,[3] and has used them for monitoring and giving feedback to physicians. Because it is a prerequisite that the public perceive low antibiotic prescription rates as good quality of care, starting in February 2006, HIRA began warning the public of the potential harms of antibiotic overuse through television and radio campaigns. In addition, HIRA has disclosed physicians' antibiotic prescription rates to the general public via its website.

We evaluated the effect of such public disclosure using nationally representative data.

Methods | From the National Health Insurance claims data, a random sample of 3% of the adult population was selected (1 162 354 persons who were 20 years or older on December 31, 2002). The claims data of medical services, which include all prescriptions written from January 1, 2003, through December 31, 2010, were used.

From these data, we defined the cases of URTI based on the *International Classification of Diseases, Tenth Revision* (*ICD-10*) codes J00 through J06, and the antibiotics according to their Anatomical Therapeutic Chemical classification (J01 category).

To perform segmented regression, we totaled the visits each month and calculated the rate of antibiotic use. We performed segmented linear regression to compare the trend of antibiotic use before and after February 1, 2006. We analyzed the trend using the autoregressive integrated moving average model, which included the seasonal effect. We also compared the rates by intervention at 3 hospital levels: primary clinic, secondary care hospital, and tertiary care hospital. Analyses were conducted using STATA, version 13.1 (StataCorp).

Results | From the predefined cohort, 938 118 persons with URTI (80.7%) had visited a clinic at least once between January 1, 2003, and December 31, 2010. The number of visits was 11 665 529, and 95.7% of the visits were to primary clinics.

The rates of antibiotic prescriptions before and after public disclosure were 58.8% and 53.0%, respectively, and the decrease in rates by intervention were consistent regardless of the hospital level (**Table**).

Segmented linear regression showed that antibiotic prescription rates abruptly decreased by February 2006, and differences between actual rates and predicted rates persisted until the end of the follow-up period. Autoregressive integrated moving average models showed that all actual rates after the intervention were below the predicted values, and most rates were observed below the lower limits of the 95% CIs (**Figure**).

Discussion | Our data show that public disclosure was effective in lowering antibiotic use for URTIs. Based on the findings in a previous study[4] on the effect of publicly disclosing quality improvement in other clinical areas, 2 primary mechanisms can be suggested: selection of high-quality providers by patients and provider response to report cards. A survey[5] in 2007 found that 21.5% of health consumers were aware of the disclosure of antibiotic prescription rates and 40.3% of them had changed their health care provider. The survey also found that 95.0% of physicians were aware, and the abrupt change might be explained by observer effect.[6]

Our study should be interpreted within the context of South Korea's medical care, in which medical services are pro-

Table. Comparison of Antibiotic Prescription Rates for URTIs by Intervention

	Intervention					
	Before[a]		After[b]			
Hospital Type	Visits for URTI, No.	Antibiotic Prescription Rate [A], % (95% CI)	Visits for URTI, No.	Antibiotic Prescription Rate [B], % (95% CI)	Difference in Rate (A − B), % (95% CI)	Ratio of Rate (B:A) (95% CI)
Total	**4 651 905**	58.8 (58.7-58.8)	**7 013 624**	53.0 (53.0-53.1)	5.7 (5.7-5.8)[c]	0.90 (0.90-0.90)[d]
Primary clinic	4 495 231	58.9 (58.9-58.9)	6 668 069	53.3 (53.3-53.4)	5.6 (5.5-5.6)[c]	0.91 (0.90-0.91)[d]
Secondary care hospital	87 559	54.6 (54.3-54.9)	215 387	46.6 (46.4-46.8)	8.0 (7.7-8.4)[c]	0.85 (0.85-0.86)[d]
Tertiary care hospital	69 115	56.2 (55.8-56.6)	130 168	49.7 (49.4-49.9)	6.5 (5.2-5.2)[c]	0.88 (0.88-0.89)[d]

Abbreviation: URTI, upper respiratory tract infection.

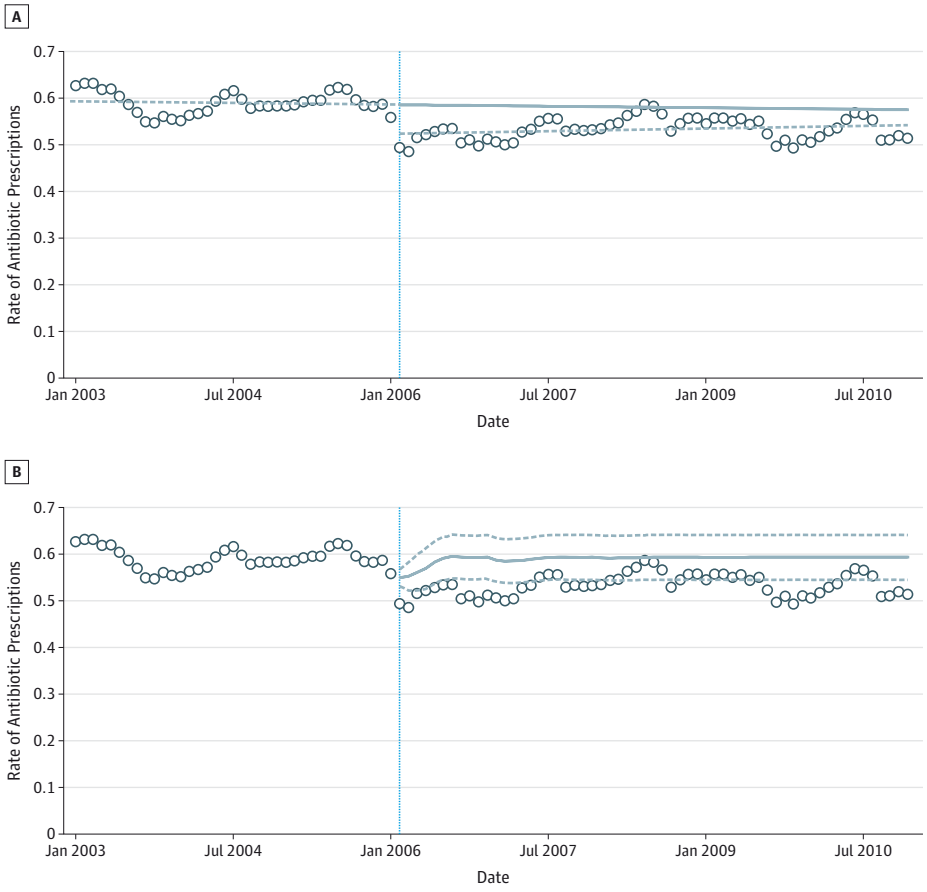
[a] January 1, 2003, through January 31, 2006.

[b] February 1, 2006, through December 31, 2010.

[c] $P < .001$, *t* test.

[d] $P < .001$, χ^2 test.

Figure. Segmented Linear Regression of the Rate of Antibiotic Prescriptions and Predicted Rate of Antibiotic Prescriptions With ARIMA Model



A, Segmented linear regression is shown. B, Autoregressive integrated moving average (ARIMA) model: (*p, d, q*) = (2, 0, 0); seasonal components, (*p, d, q, s*) = (1, 0, 0, 12). Vertical line indicates February 2006; dots, observed rates; solid line and curve, predicted rates; dashed line (A), trend of rates; dotted curves (B), 95% CIs of predicted rates.

vided mostly by private providers who might be motivated to maintain a good reputation for economic reasons. In addition, the preexisting National Health Insurance database for fee-for-service reimbursement makes individual medical institutions' antibiotic prescription rate easily available and implementation of the program affordable.

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