European Journal of Public Health and Environmental Research

Vol. 2 No. 1 2026

Article **Open Access**

Patient violence and and antibiotic abuse: Evidence from China

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Received: 26 December 2025
Revised: 17 February 2026
Accepted: 27 February 2026
Published: 04 March 2026

Abstract: Antibiotic abuse poses a critical public health challenge in China, with existing literature primarily emphasizing physicians' economic incentives as the driving force. This paper identifies a novel mechanism: patient violence as a catalyst for defensive antibiotic prescribing. Leveraging a violent incident at a top-tier Beijing hospital with a 95% patient satisfaction rating, we analyze over 67,000 electronic consultation records from an online platform where physicians' income derives solely from service fees-effectively isolating economic incentives from prescribing behavior. Using a difference-in-differences framework with physician and time fixed effects, we find that physicians in the affected department increase antibiotic prescriptions by 11.4 percentage points and non-prescription antibiotic guidance by 11.3 percentage points following the incident. These effects concentrate among patients expressing recovery expectations, with no significant impact on other patients, and decay within one week. Our findings reveal "appeasement behavior" as a distinct form of defensive medicine-physicians accommodate patient demands to mitigate conflict risk when clinical relationships become strained. The results underscore that antibiotic abuse is not solely an economic phenomenon but also a behavioral response to workplace violence, with important implications for antibiotic stewardship programs and patient safety policies.

Keywords: patient violence; antibiotics; China; decision-making

1. Introduction

Understanding the drivers of antibiotic abuse is essential for designing effective interventions. Existing research has predominantly focused on economic incentives-the financial rewards physicians receive from prescribing medications in a health system where drug sales historically contributed substantially to hospital revenues and physician incomes [1]. Under the fee-for-service model that characterized Chinese healthcare for decades, physicians faced clear financial motivation to prescribe more and costlier antibiotics [2,3]. This profit-driven explanation has dominated both academic discourse and policy responses, leading to reforms such as the zero-markup drug policy aimed at severing the link between prescribing and income.

Yet the persistence of antibiotic overprescribing following these reforms suggests that economic incentives alone cannot explain the full picture. Even after the zero-markup policy eliminated direct financial gains from drug sales, prescribing rates remain stubbornly high [4,5]. This puzzle points toward additional mechanisms that sustain antibiotic abuse despite changed economic circumstances.

This paper argues that a critical missing dimension is the clinical environment itself-specifically, the increasingly strained relationship between physicians and patients in

contemporary China. The deterioration of doctor-patient trust has reached crisis proportions: national surveys indicate that over 90 percent of physicians have experienced doctor-patient conflicts, with more than half reporting personal encounters with verbal abuse, threats, or physical violence. High-profile incidents of patient violence against physicians regularly make national headlines, creating a pervasive atmosphere of fear and uncertainty in clinical practice.

This environment forces physicians into an impossible position: they must simultaneously pursue patient welfare according to clinical evidence while protecting themselves from potential harm. When the two objectives conflict-when evidence-based care might disappoint patients expecting rapid relief-physicians face a genuine dilemma. Do they adhere to clinical guidelines and risk patient dissatisfaction that could escalate into conflict? Or do they accommodate patient expectations, even when clinically unnecessary, as a strategy to preserve safety and maintain harmonious relationships?

The medical literature has long recognized the phenomenon of defensive medicine-physicians' tendency to order tests, procedures, or treatments primarily to reduce legal exposure rather than enhance patient care. Defensive medicine is conventionally divided into two categories: assurance behavior, where physicians order additional tests to confirm negative findings; and avoidance behavior, where physicians refuse to treat high-risk patients. We identify a third form that existing frameworks have largely overlooked: "appeasement behavior"-physicians' tendency to accommodate patient demands as a relational risk management strategy. Antibiotics are particularly suited to serve as appeasement tools because patients widely associate them with rapid recovery, they signal active treatment, and they carry low immediate risk for most patients.

To test whether patient violence triggers appeasement behavior, we investigate a violent incident that occurred at Chaoyang Hospital in Beijing in early 2020. This hospital maintained a 95 percent patient satisfaction rating and ranked among Beijing's top institutions, making it an unlikely setting for violence. We analyze over 67,000 electronic consultation records from Haodf.com, an online platform where physicians earn income solely from consultation fees with no financial gain from prescribing-allowing us to isolate behavioral effects from economic incentives.

Our results indicate that physicians in the affected department increased antibiotic prescriptions by 11.3 percentage points and non-prescription guidance by 11.4 percentage points following the incident. These effects concentrate among patients expressing recovery expectations and decay within one week, consistent with an appeasement mechanism where physicians accommodate patient demands to manage conflict risk when clinical relationships become strained.

Our study adds to the widely documented motivations for antibiotic abuse. We show that antibiotic abuse in China is not solely driven by physicians' economic incentives but also be influenced by the tense doctor-patient relationship. Our findings suggest that this tension increases physicians' tendency to cater to patient demands [6,7]. We also contribute to the literature on workplace violence and defensive medical practices by demonstrating that, at least in the week following an incident of patient violence, the probability of recommending antibiotics rises sharply [8]. We also provides new insights into the broader impact of safety risks on the healthcare sector and deepens our understanding of how physicians' defensive behavior shape medical decision-making [9].

2. Data

The deterioration of doctor-patient relationships in contemporary China represents one of the most pressing challenges facing the country's healthcare system. This deterioration has deep roots in the broader transformation of Chinese healthcare over recent decades. The market-oriented reforms of the 1980s and 1990s fundamentally altered the organization and financing of medical care, shifting from a state-funded system toward one requiring substantial out-of-pocket payments from patients. This transition created new tensions: patients paying more for care naturally expected higher

quality and better outcomes, while physicians faced pressure to generate revenue for their institutions through service provision and drug sales.

The consequences of this transformation have been documented extensively. Patient satisfaction with healthcare declined through the 2000s, with widespread perceptions that physicians were motivated more by profit than by patient welfare. Trust in the medical profession eroded, and patients increasingly approached clinical encounters with suspicion rather than confidence. This atmosphere of distrust created fertile ground for conflict when outcomes fell short of expectations.

Against this backdrop, a violent incident occurred at Chaoyang Hospital in Beijing in early 2020 that shocked the medical community and attracted national attention. Chaoyang Hospital was not a likely setting for such violence-it was widely regarded as one of Beijing's premier medical institutions, consistently ranking among the top hospitals in the city and nationally. At the time of the incident, the hospital reported a patient satisfaction rating of 95 percent, placing it in the top tier of Chinese hospitals for patient experience.

The incident involved a patient who attacked a physician in the outpatient department, resulting in serious injury. While the precise details of the attack were reported in media coverage, the broader significance lay in its location: if violence could occur in a hospital with exemplary patient satisfaction ratings and national reputation, no physician anywhere could feel safe. The incident was extensively covered in national media, with discussions on social media platforms reaching millions of viewers. Physicians throughout Beijing-and indeed throughout China-became aware of the event within days.

This widespread awareness is crucial for our identification strategy. Even physicians not directly employed at Chaoyang Hospital learned of the incident through media reports and professional networks. However, the intensity of exposure varied systematically: physicians in the same department as the victimized physician received the most detailed information through hospital communications and direct collegial contact; physicians at other Beijing hospitals learned of the incident through media but lacked the immediate collegial connection.

Our data come from Haodf.com, one of China's largest and most established online healthcare platforms. Founded in 2006, Haodf provides a range of services connecting patients with physicians. Patients can search for physicians by specialty, location, and patient ratings; read educational materials about conditions and treatments; and, most importantly for our purposes, conduct online consultations with registered physicians.

The platform's institutional features are critical for our research design. Unlike traditional hospital-based practice, where physicians' income may be linked to prescribing through bonuses or hospital revenue targets, Haodf operates on a fundamentally different model. Physicians on the platform earn income solely from consultation service fees-patients pay for the time and expertise of the physician, not for prescriptions or treatments. The platform's pharmacy operates independently, with no financial relationship to the consulting physicians. When a physician recommends a medication, including antibiotics, they receive no financial benefit from that recommendation.

This institutional separation of consultation from dispensing is relatively rare in Chinese healthcare, where hospitals historically derived substantial revenue from drug sales. The zero-markup drug policy introduced in 2017 aimed to sever this link, but implementation has been uneven and indirect incentives may persist. On Haodf, however, the separation is clean and complete-physicians' compensation depends only on patient volume and consultation fees, with no connection to prescribing decisions.

This feature allows us to isolate the behavioral effects of patient violence from the confounding influence of economic incentives that have dominated prior research. Any change in prescribing behavior we observe following the violence cannot be attributed to changes in financial motivations, because those motivations were absent throughout our study period. The observed effects must instead reflect changes in physicians' clinical judgment, risk perception, or desire to accommodate patient expectations.

We obtained electronic clinical records from Haodf covering outpatient physician consultations in Beijing from December 2019 through March 2020. This window includes approximately six weeks before and after the violent incident at Chaoyang Hospital, allowing us to examine both baseline patterns and dynamic responses.

The raw data include detailed information on each consultation: patient identifiers, physician identifiers, date and time stamps, patient demographics, the patient's description of their condition, the physician's response including any treatment recommendations, and the duration and fee for the consultation. Crucially, the records distinguish between prescriptions issued through the platform's pharmacy partners and non-prescription guidance-recommendations that patients obtain medications elsewhere.

From these raw records, we constructed a panel dataset with several key features. First, we restricted attention to consultations with physicians based in Beijing, ensuring geographic relevance to the incident. Second, we required that physicians appear in the data both before and after the incident, enabling physician fixed effects specifications. Third, we limited the sample to consultations occurring within a reasonable window around the incident to maintain comparability. The final dataset comprises 67,863 electronic clinical records from 106 outpatient departments.

Our primary outcome variables capture two dimensions of antibiotic-related decisions. Prescription is an indicator variable equal to one if the physician issued a prescription for antibiotics through the platform's pharmacy, and zero otherwise. Non-prescription guidance is an indicator equal to one if the physician recommended that the patient obtain antibiotics through other channels-such as from a local pharmacy or hospital-without issuing a formal prescription through the platform.

The distinction between these outcomes is important. Prescriptions through the platform represent a stronger commitment to antibiotic treatment, as they involve direct action by the physician and create a formal record. Non-prescription guidance represents a softer form of recommendation-the physician suggests antibiotics but leaves the actual acquisition to the patient. Both forms contribute to antibiotic use, but they may reflect different degrees of physician conviction or different strategies for managing patient expectations.

Our treatment variable exploits departmental variation in exposure to the incident. Treatment is an indicator equal to one for physicians whose department matches that of the victimized physician at Chaoyang Hospital, and zero for physicians in other departments. This definition captures the intuition that physicians sharing a departmental affiliation with the victim have the most direct exposure-they are likely to receive detailed information through hospital communications, to know colleagues who knew the victim personally, and to experience the most intense vicarious trauma.

Patient-level control variables include gender, location, and a particularly important variable: recovery expectations. This variable is constructed from textual analysis of patient consultation descriptions. When patients explicitly expressed hope for rapid recovery, urgency about their condition, or expectations that treatment would quickly resolve their symptoms, we code the expectation indicator as one. Approximately 70 percent of consultations in our sample contain such expressions.

Table 1 presents summary statistics for our analytic sample. Panel A reports antibiotic decision variables. The mean prescription rate is 26.2 percent, meaning that in over one-quarter of consultations, physicians actively prescribed antibiotics through the platform. The mean non-prescription guidance rate is substantially higher at 42.9 percent, indicating that antibiotic recommendations are even more common when softer forms of guidance are included. These rates are broadly consistent with other estimates of antibiotic prescribing in Chinese outpatient settings, suggesting that our sample is representative despite the unique institutional features of the platform.

Table 1. Summary of electronic clinical records.

Variable	Mean	SD	Min	Max	N
A: Antibiotic decisions					
Prescription	0.262	0.439	0	1	67,863
Non-prescription guidance	0.429	0.495	0	1	67,863
B: Physician characteristics					
Chief physician	0.972	0.164	0	1	67,863
Tertiary hospital/center	0.439	0.496	0	1	67,863
C: Patient characteristics					
Sex (male=1)	0.431	0.495	0	1	67,863
Native (Beijing=1)	0.477	0.499	0	1	67,863
Expectations of recovery	0.704	0.456	0	1	67,863

Panel B reports physician characteristics. The high proportion of chief physicians (97.2 percent) reflects the composition of physicians active on the platform-senior physicians with established reputations are more likely to offer online consultation services. The 43.9 percent of observations from tertiary hospitals indicates substantial representation from top-tier institutions, consistent with Chaoyang Hospital's profile.

Panel C reports patient characteristics. Male patients constitute 43.1 percent of the sample, reflecting gender patterns in healthcare-seeking behavior. Beijing residents account for 47.7 percent of consultations, indicating substantial use of the platform by local patients as well as those from elsewhere in China. Most importantly for our analysis, 70.4 percent of patients explicitly expressed recovery expectations in their consultation descriptions, highlighting the prevalence of demand for rapid symptomatic relief.

3. Specification

To analyze the impact of patient violence on antibiotic use, we use the following identification to take advantage of the panel data:

$$Y_{ijt} = \beta Treatment_i * Post_t + X_{jt} + u_i + \lambda_t + \varepsilon_{ijt} \quad (1)$$

Y_{ijt} is the antibiotic decision provided by physician i to patient j at week t. We define antibiotic decision as an indicator variable equal to 1 when the physician decides to offer antibiotic prescription/non-prescription decision and 0 otherwise. $Treatment_i$ is an indicator variable equal to 1 implying that physician i's department is the same as the victimized physician. $Post_t$ is an indicator variable equal to 1 implying that week t is after the violent episode. X_{jt} is a set of patient characteristics. u_i is a physician fixed effect. λ_t is a week fixed effect.

4. Results

Table 2 presents the regression results, highlighting the impact of patient violence on physicians' antibiotic recommendation behavior. The first two columns report the findings for the full sample. Column (1) indicates that following an incident of patient violence, physicians in the affected department were 11.3 percentage points more likely to issue antibiotic prescriptions. This represents a 43.1% increase relative to the average prescription rate of 26.2%. Similarly, Column (2) shows a significant effect on non-prescription antibiotic guidance, with an increase of 11.4 percentage points, equating to a 26.6% rise compared to the average guidance rate of 42.9%. These results underscore the substantial role patient violence plays in driving antibiotic abuse, after controlling for physician fixed effects, time fixed effects, patient demographics, and diagnostic categories.

Table 2. Results: patient violence and and antibiotic abuse.

	Full sample		With Expectations		Without Expectations	
	(1) Prescription	(2) Guidance	(3) Prescription	(4) Guidance	(5) Prescription	(6) Guidance
Treatment * Post	0.113**	0.114**	0.197***	0.169**	-0.001	-0.009
	(0.0482)	(0.0461)	(0.0661)	(0.0695)	(0.0218)	(0.0467)
Physician fixed effect	YES	YES	YES	YES	YES	YES
Time fixed effect	YES	YES	YES	YES	YES	YES
Patient demographics	YES	YES	YES	YES	YES	YES
Diagnosis category	YES	YES	YES	YES	YES	YES
Observations	67,863	67,863	47,317	47,317	19,846	19,846
R-squared	0.441	0.417	0.451	0.438	0.528	0.486

Notes: Robust standard errors are in parentheses. *p < 0.10, **p < 0.05, *** p < 0.01.

To explore mechanism, the sample was divided into two subsamples. The first subsample includes patients who explicitly expressed recovery expectations during their consultations. In column (3), we find an estimate of 0.197, which is statistically significant at the 1% level. This estimate indicates an 18.1% increase in the probability of antibiotic prescription by affected physicians among patients with recovery expectations. The estimate in column (4) is 0.169, which is statistically significant at the 5% level. This implies that there is an 18.1% increase in the probability of non- prescription antibiotic guidance by affected physicians among patients with recovery expectations. These two columns reveal positive and statistically significant estimates, indicating that patient violence notably influenced antibiotic decisions for patients with recovery expectations.

In contrast, the second subsample comprises patients who did not explicitly express recovery expectations. The estimates in column (5) are smaller in magnitude and statistically insignificant compared to the estimates in column (3). There was no significant increase in the probability of antibiotic prescription by physicians for patients who did not directly express an expectation of recovery. Similarly, significant differences in the coefficients are present in columns (4) and (6), and the empirical results show that the estimates are near zero and statistically insignificant. These findings suggest that patient violence had little effect on physicians' antibiotic decisions for patients who did not explicitly express recovery expectations.

Figure 1 presents the dynamic effects of the violence incident through an event study approach, with each panel depicting the coefficients and their 95% confidence intervals. Panel (a) illustrates the impact of the violent event on the probability of antibiotic prescriptions, while Panel (b) shows its effect on the probability of non-prescription antibiotic guidance. In both panels, there is no significant difference between the treatment and control groups prior to the event date. However, following the event, the treatment group saw a marked increase in both antibiotic prescriptions and non-prescription guidance. We can observe that the effects diminish and disappear within one week.

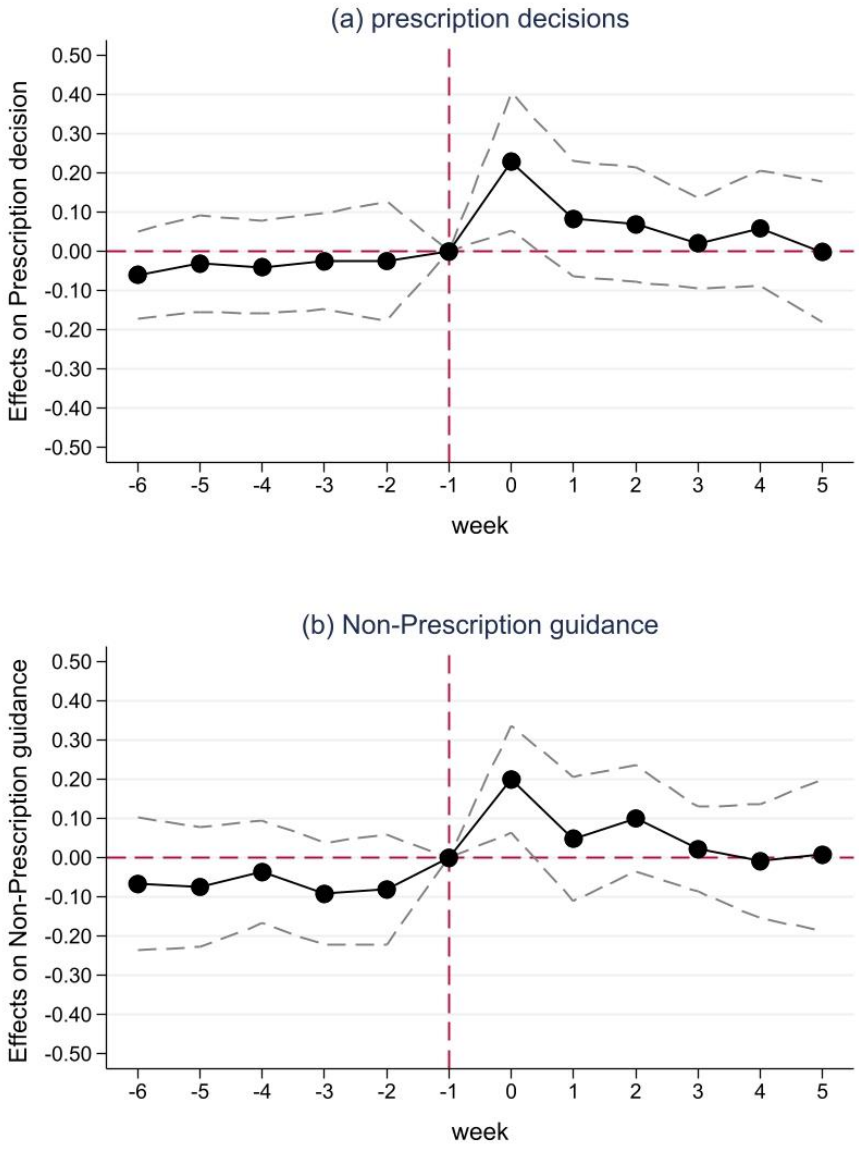

Figure 1. Dynamic effects of patient violence on antibiotic decisions. This figure presents the impact of patient violence on the key outcome variables including prescription decisions (Panel a) and non-prescription guidance (Panel b).

5. Conclusions

In China, doctor-patient disputes are a major issue, with most cases being initiated by patients and related to drug use. For instance, in 2022, 1.98 adverse events were reported per 100 discharges in Chinese healthcare facilities, with 23.03% being adverse drug reactions [10]. This situation may be linked to the serious abuse of antibiotics in China, highlighting the need for our research.

We present compelling evidence that exposure to patient violence significantly increases the probability of physicians recommending antibiotics, both in prescriptions and non-prescription guidance. This effect is particularly pronounced among patients who express recovery expectations, with no significant impact observed among the remaining. These findings suggest that physicians may cater to patient demands for antibiotics when they face patient violence.

Our results call for urgent policy attention and further research, particularly as addressing antibiotic abuse requires a concerted effort from multiple stakeholders.

Understanding how and to what extent patient violence affects physicians' antibiotic decisions is crucial, as is the development of effective strategies to mitigate these impacts.

Disclosure statement: No potential conflict of interest was reported by the author(s).

Funding: No funding was received.

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