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Pharmaceutical cost-containment policy: experiences in Shanghai, China

SHANLIAN HU,[1] WEN CHEN,[1] XIAOMING CHENG,[1] KEYONG CHEN,[2] HAIYANG ZHOU[2] AND LONGXING WANG[2]

[1]Department of Health Economics, School of Public health, Shanghai Medical University, Shanghai, People's Republic of China and [2]Shanghai Bureau of Medical Insurance, Shanghai, People's Republic of China

Background: In the decade after 1983, the annual growth rate of drug expenditure was about four times as high as that of per capita gross domestic product (GDP) in Shanghai. In 1993 and 1994, a drug list policy and hospital revenue capping policy were introduced in Shanghai to contain drug expenditure. We studied the impact of these two policies, as a model for similar policies in other parts of China and elsewhere.

Methods: Quarterly drug expenditure data were collected from 1992 to 1996 and more detailed drug expenditure flow was obtained at seven selected hospitals. Twelve focus group discussions were organized to obtain opinions from all stakeholders.

Results: The research findings showed a dramatic and continuing decline in the growth rates of total medical and drug expenditures after the implementation of the two policies. The proportion of total medical expenditure attributable to drugs declined from 67% in 1992 to 51% in 1996. The annual growth rate of drug expenditure per ambulatory visit and per bed-day was reduced as well. Drug revenue as a proportion of total hospital revenue declined gradually in all seven hospitals. The two policies did not alter the equity of drug utilization between the insured and non-insured. The government, insurance authority and state-owned drug enterprises all favoured the new policies, while hospital administrators, professionals, joint venture and foreign manufacturers wished for the reimbursement mechanisms to be improved, for retention of their freedom of choice, and for the drug list to be further expanded.

Conclusions: The drug list and capping policies in Shanghai appear to have achieved their objectives of containing the escalation of drug expenditure and improving the rational use of drugs without loss of equity. The underlying causes of the escalation of drug expenditure in China need to be further elucidated.

Introduction

Between 1983 and 1993 the annual growth rate of gross domestic product (GDP) per capita in Shanghai was over 8%, but the increase in medical and drug expenditure was about four times as high (Zhou et al. 1995). In 1990, drugs accounted for up to 50% of total health expenditure in China, or 1.9% of gross national product (GNP) (Table 1). Estimated drug spending per capita in Shanghai was about US$35 in 1992, equal to that in middle-income countries.

Several explanations are proposed for the rapid increase in drug expenditures. First, it is mainly due to government policy that hospitals are able to retain the income from the price difference between the wholesale and retail price of drugs as compensation for low hospital revenue. Because the fee schedules of hospital services are much lower than real costs, hospitals are permitted to earn a profit of 15% for pharmaceuticals and 20% for Chinese herbal preparations. The financial incentives and profit-driven prescribing behaviours of hospitals and physicians lead to higher drug costs. The national hospital compensation policy has caused serious waste of drug resources, such as oversupply and overuse of medicines. Second, the Government Welfare Insurance Scheme (GWIS) and Labor Insurance Scheme (LIS) that covered civil servants, other government employees, students and workers – approximately 50% of the population in urban areas – paid for almost all medical services including pharmaceuticals. This co-payment system meant there was little or no control over drug expenditure, leading to overconsumption of drugs. Finally, as the 15th National Congress of the Communist Party continued to promote greater opening up of, and deeper reforms in, the macro economy, an enormous potential drug market stimulated the formation of joint venture pharmaceutical firms, the importation of pharmaceuticals from abroad, and the introduction of many new and costly drugs.

In 1977, WHO published the first Model List of Essential Drugs and subsequently has attempted to improve the rational use of drugs in developing countries. The World Health Assembly suggested that member states select and procure essential drugs corresponding to their national health needs (WHO 1977). The first national essential drug list in China was officially approved by the Ministry of Health in 1982 (Dong et al. 1999). To contain the growth of drug expenditures, government health insurance authorities adopted a drug list in Shanghai in 1993, naming 936 pharmaceuticals and

Table 1. GNP per capita and drug consumption, selected developing countries, 1990

	GNP per capita (US$)	Drug expenditure per capita (US$)	Drug expenditure as % of total health expenditure	Drug expenditure as % of GNP
Philippines	730	11	68.8	1.5
Ghana	390	10	66.7	2.6
China	370	7	50.4	1.9
Pakistan	380	7	58.3	1.8
Indonesia	570	5	41.7	0.9
Kenya	370	4	25.0	1.1
India	350	3	14.3	0.9
Bangladesh	210	2	33.3	1.0

Source: World Bank 1992, 1993; Murray and Lopez 1994; Zhao 1996.

502 Chinese herbal preparations. For GWIS and LIS beneficiaries, only drugs included on this list were reimbursed; other drugs were paid out-of-pocket. The list was applied first to the claims of 6.8 million GWIS and LIS beneficiaries in Shanghai, about 50% of the city's population. The list has been revised and updated annually. Some expensive drugs are also reimbursable for secondary and tertiary hospitals.

In July 1994, a new policy of the Bureau of Health was put into effect in Shanghai to limit the total revenue of each hospital. The annual growth rate of hospital revenue was capped at 24% of the previous year's revenue, falling in annual steps to 7% in 2000. The annual growth rate of hospital drug revenue was also limited to 18% in 1994, and declined to 5% in 2000. At the end of each year, the hospital revenue above the ceiling would be fully taxed by the municipal Bureau of Health. The charges to patients for doctor's consultations and nursing were gradually raised to secure the hospital financial balance.

International experience in drug cost containment has concentrated on price setting, control of pharmaceutical industry profits, provider payment systems and co-payments for patients in health insurance plans (Gross et al. 1994; Emilien 1997; Vandergrift and Kanavos 1997). The purpose of this study is to determine the impact of the drug list policy and hospital revenue capping policy on drug expenditure in Shanghai, as a model for similar policies in other parts of China and elsewhere. There have been no previous published studies of these policies in developing countries.

Methods

Data on general medical expenditure and drug expenditure from 1991 to 1996 in Shanghai were obtained from the Statistical Yearbook of the Shanghai Health Bureau. Pooled data on quarterly drug expenditures of 29 hospitals from 1992 to 1996 were obtained from the Shanghai Bureau of Pharmaceutical Administration. Three time periods were compared: before the drug list policy (January 1990–March 1993); after the drug list policy alone (April 1993–June 1994); and after the drug list and capping policies (July 1994–December 1996).

Information on drug expenditure was collected from seven purposively sampled hospitals of different levels, as listed in Tables 2 and 3. These hospitals were selected to represent the different classes of hospital in various parts of Shanghai. A standard questionnaire was given during interviews with the financial officer in each hospital, inquiring about hospital revenue and expenditure, drug procurement and delivery, and utilization rates of medical services.

Twelve focus groups were organized to obtain information about satisfaction with the drug list and capping policies. These groups consisted of 10 to 12 representatives from the government (bureaux of health, finance, planning, pricing

Table 2. Real growth rate (%) of drug expenditure by hospitals, Shanghai, 1991–95

Hospital	1991	1992	1993	1994	1995
Tertiary	26.5	14.0	25.0	–10.9	5.0
District A	16.1	28.6	10.5	–13.4	–12.0
District B	15.2	36.0	16.2	–15.8	–3.9
Community A	11.6	67.0	19.5	–13.8	0.9
Community B	7.9	8.4	26.0	–15.1	–0.3
Tumor	37.1	18.4	24.7	–0.5	–5.8
Thorax diseases	17.3	23.9	60.6	2.9	–7.3

Source: Financial offices in seven sampled hospitals, 1991–1995.

Table 3. Drug revenue as a percentage of total hospital revenue by hospitals and periods, Shanghai, 1991–95

Hospital	1991	1992	1993	1994	1995
Tertiary	58.2	58.3	60.2	49.9	47.7
District A	67.6	66.2	60.6	47.2	45.4
District B	57.1	55.3	50.1	42.2	40.0
Community A	80.1	76.3	78.9	76.3	71.5
Community B	82.2	80.3	79.5	72.9	72.1
Tumor	56.4	59.5	56.5	51.3	47.7
Thorax diseases	43.8	45.9	43.1	39.7	37.5

Source: Financial offices in seven sampled hospitals, 1991–1995.

and social security); trade unions; hospital managers and pharmacy directors; clinic doctors; commercial pharmaceutical firms; and consumers.

The cost of 7076 randomly selected prescriptions for pharmaceuticals and Chinese herbal preparations in a large tertiary hospital in 1994 and 1995 were analyzed. A partial multiple regression analysis of these prescription costs is attached in Appendix A. All data were processed and analyzed using Microsoft Excel 7.0 and SAS 6.12 software.

Results

Containment of drug expenditure

Before 1993, the average annual growth rate of drug expenditure in Shanghai was 2.2% higher than total medical expenditure. Beginning in 1993, drug expenditure continued to increase, but more slowly than total medical expenditure. Figure 1 shows the continuing decline in the rates of growth of total medical expenditure and drug expenditure after the implementation of the two new policies. The proportion of total medical expenditure attributable to drugs declined from 67% in 1992 to 51% in 1996.

Another set of data from all Shanghai hospitals showed that the annual growth rate of drug expenditure per ambulatory visit was reduced from 23.4% in 1992 to 0.3% in 1996. Over the same period, the growth rate of drug expenditure per bed-day decreased from 28.2% to –2.4%. In 1993, there was a reduction of 1.6% in the rate of growth of drug expenditure per ambulatory visit, and of 9.5% per bed-day. In 1994, the growth rate of drug expenditure per ambulatory visit was further reduced by 6.5%, and by 4.8% per bed-day.

Although the seven sampled hospitals varied greatly in the year-to-year growth rate of their drug expenditures, all had substantial increases between 1991 and 1993. In 1993, all hospitals except one showed a dramatic decline in the growth rate of drug expenditures from the previous year. Most hospitals also showed a further decline after the capping policy was initiated in 1994 (Table 2). During the same period, the proportion of total revenue attributable to drugs declined gradually in all hospitals (Table 3).

In Shanghai in the early 1990s, Chinese domestic drugs, those made by joint venture companies, and imported products accounted for about 46%, 18% and 36%, respectively, of the total drug value. After implementation of the two policies, the respective percentages were 39%, 32% and 28% of total drug value in 1996 (Table 4). Among antibiotics, the relatively costly cephalosporins tended to decline in utilization, while the inexpensive penicillin category almost quadrupled as a proportion of all antibiotics (Table 5). The results showed that fewer imported drugs and expensive antibiotics were prescribed by doctors after implementation of the reform policies.

Maintenance of drug consumption equity

A multiple regression function analysis of prescription costs showed that the two policies did not alter the equity of utilization of pharmaceuticals between insured and non-insured outpatients (Appendix A). Drug expenditure was the same for members of the GWIS and LIS and for non-members.

Table 4. Proportion (%) of pharmaceutical cost by origin and year, Shanghai, 1992–96

	1992	1993	1994	1995	1996
Domestic drug	46.0	41.7	39.9	39.2	39.4
Joint venture drug	17.6	21.8	28.5	30.0	32.2
Imported drug	36.4	36.5	31.6	30.8	28.4

Source: Shanghai Bureau of Pharmaceuticals Administration, 1992–1996.

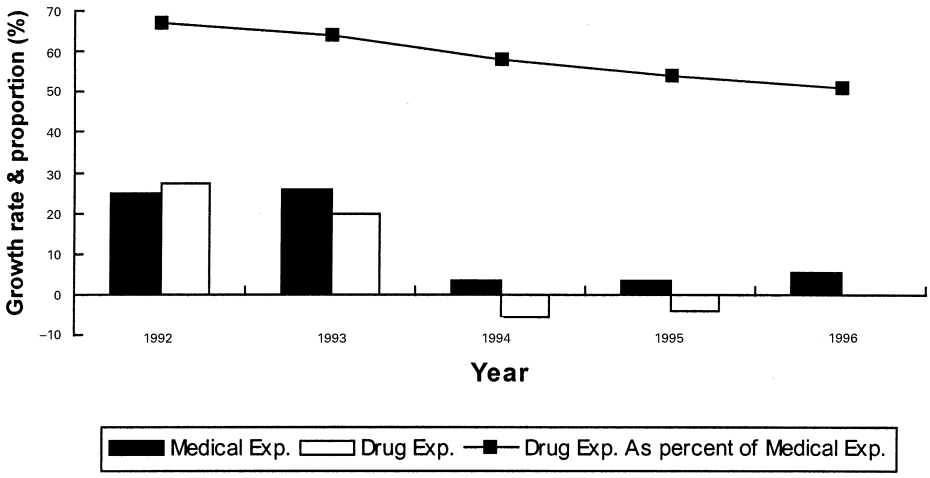

Figure 1. Annual growth rate (%) of medical expenditure and drug expenditure, and drug expenditure as a percentage of medical expenditure, Shanghai, 1992 to 1996 (Source: Shanghai Bureau of Health, 1992–96)

Table 5. Penicillins, cephalosporins and antibiotics as a percentage of all pharmaceuticals by year, Shanghai, 1992–96

	1992	1993	1994	1995	1996
Penicillins	1.5	1.9	3.2	4.7	5.8
Cephalosporins	22.7	26.3	25.6	22.4	20.3
Antibiotics	35.2	38.3	37.3	35.0	34.5

Source: Shanghai Bureau of Pharmaceuticals Administration, 1992–1996.

Opinions of stakeholders

Stakeholders from focus groups that discussed the drug list and capping policies were predictable:

- The Shanghai municipal government was very supportive and encouraged continued improvement, that the annual growth rate of health expenditure and drug expenditure should be coupled with that of gross domestic product and other socioeconomic indices in Shanghai. The bureaux of finance and health concurred and wanted additional policy changes to promote drug cost containment. The Health Insurance Administration requested cooperation from various different interest groups to support insurance system reforms. The Bureau of Pharmaceutical Administration suggested that they be permitted to increase total expenditures for drugs.
- Domestic state-owned drug manufacturing enterprises expected a more equitable environment to regulate competition with foreign drug companies. They appealed for strengthened price controls on drugs and a policy more favourable to state-owned enterprises.
- Joint venture and foreign manufacturers wanted to expand the drug list to cover additional cost-effective drugs from their companies.
- Doctors worried whether the drug policy was flexible enough to include advances in medical science, and wanted to retain their freedom of choice for prescribing drugs.
- Tertiary hospital administrators thought that drug policy should vary by level of hospital so that tertiary hospitals could use more expensive and special drugs. They also thought they should be treated differentially under the capping policy, with a higher cap being allowed for them. Actually, after implementing the capping policy, tertiary hospitals are the winners.
- Secondary and primary hospital administrators desired an improved reimbursement mechanism. They felt that if drug costs were reduced, the government should make up the deficit in some other way.
- Consumers worried that if doctors used more expensive, imported drugs that were not on the list, this would cost more and they would have to pay out of their own pocket. They were also concerned that quality of care would suffer if doctors were influenced to reduce costs and that they would receive poor quality drugs.

Discussion and recommendations

The drug list adopted by the health insurance authority aims to contain escalation of drug expenditure and improve the rational use of drugs through economically indirect restriction of prescription drugs. The capping policy adjusts the hospital revenue structure by controlling drug expenditure and raising labour costs, which gives hospitals the incentive to provide more medical services instead of overusing drugs.

The above two policies appear to have achieved their objectives without loss of equity. Although the findings of this study are highly suggestive, it has inherent limitations that make it difficult to prove direct cause and effect relationships. The pharmaceutical market changed rapidly during the early 1990s with the importation of many new foreign products and the emergence of joint venture companies. These changes, and continuing economic development, were reflected in altered drug utilization patterns. We did not analyze the changes over time according to origin (domestic, joint venture, imported) of drugs used in hospitals at different levels. Despite these limitations, we estimate that the drug list policy saved 100 million yuan RMB in drug expenditure in Shanghai in 1993, and 1.28 billion yuan RMB between 1994 and 1996, when compared with the national relative growth rate of pharmaceutical expenditure in the same period. With the restructuring of the hospital compensation system, especially under the capping policy, it became possible to promote health insurance reform and implement related insurance drug policies to further improve rational use of drugs.

We have not collected information for the period since 1996, but assume that the growth rate of drug expenditure has continued to decline as capping limits were reduced year after year. Analysis of more recent data has showed that these capping limits are in line with economic advances and are appropriate for hospitals of different types. Further exploration of these elements will help to guide policies to adjust capping limits for optimal performance.

International experience informs us about three main targets of drug policy: accessibility of essential drugs, rational use of medicines, and appropriate cost containment (Freemantle and Bloor 1996; Bloor and Freemantle 1996; Bloor et al. 1996). Comprehensive drug policies may generate positive or negative drug lists, and may lead to price setting, bulk purchasing, control of the volume of drug consumption, rational use guidelines, reimbursement mechanisms, and expenditure limitations. Both the implementation of an essential drug list and a capping policy can improve equitable access and prevent runaway expenditure. The achievements should be considered in terms of the joint effects of the two policies, including selective reimbursement of drug costs and taxing providers' revenue if drug income is beyond the ceiling. This has been demonstrated in the Shanghai experience reported here.

The inappropriate system for hospital compensation appears to have been the underlying cause of the escalation of drug expenditures in China (Wei 1999). Inadequate compensation mechanisms cause hospitals to rely heavily on the 15–20%

drug price mark-up, leading to over-prescription and irrational use of medicines in hospitals. Irrational usage of antibiotics is common; for example, their improper use prophylactically in 'clean' operations and viral diseases, the use of multiple antibiotics, and routine use of third generation antibiotics. Overuse of antibiotics stimulates the occurrence of super-infection and development of resistant strains, increasing illness and economic burden to patients as well as medical expenditure. The incentive leading to overuse of drugs should be removed as an urgent priority of health reform.

As it is the doctor who actually prescribes medicines, appropriate clinical guidelines for prescription practices should be promoted. Authorities should minimize the irrational use of drugs and the prescription of costly products when less expensive drugs of equal efficacy are available. Routine auditing and proper incentives are necessary to encourage doctors to abide by clinical guidelines.

Medicines are special goods. Containing drug costs is a complex matter also involving the principle of drug price setting and mark-up, and profit margins at manufacture, distribution, and delivery. Issues of equity, such as price to consumer and access to drugs, are also paramount. The pharmaceutical industry, now undergoing rapid growth and change, must be responsive to these concerns.

Drug policy does not involve the health sector alone, but all key stakeholders, including the health, commerce and other concerned government ministries; national and local governments; professional and voluntary organizations; domestic, joint venture, and foreign pharmaceutical companies; international agencies, and consumers. Viable drug policies require the cooperation of all of these groups.

The irrational and inappropriate use of drugs is widespread, but the extent and costs of these practices are unknown. Patterns of pricing, distribution and use of pharmaceuticals are also of great importance, but largely unstudied. Research is needed to explore and define these issues as a basis for new policies to encourage the economical use of drugs. The establishment of a strong programme in pharmacoeconomics can help to improve the cost-effective use of drug resources, and increase the productivity of the entire health sector. We believe that the important gains reported in this study of drug cost-containment policies in China might be of value in relevant situations in other developing countries throughout the world.

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Correspondence: Shanlian Hu, Professor, School of Public Health, Shanghai Medical University, 138 Yi Xue Yuan Rd., Shanghai 200032, People's Republic of China.

Appendix A

A multiple linear regression analysis was applied to identify whether there was a difference in prescription expenditure on pharmaceuticals between the insured (GWIS and LIS beneficiaries) and the non-insured. The prescription expenditure

Table 1. Regression coefficients of prescription expenditure by different variables

Variables	Regression coefficient	Standard error
Male	0.2760**	0.0450
Age, 40–60 years	0.3317**	0.0545
Age, ≥60 years	0.3703**	0.0568
GWIS beneficiaries	0.0503	0.0567
LIS beneficiaries	0.1095	0.0839
No. of drugs prescribed	0.4334**	0.0196
Receiving injection drug	0.0996	0.0979
Receiving antibiotics	0.3150**	0.0527
Visit in 1995	0.2180**	0.0446

n = 3764, F = 83.70, R2 = 0.165. **p < 0.01.

was transferred to logarithm, as a dependent variable. The independent variables included gender, age group (<40, 40–60 and ≥60), medical insurance membership (GWIS/LIS beneficiaries and non-insured), receipt of antibiotics or injection drugs, year of visit (1994 or 1995), and the number of drugs prescribed.

The results showed that males aged over 40, receipt of antibiotics, and number of drugs prescribed did influence the prescription expenditure. Membership in insurance plans did not significantly affect the cost per prescription compared to non-members.