URBAN HEALTH CARE REFORM INITIATIVE IN CHINA: FINDINGS FROM ITS PILOT EXPERIMENT IN ZHENGJIANG CITY(1)

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Abstract

This research presents a preliminary assessment of China's urban health care reform experiment. In reforming its existing urban health care programs, the Chinese government initiated a new community-based insurance plan, which was implemented in a pilot experiment in 1994. Data for this study was derived from the first post-experiment survey, which was conducted in Zhengjiang city in 1995.

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The survey contains a total of 14,745 individuals, a 3.2% stratified random sample of the total enrollees in Zhengjiang city. A two-part econometric model was employed as the study's analytical framework.

Major findings show significant changes in health care cost and utilization patterns in response to the experimental health insurance plan instituted in Zhengjiang city. First, the incidence of using any health care services increased by 12% among the general population. Second, when looking into changes in the composition of difference services, there was a shift from the likelihood of using inpatient care to outpatient care. Third, total health care expenditures decreased by 8% among the general population and 18% among users. And fourth, among respective service-specific users, the utilization rates consistently decreased by 14% for outpatient visits, 11% for inpatient admissions, and 17% for length of stay (LOS) per admission. Based on these findings, the experimental plan appears to be more cost effective than the previous health care programs.

Introduction

Over the last two decades, China's health care system has undergone numerous changes (Hsiao, 1984; Hu, 1984; 1988; Cretin et al., 1990; World Bank, 1993; Henderson et al., 1994; Liu et al., 1994; Liu and Hsiao, 1995). Like many other countries, runaway health care costs and limited insurance coverage have been serious problems that stimulated the Chinese government to reform its existing publicly financed health insurance programs. In December 1994, the Chinese central government initiated a new medical insurance plan for pilot experiments in two medium-sized cities: Zhengjiang and Jiujiang (Cai, 1995; Yuen, 1996). The experimental plan was intended to provide citywide insurance coverage for the urban working population, while capping overall health care spending. The government hoped to eventually reform its existing urban health insurance programs, following the design/testing of the experimental plan. Given that nearly 360 million people live in urban areas, the urban health insurance experiment will undoubtedly have profound and significant impacts on China's health care policy and transitions in health care markets.

To date, only a few studies have been conducted to describe the pilot experiment (Cai, 1995; Xiang and Hillier, 1995; World Bank, 1996;

Yuen, 1996; Jiangsu Province Bureau of Health, 1996; Song, 1997; Yip and Hsiao, 1997; Liu et al., 1998). A major observation from most of the previous studies suggested that the new insurance plan was effective in containing total health care expenditures (Jiangsu Province Bureau of Health, 1996; Yip and Hsiao, 1997). What remains inconclusive thus far is how the cost savings were derived from this new plan. In particular, some questions were raised as to whether and to what extent the identified cost savings were attributable to reductions in utilization rates of various services or to the reduction in the use of expensive diagnostic services and prescriptions.

Moreover, previous studies were descriptive in nature. Because of data limitations, none of the existing studies was conducted in the context of an explanatory framework that controls for the confounding factors while assessing the dynamic changes in health care costs and outcomes resulting from the pilot reform experiment.

Using data from the first survey conducted in 1995 by the Jiangsu Province Department of Health, this study conducted a preliminary economic assessment of the experimental program in Zhengjiang. Although the analysis is based only on data for the baseline and one post-reform year,[3] it is the first evaluative study on the Chinese urban health care reform experiment using an econometric modeling design. This study addresses three major issues concerning the health reform experiment: (1) whether the cost-containment instruments (e.g., prospective budgeting, Medical Savings Accounts, fee schedules, prescription guidelines, and consumer co-payments) designed for the experimental plan were effective in containing total health care expenditures; (2) what utilization patterns (e.g., inpatient care vs. outpatient care, hospital length of stay and the use of expensive diagnosis and treatment services) were resultant from the pilot experiment; and (3) to what extent the experiment may have led to changes in other health outcomes such as equity and access to care (Cai, 1995; Yuen, 1996).

The next section gives a description of the current urban health care systems and the experimental plan. Section III outlines our analytical framework and data description. Section IV presents major results from this analysis. Section V discusses the policy implications of the results. The last section summarizes the study with our concluding remarks.

The Urban Health Care Systems in China

In the urban areas of China, the health care market is hierarchically structured into three tiers: (1) street health clinics and workplace clinics providing preventive and primary care; (2) district and enterprise hospitals and specialist clinics providing secondary care; and (3) provincial and municipal general hospitals and teaching hospitals providing tertiary inpatient care. These health care institutions are managed by a wide range of public organizations such as the central and provincial governments, state enterprises, and universities. Since these institutions are not accountable to any single body, their financial and quality performance are poorly monitored and evaluated, resulting in over-billing, over-prescribing, and over-utilization of health services.

The urban health care institutions fall into two major employer based systems: Labor Insurance Program (LIP) and Government Insurance Program (GIP). Since 1951, employees and retirees in state-owned enterprises are covered by LIP. Medical expenses are reimbursed from the employer's pre-tax income. This caused serious problems for the state enterprises that have a large number or percentage of older workers or retirees, who are more likely to utilize more medical care. Firms with poor financial performance are also being challenged. Currently, LIP covers about 156 million people, which is 43% of the total urban population. All employees in government sectors have been covered through GIP and managed by the Ministry of Finance since 1952. GIP also covers university students and retired officials, which represent approximately 24 million beneficiaries, or 7% of the total urban population (Yuen, 1996).

Individuals who are not insured by GIP or LIP must pay out of pocket for their health care. In the past, however, the government subsidized all health care substantially by regulating charges that were far less than the true costs of care. For example, as government employees, physicians' labor costs were not factored into the usual health care cost accounting equations. Thus, basic health care was quite affordable for most of the uninsured population. With the introduction of market-oriented reforms since the 1980's, service providers have been allowed to raise their fees and charges. As a result, accessibility to health care has become a serious problem for the uninsured.

Moreover, the overall health care cost has been escalating at an annual rate of 20% in recent years (Yuen, 1996). Such runaway health care costs, coupled with the low coverage and poor risk-pooling capacity under GIP and LIP, have created health care crisis for Chinese governments and state enterprises (Liu and Hsiao, 1995). In an attempt to reform the existing health care system, the Chinese central government, in December, 1994, launched a pilot experiment of a new citywide insurance plan in the cities of Zhengjiang and Jiujiang.

This experimental plan provides mandatory medical insurance coverage for all employees through employment under a single, citywide insurance plan. It also covers retirees, disabled veterans, and university students. It contains two key components: (1) an individual Medical Savings Account (MSA) for each subscriber, and (2) a citywide Social Insurance Account with pooled insurance funds across all subscribers (Jiangsu Province Bureau of Health, 1996). To participate in the experimental plan, providers of health care are evaluated and selected by the City Social Security Bureau. All participating providers must comply with an agreed fee schedule and financing arrangements, and are also subject to audits from the Bureau. The Employees Medical Insurance Management Committee governs the insurance plan. It is established within the City Social Security Bureau and is composed of representatives from the finance, health, personnel, social insurance, and pricing, as well as other departments. Operational matters are handled by the Employees Medical Insurance Fund Management Center, which reports to the Management Committee. Regulations require that the administrative expenses must be within 2% of the total insurance capital.

The experimental plan is financed through contributions from a combination of employers and employees. It is structured into three tiers: individual Medical Savings Account (MSAs), out-of-pocket deductibles, and the Social Insurance Account. For MSAs, a current employee contributes 1% of his/her salary to his/her named account, and retirees are exempted from this contribution. The employer contributes 10% of the employee salary as premium, of which 4% goes to the individual MSAs for those under the age of 45 and 6% for those over 45. When the funds in an MSA run out, beneficiaries are required to pay up to 5% of their annual salary out of pocket as a deductible. The Social Insurance Account, funded by the remaining portion of the employer's premium contribution, pays for the medical expenses incurred by participating employees after the individual account has been exhausted and the deductible is paid by the insured.

The reimbursement arrangements between the insurer and the provider are based primarily upon capitated budgets with fee schedules, varying with levels, types of providers, and services provided. For example, at tertiary hospitals, the reimbursement rate is 47 RMB ($1≅8.3RMB) for an outpatient visit and 110 RMB for a hospital day (capped at 19 days per patient on average). At secondary hospitals, the rate is 75 RMB for an outpatient visit and 90 RMB for a hospital day (capped at 16 days per patient on average). Drug formularies and some guidelines for the use of diagnostic and treatment procedures are also used to determine the capitated budget. About 5% of the agreed-upon budget is top-sliced from the hospital for quality-control purposes. This amount would be released back to the hospital in full, in part, or not at all, depending on the result of the quality audit. Every six months, the insurer and the provider reconcile their accounts. If the actual amount received by the provider is less than the budgeted amount, the provider will receive the balance from the insurer. If the actual amount received is greater than the budgeted amount, then the provider has to surrender the surplus to the insurer. There are penalties for late payment for both parties.

Methods and Data

The Analytical Model

Empirical studies in the West suggest two typical characteristics in health care utilization (Duan et al., 1983); about 20% of the population incur no medical care expenses during any given year, while the remaining 80% of the population have highly skewed expenses. Because of the censoring nature of health data distribution, the ordinary least squares (OLS) method is unlikely to provide valid results. Alternatively, two competing econometric models have been developed to obtain better estimates: the Two-Part Model (TPM) and the Sample Selection Model (SSM) (Heckman, 1979; van de Ven and van Praag, 1981; Duan et al., 1983).

Although inconclusive theoretically, most empirical studies seem to support TPM over SSM estimators through Monte Carlo simulation analyses of health care services (Hay et al., 1987; Manning et al., 1987). Along this line, the present study tested whether the experimental data would be subject to any significant sample-selection bias in light of the central concern with the SSM approach. In particular, a probability choice model of using health care in any given year was estimated for a probit model specification. Conditional on being a health care user, a log linear expenditure model was obtained with a correction for the sample selection effect captured by the estimated inverse Mill's ratio (Heckman, 1979). Our estimated SSM models suggested no significant sample selection effect in the study sample.[4] As a result, this study derives its empirical findings from the TPM framework.

A central argument with TPM is that health care users and non-users would follow different distributions with regard to their demand for health care. As a result, an attempt is made to model health care use in a two-step process: 1) whether or not to use care; and 2) how much care to use, given that one is using care. More formally, the model may be written in two equations (Duan et al. 1983). The first equation is a choice model of using care:

$$\boldsymbol{I}_i = \boldsymbol{X}_{1i} \mathrm{a}_1 + \mathrm{e}_{1i} \; \boldsymbol{i} = 1, \ldots \boldsymbol{N} \qquad (3.1)$$

where $\boldsymbol{I_i}$ is a latent utility index being ‡ 0 for users and < 0 for non-users. $\boldsymbol{X_{1I}}$ is a row vector of explanatory variables, $\mathrm{a}_{\boldsymbol{1}}$ is a column vector of coefficients to be estimated, and $\mathrm{e}_{\boldsymbol{1i}}$ is a stochastic term. Conditional on using care ($\boldsymbol{I_i}$ ‡ 0), an individual would spend on health care according to an expenditure equation:

$$\boldsymbol{H}_i \left| \boldsymbol{I}_i \geq 0 = \boldsymbol{Z}_{1i} \mathrm{b}_1 + \mathrm{h}_{1i} \right| \boldsymbol{I}_i \geq 0 \qquad \boldsymbol{i} = 1, \ldots \boldsymbol{N}_1 \qquad (3.2)$$

where $\boldsymbol{Z_{1i}}$ is a row vector of explanatory variables, $\mathrm{b}_{\boldsymbol{1}}$ is a column vector of coefficients to be estimated, $\mathrm{h}_{\boldsymbol{1i}}$ is a stochastic term, and $\boldsymbol{N_1}$ is the total number of observations for users only. The likelihood function for this model is of the form:

$$L(\alpha_1, \beta_1, \sigma_1^{\,2}) = \prod_{i\in\bar{\psi}} F_1(-X_{1i}\alpha_1) \prod_{i\in\psi} [1 - F_1(-X_{1i}\alpha_1)]\, f_1(H_i - Z_{1i}\beta_1)$$

(3.3)

where $\psi = \{i | I_i \geq 0\}, \bar{\psi} = \{i | I_i < 0\}$, F_1 is a distribution function of ε_{1i}, and f_1 is the density function of η_{1i}. It is clear from (3.3) that the likelihood function can be written separately as two terms. The first term depends exclusively on parameters in (3.1); the second term depends exclusively on parameters in (3.2). This separation nature of the likelihood function is a consequence of the independent assumption between equation (3.1) and (3.2). As a result, the expected medical expense for an individual with characteristics X_{1i} and Z_{1i} would be:

$$E(H_i \big| X_{1i}) = F_1(X_{1i}\alpha_1) \times e^{z_i'\beta_1} \times E(e^{\eta_i} \big| X_{1i}) \qquad (3.4)$$

where $E(e^{\eta_i} \big| X_{1i})$ can be estimated simply using $exp(\sigma_1^2/2)$ under a normality assumption. Alternatively, it can be better estimated using the "smearing" estimate developed by (Duan 1983). The smearing estimate, a consistent nonparametric estimate of K without normality, is the sample average of the exponential least-squares residuals:

$$\hat{K} = \sum_i [\exp(\hat{\eta}_{1i})] / N_1$$

(3.5)

where $\hat{\eta}_{1i}$ are least-squares residuals.

Data

The City of Zhenjiang in Jiangsu province consists of a county, three towns, and two districts, within an area of 3,843 square kilometers. It has a total population of 2.6 million, of which 525,000 are urban residents. In 1994 the per capita GDP was 8,300 RMB with an average annual salary of 5,020 RMB for an urban employee. The GIP covered 78,887 individuals, whereas LIP covered 360,004. Under the government mandate, all the citywide employers and employees were required to enroll in the pilot experimental insurance plan. As a result, in 1995, 99% of eligible employers (3,881) and 98% of individuals (453,600) were enrolled into the experimental plan (Jiangsu Province Bureau of Health, 1996).

To assess the performance of the pilot experiment, a series of annual surveys has been carried out since 1995. This study was conducted based on the first post-reform survey in 1995, which includes 14,745 individuals, about 3.2% of the total urban employees. The survey contains information on individual characteristics, two-week illness, chronic disease, outpatient and inpatient utilization, various health expenditures, and income. Most of the utilization rates and cost variables are for both 1994 (baseline) and 1995. As a result, we were able to assess the experimental plan in comparison with GIP and LIP using various cost and utilization measures. To make the across-year comparison possible, a data set for 1994 was created to contain a subset of predictable variables same as in 1995 (e.g., sex, marriage, education, chronic disease), while allowing time-wise variables to change accordingly (e.g., age, income, costs and utilization of various health care services). Following this strategy, the study sample contains a total of 27,149 observations for both 1994 and 1995.

Empirical Results

Having health care expenditures and utilization rates as main outcomes measures, all results were obtained in the context of multivariate TPM functions that quantify the net impact of the experiment, while controlling for all other confounding factors observed in the database. These controlled variables include individual demographics, socioeconomic characteristics, occupation and health status, and individuals' opinions on the reform. The following sections present major results on the net changes in various cost and utilization measures that were attributed to the reform experiment.[5] Following the TPM procedure, all analyses were carried out in two steps: whether to use care, and if so, how much to use.

Cost Savings and Substitution Effects

First, we examined changes in the individuals' likelihood of seeking any types of care between 1994 and 1995. As shown in Table 1, the likelihood of seeking care among the general population increased 8% ($p<0.0001$) in terms of marginal probability,[6] which measures the absolute change in the likelihood of using care. Equivalently, this increase is about 12% of the pre-reform incidence level of using care, measured by the relative change measure in the Table.

Table 1
General Health Care Expenditures

Changes in Probability Function of Initiating A Care

Net Impact due to the Reform	Coefficient	$Pr > \chi^2$	Marginal Prob. $\partial P/\partial x$	Relative Change in Prob. $(\partial P/\partial x)/P_0$
Δ (94-95)	0.4349	0.0001	0.0789	0.1206
Model Fitting	-2 ln LR = 29561, 15 DF, P=0.0001; Users =20,098; Non-users = 7,095			

Changes in Conditional Expenditure Function (Logarithm)

Net Impact due to the Reform	Coefficient	Pr > |T|	% Change In Expenditures	
			Conditional	Unconditional
Δ (94-95)	-0.1995	0.0001	-18.088	-8.206
Model Fitting	F Value = 279; Prob>F = 0.0001; R^2 = 0.172; Root MSE = 1.18 Sample size: N (users) = 20,098; Mean = 5.06;			

Given the use of care, the change in total health care expenditures was examined among health care users. As indicated by the conditional percentage change in expenditures, there was a significant reduction of 18% as a result of the reform (0.0001).[7] This result, however, only pertains to individuals who ever used care. For an individual among general population, we computed a measure of unconditional change in expenditures taking into account the changes in both probability and quantity of care measures.[8] This unconditional change was found to be 8%, measuring the overall rate of cost savings among all individuals. That is, a typical person from the general population would spend 8% less in total health care cost to the new plan than to the previous GIP and LIP.

Since the probability of seeking care increased while the total expenditures decreased, this pattern could be driven by a change in the composition of outpatient care vs. inpatient care. To investigate this issue, we analyzed the changes in the use of hospital care. As shown in

Table 2, the probability of hospitalization decreased by 0.7% (p<003) in absolute scale, or decreased by 15% of the previous incidence of hospitalization in 1994. The hospital expenditures among hospital inpatients, however, remained constant. That is, the experimental plan reduced the probability of seeking hospital care, but not the expenditures per admitted patient. These results suggest a substitution effect resulting from the new insurance plan that promoted the use of outpatient care for inpatient care.

Table 2
Hospital Care Expenditures

Changes in Probability Function of Initiating A Hospital Care

Net Impact due to the Reform	Coefficient	$Pr > \chi^2$	Marginal Prob. $\partial P/\partial x$	Relative Change in Prob. $(\partial P/\partial x)/P_0$
Δ (94-95)	-0.1746	0.0034	-0.0073	-0.1536
Model Fitting	-2 ln LR = 9,541, 15 DF, P=0.0001; Sample size: Users = 1,215; Non-users = 25,978			

Changes in Conditional Hospital Expenditure Function (Logarithm)

Net Impact due to the Reform	Coefficient	Pr > |T|	% Change In Expenditures	
			Conditional	Unconditional
Δ (94-95)	-0.0708	0.2690	-0.0684	-0.2115
Model Fitting	F Value = 5.801; Prob>F = 0.0001; R^2 = 0.071; Root MSE = 1.07 Sample size: N (users) = 1,215; Mean = 7.30;			

Decreased Utilization Rates

Given the significant total cost savings resulting from the experiment, what remained unclear was where cost savings were derived (Yip and Hsiao, 1997). Particularly, were the cost savings attributed mainly to the reduced utilization rates of primary services, or alternatively to the reduced use of expensive diagnosis and treatment facilities? In order to disentangle this question, changes in five major utilization measures were further investigated: outpatient visits, admissions, emergency visits, LOS per admission, and use of expensive technology facilities.

As shown in Table 3, it was found that while the likelihood of seeking outpatient visits increased among the general population, the total annual number of visits per user decreased significantly from 1994 to 1995, by 14% of outpatient care ($p<0.0001$) and 11% of inpatient care ($p<0.006$). Moreover, there was also a significant reduction in LOS per admission by nearly 17% according to the Poisson regression ($p<0.008$) or 3.5 days following the result from the linear regression model ($p<0.015$) per admission. As to the use of expensive technology facilities which were defined to include CT, TCT, ECT, MRI, Doppler/color ultrasound, x-ray, b-ultrasound, biochemical analysis, extra-corporeal-shock-wave with lithotripsy (ESWL), and microwave diathermy, the likelihood of using any of the procedures did not change significantly. Among those who ever used any of these services, however, the annual utilization rate decreased by 14% after the reform ($p<0.0001$). For emergency visits, there was no significant change in both the likelihood of seeking the care and the quantity of visits per user.

Table 3
Health Care Utilization

Annual Number of Outpatient Visits

	Changes in Probability Function		Changes in Conditional Utilization Function	
Net Impact Due to the Reform	Coefficient	Pr > χ^2	Coefficient	Pr > χ^2
Δ (94-95)	0.3384	0.0001	-0.1388	0.0001
Model Fitting	-2 ln LR = 30,021, 15 DF, P=0.0001 Users=19,691; Non-users=7,502		Poisson Log likelihood = 19,417 Users=19,691; (Mean =5.63)	

Annual Number of Hospital Admissions

	Changes in Probability Function		Changes in Conditional Utilization Function	
Net Impact Due to the Reform	Coefficient	Pr > χ^2	Coefficient	Pr > χ^2
Δ (94-95)	-0.1746	0.0034	-0.1142	0.0055
Model Fitting	-2 ln LR = 9,541, 15 DF, P=0.0001 Users=1,215; Non-users=25,978		Poisson Log likelihood = 19,417 Users=1,215; (Mean =1.15)	

Length of Stay Per Admission (LOS)

	Changes in Linear Function		Changes in Poisson Regression	
Net Impact Due to the Reform	Coefficient	Pr > |T|	Coefficient	Pr > χ^2
Δ (94-95)	-3.5036	0.0154	-0.1736	0.0079
Model Fitting	R^2 = 0.065, Adj. R^2 = 0.053 Users=1,158; (Mean =20.55)		Poisson Log likelihood = -2,020 Users=1,158; (Mean =20.55)	

Annul Number of Emergency Visits

	Changes in Probability Function		Changes in Conditional Utilization Function	
Net Impact Due to the Reform	Coefficient	Pr > χ^2	Coefficient	Pr > χ^2
Δ (94-95)	-0.0252	0.5640	-0.0544	0.2170
Model Fitting	-2 ln LR = 15,409, 15 DF, P=0.0001 Users=2,361; Non-users=24,832		Poisson Log likelihood = -1,004 Users=2,361; (Mean =1.65)	

Annual Number of Expensive Diagnosis Services

	Changes in Probability Function		Changes in Conditional Utilization Function	
Net Impact Due to the Reform	Coefficient	Pr > χ^2	Coefficient	Pr > χ^2
Δ (94-95)	-0.0022	0.9539	-0.1403	0.0001
Model Fitting	-2 ln LR = 17,967, 15 DF, P=0.0001 Users=3,624; Non-users=17,653		Poisson Log likelihood = -778 Users=3,624; (Mean =2.10)	

Discussions

Following the results presented above, some major policy implications for the China's urban health care reform experiment can be drawn as follows. First, it was found that the experiment model led to an increased likelihood of seeking initial visits among the general population, while resulting in an overall reduction in total health care cost. Two possible scenarios could be the driving forces for the cost savings. One is that the new insurance plan may help promote the use of more cost-effective services. This would be the case if much of the increased initial visits were more preventive-oriented or obtained early on in disease state, both of which could contribute to the cost savings down the road. The other scenario implies that the experimental plan has better mechanisms that induced a more effective use of outpatient care in substitution for inpatient care.

Second, the speculation of substitution effect was supported by further evidence from the use of inpatient care. The analysis of changes in the use of inpatient care services demonstrated a consistent decreasing trend in all inpatient-related variables, including the probability of seeking inpatient care, the annual number of admissions, and hospital length of stay per admission. From international experiences, health policy makers have long argued for promoting such a substitution effect in order to improve the overall cost-effectiveness of health care use. Empirical studies, however, are inconclusive in terms of how the relationship between the use of inpatient care vs. outpatient care would respond to changes in a health insurance policy (Davis and Russell, 1972; Elnicki, 1976; Freiberg, 1979; Manning et al., 1987). For instance, Manning et al. (1987) found inpatient care and ambulatory care to be complementary, both falling as the insurance generosity for ambulatory care fell. Yet other studies showed a substitution effect between inpatient and outpatient care utilization similar to ours. Nevertheless, the substitution effect of outpatient care for inpatient care is indeed a major objective of the health care reform in China.

Third, while LOS was shortened to some extent, inpatient care spending per admission among hospital users remained constant before and after the reform. According to this and our earlier results, the variation in inpatient expenditures seemed to be quite inelastic, as opposed to the rather elastic likelihood of seeking general care in response to the policy change. While this pattern is quite consistent with many empirical observations in the West (Davis and Russell, 1972; Phelps and Newhouse, 1972; Newhouse, 1993), it also raises a significant policy issue concerning the role of providers in the determination of inpatient care resources in China. This is partly because the incidence of seeking the initial care in general is determined largely by patient role, whereas the total amount of care per episode is more likely to be influenced by both patient and provider roles (Alberts et al., 1997). Since providers generally are more medically adept than patients and third-party payers (Arrow, 1963), the inelastic nature of the inpatient care utilization suggests a supply-driven area that challenges further health care reform in China.

Fourth, utilization analysis suggested a decreased trend in major utilization variables among users including annual number of outpatient visits, number of inpatient admissions, LOS per admission, and the use of expensive diagnosis and treatment facilities. For the use of expensive facilities, in particular, the decreased change was identified only for the total amount per user but not for the incidence rate. This is an interesting and important observation as it suggests that the experimental program was effective in containing the extent to which the expensive facilities were used by users without compromising the access to these facilities for the general population. Nonetheless, the utilization analysis indicates that the decreased utilization of various services seemed to play a major role in obtaining the cost savings under the experimental plan.

Finally, to a certain extent our results may also shed light on some changes in access to care and equity as well. The former is evidenced by the fact that over 98% of all eligible employees in Zhengjiang have been covered by the new insurance plan, and it was indicated above that the incidence of obtaining care increased overall for the insured. For the latter, given the overall increased likelihood of using outpatient care among all individuals, the reduced utilization rates of outpatient and inpatient visits among care users would imply a more equitable distribution of health care utilization across all individuals among the general population.

Summary

China has been undertaking a series of significant initiatives in reforming its urban health care system. The first major initiative began in 1994 with a citywide health insurance experiment implemented in the city of Zhengjiang and Jiujiang. In 1996, the State Council expanded the experimental reform into 57 other cities. In the end of 1998, a nationwide implementation of the reform was launched. There were two fundamental changes in the reform. One was to risk-pool together the two previously separated health care programs: labor insurance program and government insurance program. The other was to establish dual medical savings accounts (one at the individual level and one at the social community level). Both changes were fully incorporated into the experimental model in Zhengjiang and Jiujiang. To date, only the Zhengjiang experimental model was well monitored with a series of annual follow-up data. To this extent, the experiment in Zhengjiang provides a very unique and important database to assess the China's urban health care reform.

This study presents the first analysis of China's urban health care reform based on the Zhengjinag experiment in 1994-1995. The analysis was conducted using a variety of outcome measures including outpatient care, inpatient care, emergency care, LOS, and expensive diagnosis and treatment services. In particular, various health care cost and utilization functions were estimated in the context of the two-part model (TMP). Based on the findings, the analysis leads us to conclude that relative to the previous LIP and GIP, the experimental insurance model is clearly more effective in containing health care costs, and perhaps may be more equitable in the distribution of health care utilization. The study also suggested that the reform led to a strong substitution effect of outpatient care for inpatient care, and consistent reduced utilization of various services, both contributing to the identified cost savings for the experimental insurance model.

Due to data limitations, several major issues still remain to be addressed in future research. First, the present study was conducted using 1994 and 1995 data. Therefore, it was unable to document the experimental plan's continuum of containing total health costs in a longer period. This limitation can be minimized when subsequent survey data for 1996 and 1997 become available in our future research. Another limitation of the study is the lack of information on changes in population-based health outcomes. From a societal standpoint, whether a system is superior to another will ultimately depend upon which system achieves better outcomes with given inputs or costs. In the West, the general consensus defines population health outcomes far beyond utilization measures and conventional clinical markers (Eddy, 1994; Wilson and Cleary, 1995). Life years and health-related quality of life gained, for example, become the major components of health outcome measures (Weinstein and Stason, 1977; Kaplan, 1993; Torrance et al., 1996). Therefore, a more comprehensive study design that contains well-defined population health outcomes should be a major priority in assessing and directing the future health care reform in China.

Notes

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2. Editorial correspondence: Prof. Gordon Liu, Ph. D., University of Southern California, Dept. of Pharmaceutical Economics & Policy, 1540 E. Alcazar St., room 140, Los Angeles, CA 90089. Email: GLIU@USC.EDU; Renhua Cai is the director of China Health Economics Institute; Zhongyun Zhao, Ph. D., is from Merck-Medco Managed Care; Peter Yuen, Ph. D., is a professor of health care management at Hong Kong Polytechnic University; Xianjun Xiong is from the China Ministry of Labor and Social Security; Schumarry Chao, MD., MBA, is a professor of medicine at University of Southern California; and Boqing Wang, Ph. D., is a senior economist at the Washington State Department of Social and Health Services.

3. A series of studies using follow-up data are being investigated.

4. The SSM estimates and sample selection bias tests are available upon request.

5. A complete description of the TPM estimates for other variables are available upon request.

6. The marginal probability is computed by $\partial E(Y)/\partial X_i=\Lambda(\beta X)\{1-\Lambda(\beta X\}\beta_i$, where $\Lambda(\cdot)$ denotes the logistic cumulative distribution function (Greene 1990).

7. The conditional expenditure function refers to a semi-log regression model (Y) pertaining to users only. The function gives an estimate of % change in Y in response to a unit change in a particular explanatory variable x.

8. The unconditional expenditure function is obtained by incorporating the probability function (P) into the conditional expenditure function (Y). It is used to estimate the combined percentage change in P and Y in response to one unit change in x, holding all other variables constant at the mean level.

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