

The effects of increased market competition on hospital services in Shandong and Henan Provinces

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Abstract

The Chinese government began a major reform of the hospital sector in the early 1980s. The main aim was to increase productivity by phasing out prospective global budgets from the government, and encouraging between-hospital competition for the business of user-pay and insured patients. This goal was to be achieved without unreasonable prejudice to the financial sustainability of hospitals or to the fairness of access and service provision.

We explored the effects of these changes by analysing data for four levels of hospital in two of the most populous provinces between 1985 and 1999. We used data envelope analysis, and found that the majority of hospitals experienced a decline in productivity. Social efficiency (measured by the level of provision of unnecessary services) also declined, especially in the largest hospitals that could easily increase the use of expensive technologies. Most hospitals increased their economic sustainability, measured as the ratio between revenue and expenditures. However, the lowest-level hospitals experienced stable or reduced sustainability due to their inability to compete with marketing by higher-level hospitals.

We conclude that, although there were many benefits, the overall impact of the introduction of market forces may have been negative. An important factor was that not all aspects (such as supplier-induced demand) were adequately controlled by government agencies. We suggest ways of alleviating the most problematic elements of current arrangements.

The context

After the communist government was established in 1949, China was very successful in achieving good health at a low cost, mostly through government-funded and delivered national programs for health promotion and illness prevention. However, curative services were relatively weak, and there were few incentives for innovation.

This was one of the reasons for institution of the 'socialist market economy' (SME) reforms after 1982, but the main motives for change were outside the health sector. Indeed, the SME reforms were designed and implemented without detailed consideration being given to some of the possible effects on health, education, and community services in general.

One consequence of the SME reforms in the health care sector was recovery of some parts of the private sector. For example, there was a large increase in private participation in the pharmaceuticals, medical equipment, and other technology-driven components of the health sector. However, the growth of the private hospital sector was much slower – mainly because of continuing financial advantages of public hospitals, and constraints on private practice for doctors employed in public hospitals. In 1999, the government announced that many public hospitals would be allowed to separate their activities into for-profit and not-for-profit components, but the effects of this change were too recent to permit measurement in the study reported here.

At the time of writing, the large majority of Chinese hospitals continue to be owned and operated by various levels of government. In 1999, there were 67,000 government hospitals at and above township level. They contained about 3 million beds and employed 5 million personnel, of whom 2 million were doctors (Ministry of Health 1999, Ministry of Health 2000).

Health care financing has always involved a high level of user-pay. During the planned economy period (from 1949 to 1982), the government increased its contribution to health care in real terms. However, only the essential primary care services were entirely free of charge. Many other services were government-supported, but copayments were usually quite high. Social insurance schemes made a contribution, but they were typically limited in terms of covered services and restricted to particular groups (such as government employees). China has never had a unified national health insurance scheme, and has never had the desire to reduce user-pay to the levels that have applied in most other countries of similar wealth.

In the planned economy period, government hospitals were provided with annual budgets that were based largely on expenditure history and population-based indicators. The most common approach involved three steps. The service population was defined, and used to calculate the required numbers of staff by category. These were used in turn to calculate the budget, while taking account of actual income and expenditure in the previous year (Ministry of Finance 1979).

Hospitals were allowed (and expected) to generate additional revenue from patients with health insurance, and from user charges. Hospital charges were unbundled – that is, applied to individual items of service such as inpatient days, pathology tests, and drugs. Charging rates were, however, tightly controlled by the government and typically set below cost (Liu, Chen & Dong, 1998). Where additional revenues from insurance and user-pay were insufficient to balance the accounts, the government would provide supplementary grants.

Low levels of productivity can be anticipated from these arrangements, and this was the reality throughout most of the Chinese hospital sector. In particular, cost containment was discouraged by linking budgets to the number of staff, allowing hospitals to obtain more revenue from insured or user-pay patients by providing additional services, and promising to take back unspent funds at the end of the year or make up any operating deficits.

Under the SME reforms, the dominant changes were the progressive removal of government budgets, and giving hospitals greater freedom to charge insured and user-pay patients. Hospital services that had previously been provided free or at heavily subsidised prices now attracted significant charges. Most hospitals had no choice but to attempt to increase the number of episodes and the average charges per episode.

Governments made it clear that, in due course, operating deficits would be the responsibility of hospitals, and that surpluses could be retained for use as hospital managers desired. In practice, governments have continued to intervene in both circumstances – albeit to a reduced degree (Ministry of Health 1990).

The government's expectation was that the increased financial pressure and associated competition between hospitals would cause improvements in efficiency, quality of care, and customer service. This clearly happened, but to varying degrees across hospitals. The larger hospitals in urban areas seemed to respond the best. However, the causes were unclear. One confounding factor was that the SME reforms were associated with a rapid increase in demands for health care from an increasingly prosperous urban population.

The government anticipated that there would be small increase in user-pay overall, and that the loss of government grants would be more than compensated by an increase in social health insurance. Indeed, after 1982 the government worked hard to increase the membership and the range of services covered by insurance – and was the sponsor and operator of most schemes (Hindle 2000). Official statistics show that government spending on social health insurance increased by nearly 20% per annum between 1984 and 1990.

However, the main change was that of increased user-pay. Its share of total health expenditure increased from 23% to 54% between 1980 and 1996.

Many refinements of detail have been made since 1982, mostly in response to worrying trends. For example, it was common in the early years to attribute blame for problems of budget management or poor customer relations to weaknesses of hospital administration – and therefore a variety of training programs and procedural manuals were developed. Rules for the prescribing of drugs were progressively tightened in response to concerns about excessive use (especially of highly priced and consequently more profitable branded items). Some success has been achieved since about 1995, but many problems remain (Hao & Zhang 2001). Similar constraints were legislated over the acquisition and use of high-technology equipment such as MRIs and CT scanners.

Other reforms concerned the broader context within which hospitals operated. For example, the 1996 National Health Conference introduced and obtained endorsement for the strengthening of regional planning – with such aims as encouraging rejuvenation of referral systems, reduction of unnecessary duplication of services, and establishment of care provider networks.

One of the main reasons for concern was the negative impact of the SME reforms on community health services. The government had initially believed that the reforms needed to be directed mainly at the hospital sector. It was argued that improvements in the cost-effectiveness of hospitals (which were consuming by far the largest share of government funding for health) were a pre-requisite to further progress in community health services.

Although not covered in the research reported here, the effects of the SME reforms on community health services appear to have been largely destructive. The most important factor was that hospitals were better able to market their services, and they consequently were able to attract both patients and money from non-hospital services providers. Unfortunately, they were not able to generate the anticipated surpluses that could be used to finance additional spending in community health.

In recent years, the government has been attempting to upgrade community health services, but serious difficulties have been experienced. The main constraint is that the community at large has lost its trust in the quality of the services, and continues to travel further and pay more for what it believes are better services in the hospitals. There has been a downward spiral: fewer patients meant less money, and this led to a loss of the best doctors and nurses. In turn, this led to further reductions in quality of care (and patients' perceptions of quality), and consequently to further losses of business.

Our study arose out of a concern that the effects of the SME reforms had not been adequately evaluated. Although many studies had been undertaken, they had tended for the most part to address only a subset of effects – such as prices or accessibility. Moreover, some of the published evaluations presented findings that seemed implausible.

Method of study

We selected the two largest Chinese provinces, Shandong and Henan, for the analysis. The selection was purposeful but is probably adequate because they have a total population approaching 200 million and differ in economic prosperity and rate of development. Stratified cluster sampling was used for the most part to select 24 hospitals in Shandong and 21 in Henan, distributed among four levels of government – province, city, county, and township.

For every hospital in the sample, we obtained data on the full range of their activities from their annual statistical returns to provincial health authorities for alternate years between 1985 and 1999. The variables concerned the number of employees by type, the value of capital assets (buildings and equipment), patient care activities (inpatient and outpatient), and income and expenditure by source.

Two inpatient case types were then selected for detailed study: acute appendicitis without major complicating factors and normal childbirth without significant risk factors. There were no available data or reliable statistics on appropriateness of services, and there was consequently no alternative to the examination of the hospital records of individual patients. We chose two high-volume case types for which

- there was a reasonable basis for judging appropriate care
- views on appropriate care had changed little over the study period

there would be differences in terms of the use of diagnostic and treatment services (since one case type was mainly associated with urgent admission for surgery, whereas the other was typically non-urgent and required predominantly medical and nursing care).

For each of two years, 1987 and 1999, a simple random sample of inpatient records was selected and the case notes retrieved for further analysis. 2185 records were selected from hospitals in Shandong (1013 acute appendicitis and 1172 normal childbirth). 1965 records were selected from hospitals in Henan (963 acute appendicitis and 1002 normal childbirth). The aim was to obtain records from hospitals at each of the four levels of government. In the event, data were unavailable from township hospitals for normal childbirth in Henan, and from township hospitals for acute appendicitis in both provinces.

The case notes were used to obtain patient-specific data on sociodemographic attributes (age, gender, location, occupation, health insurance status, etc) and clinical attributes (diagnosis, length of stay, and service consumption by type – medical consultations, equipment use, drugs, and pathology tests).

The opportunity was taken to conduct an opinions survey of health sector employees, both clinical and non-clinical. The results of this survey are not reported here, because they are the subject of a separate report.

Measures of performance

Three measures of performance were defined: productivity, hospital financial sustainability, and social efficiency. An aggregate measure across these three dimensions was then computed, which we have termed the hospital efficiency performance index.

Productivity was measured by use of data envelopment analysis (DEA). This is a linear programming method that has been developed specifically for analysis of organisations with multiple inputs and outputs (Jacobs 2001; Thanassoulis & Emrouznejad 1998). In this study, input variables were number of health workers, the value of capital assets, and number of inpatient beds. The output variables were number of outpatient visits and number of inpatient days of stay. The DEA score used in this study is an index value ranging from 0 to 100 (where the higher the score, the higher is the level of efficiency).

The output data needed to be casemix-adjusted across hospital level, in order to reflect the tendency for more complicated and costly services to be provided at higher levels of referral. Unfortunately, no adequate data were available. While there were some potentially useful statistics on admissions by diagnostic and procedure categories, they were not available across all hospital levels for a sufficient number of years. We therefore had no option but to extrapolate from the existing data by use of the group judgements of a panel of clinical and financial experts. A modified Delphi technique was used to derive cost relativities of 1.0, 2.5, 3.0, and 4.0 for the township, county, city, and provincial hospitals respectively.

Sustainability was defined in this study as the hospitals' ability to recover costs, meaning the service revenue as a percentage of cost.

Over the period under study, changes were made in the range of costs for which the hospitals were responsible. It was therefore determined that sustainability should be measured in two ways. The first only took account of recurrent costs. The second included capital costs, where depreciation rates were standardised using criteria published by the Ministry of Health.

We defined social efficiency as the existence and extent of unnecessary service provision and hence expenditure by payers. Unnecessary services can be measured in various ways (Liu & Mills 1999). In this study, we chose to measure it by having a panel of experienced doctors review the sampled inpatient records in order to identify unnecessary days of stay, drugs, diagnostic tests and other services against guidelines for appropriate care (Xu, Wang, Liu & Sun 2001).

The costs of the unnecessary services were then calculated by use of various data sources. The most important was the list of year 2000 fees issued by the Shandong provincial government (Shandong Bureau of Pricing 2000).

Finally, we defined an aggregate measure of performance as a weighted sum of the scores on the three dimensions described above. The weights were determined by combining the subjective judgements of a panel

of health economics and hospital management experts. In the event, they weighted productivity, hospital financial sustainability, and social efficiency in the ratios of 0.25, 0.25, and 0.50 respectively.

This aggregate measure is of limited usefulness at best. However, we were advised by various insurance and hospital sector managers that they would find it helpful.

Results

As a preliminary to statistical analysis, we compiled an annotated review of changes in health policy and hospital financing arrangements since 1980. In general, the most important changes were the progressive reduction of government funding, increased reliance of hospitals on direct patient billing (both insured and uninsured), decentralisation of responsibilities from the central to the provincial and lower levels of government, and increased autonomy of hospital management (including staffing levels and mix).

The increased autonomy of hospitals led them to apply a wide range of strategies to find replacement revenue, as direct government contributions were progressively reduced. They included attempts to increase volumes and the directing of patients towards high-profit services, as well as the use of more efficient processes of care.

Selected attributes of the sampled hospitals

Figure 1 shows a few statistics for the hospitals in the sample. The number of health professionals increased at an annual rate of 3% between 1987 and 1999. Doctors and nurses had similar rates of increase. The ratio of doctors to nurses was 1 to 0.5 in township hospitals, and around 1 to 1.15 in all other hospital categories.

Although not shown in Figure 1, our study found that capital inputs in all types of hospitals increased. In township hospitals, the monetary value of fixed assets increased 5.5 times between 1987 and 1999. The equivalent statistics were 10.4 times in county hospitals, 11.5 times in city hospitals, and 6.7 times in provincial hospitals. Both buildings and medical equipment were greatly expanded.

During these periods of rapid expansion in workforce and capital assets, the numbers of outpatient visits changed little, and actually decreased in township and county hospitals. In township hospitals, both outpatient visits and hospital bed-days decreased. In city and provincial hospitals, the number of outpatient visits slightly increased and number of hospital bed-days increased at an annual rate of 1.5 % from 1987 to 1999. In all hospitals, the numbers of hospital admissions increased.

In general, there was a trend away from community care and hospital outpatient care, and towards inpatient care. These statistics also illustrate the general trend towards higher-level hospitals.

Figure 1: Mean values per hospital, selected attributes of the sampled hospitals

Hospital category	Year 1987	1991	1995	1999
<i>Township hospitals</i>				
Number of staff	47	59	70	76
Number of doctors	18	23	28	31
Number of nurses	10	13	16	17
Number of hospital beds	48	52	50	50
Number of outpatient visits	51722	53226	53299	45042
Number of inpatients	998	1232	1066	1269
ALOS (days)	8.68	7.61	7.31	5.56
Bed occupancy rate (%)	49	38	36	41
<i>County hospitals</i>				
Number of staff	368	453	488	532
Number of doctors	108	136	152	163
Number of nurses	128	157	164	182
Number of hospital beds	261	308	350	378
Number of outpatient visits	188967	175167	141511	153925
Number of inpatients	5621	6450	6427	12183
ALOS (days)	15.67	16.29	15.78	10.61
Bed occupancy rate (%)	88	84	68	68
<i>City hospitals</i>				
Number of staff	669	729	828	929
Number of doctors	191	213	251	288
Number of nurses	213	243	281	330
Number of hospital beds	435	486	589	669
Number of outpatient visits	296230	312536	251880	305708
Number of bed-days	156952	173718	186648	193641
Number of inpatients	7959	8237	9043	12501
ALOS (days)	19.72	21.09	20.64	15.49
Bed occupancy rate (%)	96	95	86	78
<i>Provincial hospitals</i>				
Number of staff	1605	1621	1666	1773
Number of doctors	438	458	511	534
Number of nurses	502	493	559	648
Number of hospital beds	815	885	995	1028
Number of outpatient visits	718139	821383	719979	890200
Number of bed-days	278651	303672	322751	326836
Number of inpatients	11949	12690	15289	22024
ALOS (days)	23.32	23.93	21.11	14.84
Bed occupancy rate (%)	94	94	88	86

Hospital productivity:

We found that hospital productivity had declined for most hospital categories and periods between 1987 and 1999, regardless of the metrics that we used. We had anticipated that some degree of loss of productivity would be evident, but were surprised at the degree of decline and the large number of hospitals that had been affected.

Figure 2 shows that the number of outpatient visits per doctor fell by more than 5.5% per year in township hospitals. Similar falls occurred in county and city hospitals. However, outpatient productivity was relatively stable in provincial hospitals.

Figure 2: Productivity by hospital category and year

Hospital category and statistic	Year				Annual rate of change (%)
	1987	1991	1995	1999	
Township hospitals					
Outpatient visits per doctor	2873	2314	1904	1453	-5.52
Hospital bed-days per doctor	481	408	278	228	-6.03
Activity equivalents per doctor (visits)	4077	3333	2599	2022	-5.68
County hospitals					
Outpatient visits per doctor	1750	1288	931	944	-5.01
Hospital bed-days per doctor	816	773	667	793	-0.24
Activity equivalents per doctor (visits)	3789	3220	2599	2927	-2.13
City hospitals					
Outpatient visits per doctor	1551	1467	1004	1062	-3.11
Hospital bed-days per doctor	822	816	744	673	-1.65
Activity equivalents per doctor (visits)	3605	3506	2863	2743	-2.25
Provincial hospitals					
Outpatient visits per doctor	1640	1793	1409	1667	0.14
Hospital bed-days per doctor	636	663	632	612	-0.32
Activity equivalents per doctor (visits)	3230	3451	2988	3197	-0.08

A similar pattern was present for inpatient days of stay. Even the provincial hospitals experienced a decline in productivity. Also shown in Figure 2 is the weighted sum of outpatient and inpatient activity per doctor. The trends in this statistic are much the same.

Without casemix adjustment, the DEA scores declined in all hospital categories between 1987 and 1999. However, as might be expected, adjustments for casemix improved the relative performance of the higher categories of hospitals. Figure 3 shows that, after casemix adjustment, the patterns for township, county, and city hospitals were similar: all three categories experienced a decline in relative efficiency. No results are shown in Figure 3 for provincial hospitals. The results were unreliable, which might have been expected, given the small sample (only three hospitals).

However, we note in passing that analyses of a larger sample showed that the DEA score for provincial hospitals declined from 1987 to 1995, but then increased significantly after then. Overall, there was an increase of 5% in the provincial hospital's DEA score from 1987 to 1999.

Figure 3: DEA productivity scores by hospital category and year (after casemix adjustment)

Hospital category	Year			
	1987	1991	1995	1999
Township	62.81	54.27	48.71	47.28
County	92.52	77.98	63.40	61.68
City	83.85	79.94	67.56	62.51
Provincial	*	*	*	*

* Unreliable results due to small number of observations

The results from Figures 2 and 3 appear to indicate that the downward trends in productivity affected all hospital categories to similar degrees. However, legislative and other changes after 1990 that were intended to increase efficiency (such as the greater controls over drugs prescribing) affected provincial hospitals much more rapidly. This might be expected, given that they are more able to be monitored, are supervised by more experienced and qualified government officials, and have a larger and more flexible infrastructure. Possibly of particular importance, provincial hospitals had fewer constraints to adjustment of number of employees in accordance with patient care activity levels.

Also not shown in this paper are the large increases that occurred in the average charges for outpatient and inpatient episodes in all categories of hospital. Both service settings experienced increases in charges of over 10% per annum in township hospitals. Even larger increases were experienced in the other three categories of hospitals.

The patterns of lost productivity were present in all hospital categories, with or without adjustments for casemix. They were also largely insensitive to adjustments to take account of the different mixes of staff and levels of capital investment.

The main underlying causes are unclear. However, factors that were probably relevant include the following:

- a declining rate of growth in hospital occasions of service (admissions and outpatient clinic attendances) partly as a consequence of increased user-pay
- a relative decline in the rate of growth of unit prices
- increased levels of service per episode of care (outpatient visits and inpatient episodes):
- failure to control the number of hospital staff, in line with the changes in service levels
- increased investment in expensive technology that could not always be fully utilised.

Social efficiency:

Social efficiency (as measured by the level of unnecessary service provision) decreased in all categories of hospitals, and for both of the selected case types. The decline was larger for appendicectomies than that for normal childbirth. This is probably a consequence of the greater opportunities to apply higher technology, and a greater degree of uncertainty among patients with regard to their expectations of care.

Figures 4 and 5 show the changes in social efficiency for the two selected case types. Unnecessary expenditures for both acute appendicitis and normal childbirth increased relative to total expenditures, and this led to decreases in the index values for social efficiency.

Figure 4: Social efficiency analysis for acute appendicitis

Hospital category	Year	No. of cases	Total cost per case (Y)	Total unnecessary cost per case (Y)	Social efficiency	Annual rate of change (%)
Township hospitals	1987	—				
	1999	281	384.3	103.5	0.7307	—
County hospitals	1987	289	317.7	67.3	0.7882	
	1999	349	615.7	294.1	0.5223	-3.37
City hospitals	1987	406	345.4	70.3	0.7965	
	1999	425	689.9	258.9	0.6247	-2.00
Provincial hospitals	1987	113	342.3	62.3	0.8180	
	1999	113	1162.9	720.3	0.3806	-6.18

(Y) = Yuan. Aus\$1 = 4.1 Yuan.

For acute appendicitis cases, the decrease in social efficiency was most marked in the provincial hospitals. Provincial hospitals also lost the most social efficiency for normal childbirth, but the losses were much smaller than for acute appendicitis.

Although not shown here, the main change was in the unnecessary use of drugs. For the acute appendicitis cases, social efficiency in drugs use decreased by 0.41, 0.31, and 0.54 in county, city, and provincial hospitals respectively. For normal childbirth, drugs were the major cause of the falls in social efficiency.

Significant contributions to lost social efficiency were made by those services making use of high-technology equipment. These losses applied to both case types.

Average lengths of stay (ALOS) for acute appendicitis fell for all three hospital categories for which there were data. For county hospitals, they decreased from 9.8 in 1987 to 7 days in 1999. For city hospitals, they fell from 9.2 to 7.6 days, and for provincial hospitals they fell from 8.3 to 6.8 days. ALOS for normal childbirth declined marginally in the township, county, and provincial hospitals. They increased in city hospitals, from 3.8 days in 1987 to 4.9 days in 1999.

Figure 5: Social efficiency analysis for normal delivery

Hospital category	Year	No. of cases	Total cost per case (Y)	Total unnecessary cost per case (Y)	Social efficiency	Annual rate of change (%)
Township hospitals	1987	68	193.5	7.0	0.9639	
	1999	316	218.5	4.6	0.9790	+0.13
County hospitals	1987	285	289.6	17.4	0.9400	
	1999	455	355.7	49.5	0.8608	-0.73
City hospitals	1987	357	277.8	12.9	0.9536	
	1999	454	438.3	54.8	0.8750	-0.71
Provincial hospitals	1987	122	310.3	13.8	0.9555	
	1999	117	480.0	66.4	0.8617	-0.86

(Y) = Yuan. Aus\$1 = 4.1 Yuan.

The greater losses in the provincial hospitals probably reflect their greater opportunities to use expensive technologies including drugs and diagnostic equipment. It is also likely to be a consequence of the higher proportion of insured patients in the major urban areas. Many studies have shown that supplier-induced demand depends on ability to pay, and especially on the level of insurance cover where insurers are not able (for whatever reason) to control utilisation rates.

Sustainability:

Figure 6 shows trends in financial sustainability. From 1987 to 1999, township hospitals showed decreasing sustainability while other types of hospitals showed increasing sustainability. This was the case for both indicators – total cost recovery rate (TCRR) and variable cost recovery rate (VCRR).

Figure 6: Trends in financial sustainability by hospital category

Hospital category	Statistic	1987	1991	1995	1999
Township hospitals	VCRR	0.83	0.91	0.78	0.76
	TCRR	0.75	0.83	0.71	0.67
County hospitals	VCRR	0.59	0.77	0.75	0.88
	TCRR	0.51	0.68	0.67	0.77
City hospitals	VCRR	0.43	0.79	0.81	0.85
	TCRR	0.37	0.69	0.73	0.74
Provincial hospitals	VCRR	0.54	0.63	0.76	0.85
	TCRR	0.44	0.55	0.70	0.79

The decline in sustainability in the township hospitals is presumably a reflection of the greater financial difficulties as a consequence of

- lower incomes of their service population
- the lower levels of skill of their staff, and their consequent difficulties in competing with the higher level hospitals due to perceived lower quality of care
- their overall inability to market their services, and a consequent loss of patient volumes and associated revenue.

We found that the township hospitals became more financially dependent on government subsidies over the study period. In contrast, hospitals in the other categories experienced a reduction in the extent to which they derived revenues from government sources.

The hospital efficiency performance index:

We believe that the optimal financial condition for a well-operated hospital is where there is a reasonable balance between hospital productivity, sustainability, and social efficiency. The indices of relative hospital performance are reported in Figure 7.

Figure 7: Relative performance indices by hospital category and year

Indicators	Township hospitals		County hospitals		City hospitals		Provincial hospitals	
	1987	1999	1987	1999	1987	1999	1987	1999
Productivity	4077	2022	3789	2927	3605	2743	3230	3197
Productivity index	1.34	0.66	1.13	0.87	1.14	0.86	1.01	0.99
Sustainability	0.75	0.67	0.51	0.77	0.37	0.74	0.44	0.79
Social efficiency		0.73	0.79	0.52	0.80	0.63	0.82	0.38
RPI	-	0.70	0.81	0.67	0.78	0.69	0.77	0.64

Since this index is a composite of the three measures described above, it is to be expected that overall performance declined in all categories of hospitals over the study period. This was in fact the case. Compared to the index values in 1987, the RPI values had decreased in all types of hospitals by 1999.

Conclusions

We experienced difficulties in obtaining valid and comparable data. This was partly because of devolution of most of the responsibility for implementation of the reforms to lower levels of government, and to the hospitals themselves. This not only led to many variations in rules and methods of operation, but also to reduced comparability of information relevant to the reforms themselves. A good example is the fact that prices have been mandated by provincial and lower levels of government, and they have also been free to redefine hospital product classifications.

However, the patterns that are present in our results seem to be robust, and consistent with the underlying logic. They are also consistent with some of the recent evaluations by government agencies. With regard to financial sustainability, our results are similar in part to those presented in a recent report from the Ministry of Health (1999). Inter alia, it concluded there had been an average increase of 25% to 30% in real revenues of almost all hospitals at county level and above since the start of the SME reforms. This had been associated with an increase in the incomes of hospital employees above the national salaries and wages indices. These statistics are not as valid as the measures used in our study, but they are suggestive of the same trends.

With regard to internal efficiency, recent government statistics suggest there have been significant increases. The arguments are supported by data that show an increase in the number of outpatients and inpatients per doctor, and decreases in the waiting times for outpatient visits and for hospital admissions. However, unlike our analyses, official statistics make no attempt to adjust for casemix differences. Moreover, increases in outputs per unit of input must be adjusted for any changes in input prices.

Unfortunately, valid statistics on the way the reforms have affected social efficiency are notable for their absence. This may reflect difficulties of measurement: however, our approach should have been feasible in other studies – and indeed it should have been possible to use more valid and comprehensive measures than were possible in our study. There is reason to believe that, as in many other countries including Australia, the Chinese government has been more eager to point out how markets in health care benefit the advantaged than to note how they must inevitably harm the disadvantaged.

In spite of the limitations of our analyses, and difficulties in checking our results with those of other studies, some conclusions and recommendations may be made with a degree of certainty. The most important are listed below.

Inappropriate incentives in hospital payment methods

Hospitals have been paid in ways that do little to encourage efficiency and cost-effectiveness. For example, government funding in proportion to number of staff encourages employment but not productivity, and itemised billing encourages the overprovision of services during each inpatient episode (Zhao 1998).

We believe that there should be a change towards output-based funding from capped overall budgets. For example, global expenditure ceilings could be defined for each hospital in proportion to expected production levels, and there could be a change to per case payment (that is, predetermined payment amounts for complete episodes of care, without regard to actual inputs such as number of tests or length of stay). Other factors should be taken into account in due course, including rewards for high quality of care and good health outcomes.

Weaknesses in workforce planning and management

The financing mechanisms did little to ensure that the right numbers of staff were available. The best-qualified staff were encouraged to move to the higher-level hospitals, while the status and financial rewards of staff in lower-level hospitals and in the community deteriorated. Staff were encouraged to work in high-technology areas, simply because they offered greater potential for profits.

Changes in staffing levels and mix did not always occur as rapidly as possible. One factor was that government agencies were slow to give sufficient freedom to hospital managers. Even when there were no external constraints, some hospitals (and particularly those in small communities) were reluctant to dismiss long-serving employees because of concerns for a lack of alternative employment.

Governments are beginning to address these problems. For example, more attention is now being paid to retraining and facilitation of redeployment. However, much remains to be done. It was wrongly assumed that competition in the marketplace would provide the right processes by themselves.

Poor control of high-cost technologies and capital assets

In the early years of the SME reforms, it was assumed that capital investments would generally be beneficial – and to some extent this was the case. However, governments were slow to see the dangers. A combination of factors led to unsound investments, especially in high-technology services. One was that the government pricing authorities tended to make the error of setting prices for new services on the basis of early cost experience – typically characterised by high purchase prices, low volumes and inefficient operation. By the time a steady-state cost had been determined, the initial high levels of profit had caused too many hospitals to make the investment. The duplication of services was made worse by the belief of hospital managers that they needed high-technology services for marketing purposes, regardless of the level of profitability of the services themselves.

If hospitals were paid on an output basis from capped budgets, many of the current problems of inappropriate use of high-cost technologies and unsound capital investments would be alleviated. However, governments need to retain some degree of control at a strategic level. For example, they should define ceilings in the capacity of some kinds of expensive technologies, and require hospitals to obtain approval for capacity changes.

Failure to appreciate that patients needed help with their purchasing decisions

A fundamental problem is that competition between hospitals is largely based on formal and informal marketing direct to potential patients. In other words, patients make their own decisions regarding the selection of care providers, and there are few formal and easily available sources of advice.

Government agencies and health insurers need to become more active in this regard. For example, they should be instituting annual competitive contracting processes whereby hospitals that are successful will be more likely to be chosen by individual patients as a consequence of both advice and financial incentives – such as reduced insurance copayments where patients select recommended or selectively contracted hospitals.

Inefficient insurance schemes

The separation of government-sponsored and operated insurance schemes by type of person (government-employed, privately employed, unemployed, etc) and geographical area (by province, city, urban, and rural) has reduced the effectiveness of purchasing as well as added to administrative expenses. Moreover, too many people are uninsured or under-insured and must rely on their own judgements with respect to health care purchasing.

The best approach is to maximise the degree to which people are insured (and thereby minimise the level of user-pay for uninsured services and copayment for insured services), and to ensure all insurance schemes are tightly regulated by government agencies. In terms of efficiency, a single government-owned and operated health insurance system is to be preferred.

There may be other considerations that lead to a degree of devolution of insurance scheme operation to local authorities or to non-government agencies. If this is the case, the central government needs to ensure that operations of devolved schemes are consistent with the overall community interest.

Delays in developing cost-effective clinical practice

It is clear that clinicians had neither the knowledge nor the inclination to provide cost-effective care. In a related study, we have reported that, although some useful clinical guidelines had been made available from time to time, they were hardly ever used. Hospital managers were more interested in stimulating doctors to generate admissions and services than in encouraging or controlling resource use.

Many of the existing guidelines are out of date, and hardly any have the essential attributes of clinical pathways. The weaknesses are beginning to be addressed on a pilot basis.

However, we believe there will be relatively little benefit in demonstrating cost-effective methods of care unless hospitals (and subsequently doctors) have financial incentives for hospitals to put the information into practice. This can be done in a variety of ways, such as paying higher rates for care that is in accordance with good clinical pathways, or even making adherence to good pathways a condition of licensing, accreditation, or annual contracting. We have suggested to various government insurers that several forms of incentives should be used in combination.

The destruction of cost-effective referral systems

The relatively effective referral systems that had existed for many years broke down almost immediately after the new rules for competition were introduced. Hospitals at the lowest level lost most of the patients that were potentially profitable (Chen & Zhang, 2001). These patients went to the highest level of hospital that they could afford, and were then provided with much more expensive care than they needed. As the competition between the higher-level hospitals became more intense, under-utilisation of expensive capital equipment meant that few of them could operate in a profitable way.

More needs to be done to establish a formal referral system, whereby lower-level and more easily accessible hospitals are used when the more specialised care at higher levels is unnecessary. Care providers in lower-level hospitals need to be upskilled, and given more responsibility and authority with respect to upward referrals. Community care providers, and especially GPs, need to be given a formal role in referral.

Summary

It seems that the introduction of greater competition into the public hospital sector in a relatively uncontrolled manner was the main cause of reduced performance in almost every hospital in the sample, and of a significant decline in performance overall. Competition would not always have these kinds of adverse effects. However, one might reasonably conclude that, over the period under study, the market was particularly ineffective in three respects.

First, purchasers (and particularly individual patients) have not been able adequately to judge whether the services being provided were cost-effective. The Chinese government failed to take adequate account of a basic idea in health care as a market commodity – that of information asymmetry.

Second, there were largely ineffectual controls over some types of supplier-induced demand. Lack of an informed patient does not, by itself, do serious harm to the cost-effectiveness of health care if the suppliers have a strong interest in cost-effectiveness.

Third, an increased reliance on user-pay (and hence reduced levels of social pooling) meant there was a reduction in the correlation between need for care and receipt of health services. User-pay is always likely to

lead to reduced cost-effectiveness, since factors other than need will affect resource allocation. In combination with poor sources of advice and positive incentives for supplier-induced demand, user-pay can have disastrous effects.

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