

Model Construction, Model Application - Resolving the scope *versus* depth dilemma over the coverage of catastrophic and high- frequency events

DOI: 10.3395/inciis.v2i1.125en



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Abstract

This paper puts forth a new financing standard calculation model for the new cooperative medical schemes (NCMS). The chief aim of this new model analyzes the dynamic relationship between NCMS financing standards, reimbursement proportion, disease coverage, and the NCMS reimbursement mode.

Keywords

New cooperative medical schemes, reimbursement, calculation model

Discussions about a reimbursement calculation model for the New Cooperative Medical Schemes (NCMS) take place during a period of recent, unprecedented Government attention to the challenges of the rural health sector in P.R. China. The October 2002 document of the Central Committee and the State Council, "Decision on Further Strengthening Rural Health Work," provides the foundation for the Government's efforts to strengthen rural health services. This and other Government documents set out a number of well-documented challenges that need to be addressed if Government objectives to improve quality and increase access to health services for the rural population are to be

achieved. These policy documents also set out the broad lines of a policy response, including the development of new financing mechanisms in rural areas (NCMS, the Medical Assistance Scheme - MA, and the Basic Medical Insurance Program - BMI), and general proposals for addressing cost escalation and inefficiencies in service delivery. These determined Government efforts are an essential step in meeting China's rural health challenges. Nonetheless, significant challenges remain if the Government is to achieve its objectives for improving the quality of, and access to, rural health services. While the new Government financial resources for rural health are a necessary condition for improvements, the Government

is aware that a number of institutional and management constraints need to be addressed in order to ensure that available resources have the greatest possible impact on health outcomes. These constraints arise in two broad areas: health financing and service delivery. It may be useful to note that many middle income countries (in Central and Eastern Europe, Latin-America, and Asia) are facing similar challenges and developing policies to address them. Therefore, this model and some of these experiences may be applicable not only for use in the Chinese context, but also in others.

In terms of health service delivery, the Government has recently mobilized a significant amount of resources to support the rural health service delivery system. These new resources are a response to commitments made in the 9th and 10th 5-year plans, as well as health system weaknesses that became apparent during the SARS outbreak. Substantial investments in infrastructure, equipment, and capacity development have already been undertaken, and further commitments have been made for the 11th 5-year plan. This injection of resources – targeted primarily towards public health institutions, county hospitals, and township health centers – will result in an important upgrading of both facilities and human resources.

In the area of health financing, the NCMS and the MA schemes are important innovations. They represent a shift away from supply-side towards demand-side financing, and provide new opportunities not only to increase Government support for health to the rural population, but also to improve the accountability and performance of health care providers.

This paper studies the reimbursement calculation model for the New Cooperative Medical Schemes in order to resolve the scope vs. depth dilemma over coverage of catastrophic and high-frequency events, so that this program can effectively assist the Government in addressing this challenge.

Since 2003, according to government documents (CHINA STATE COUNCIL, 2003; 2004) pilot NCMS projects have now been implemented all over China. However, the schemes are new, and face considerable challenges. In part, these challenges relate to how the schemes are designed and administered. Important design challenges include resource mobilization (e.g. ensuring an appropriate level of financing, relative contributions by individuals and different levels of government, and targeting of public subsidies), design of a benefits package commensurate with financing (e.g. actuarial soundness, balance between coverage of catastrophic and high-frequency events, scope vs. depth), and the participation regime (dealing with adverse selection in NCMS; eligibility criteria in MA). There are also challenges to the NCMS and MA programs with respect to administrative and management arrangements.

For the last three years, the implementation of schemes has been modified to some degree to resolve conflicts between the width and the depth of benefits. At present, however, one of the most debated topics is

how to determine an appropriate model for NCMS: to continue to use the existing public medical care model, to use the lower benefit model of the urban employee health insurance system, or to explore a new model that is suitable for the special characteristics of the agriculture population (WANG, 2006).

NCMS was initially created as “a medical cooperative scheme mainly for treatment of major illnesses for the agricultural population” (CHINA STATE COUNCIL, 2003; 2004). However, there are different viewpoints on how to define “major illnesses” in different departments and different fields. For example, the urban health insurance system run by the Ministry of Labor and Social Security, defines some special illnesses as major illness. Also, there are different viewpoints within the health system itself. Some scholars argue that “major illnesses” are the diseases whose treatment cost is more than a government set maximum limit, which is usually four times the average local salary” (ZHAO LIN-HAI et al., 2006), while other scholars define “minor illnesses” as illnesses with short incidence time and short recovery time, while the opposite is defined as major illnesses (CONG SHU-HAI, 2006). Furthermore, some health administrators think that the difference between major illnesses and minor illnesses is whether patients receive in-patient care or not. However, agriculture population survey data indicates that agriculture populations themselves define “major illness” and “minor illness” using multiple standards including disease course, payment, the need to be hospitalized, and disease development to different degrees. In brief, there are many ways to define major illness, and these definitions have an impact on how financing standards are calculated. Therefore, there is a great need for administrators to have a standard calculation model that not only defines major disease according to economic impact, but also brings into play other aspects of disease important to health security in an intuitive, reasonable, dynamic, and simple way. This paper sets forth to design such a calculation model for NCMS, which mainly aims to analyze the dynamic relationship between the NCMS financing standard, reimbursement proportion, disease coverage, and the NCMS reimbursement model.

Model construction

1. Obtain the total agriculture population of the area (F).
2. Obtain the most frequent occurring diseases (D) and their prevalence rate (P) of the area, which can be obtained either from the Department of Disease Surveillance or by evaluating the demand for medical treatment.
3. Obtain the types of diseases, number of cases, and the medical payment of these diseases from hospitals at all levels in the area, and calculate the total cost of each disease (C).

The model data of a hypothetical area is listed below in Table 1 as an example to help explain the construction of the model with simulated data in Table 2.

Table 1 - The calculation model for new cooperative medical schemes

Disease 1	Cost of each disease 2	Prevalence rate 3	Prevalence number of case 4=F×3	Total medical payment 5=2×4	Cumulative total medical payment 6=ΣX
D1	C6	P6	N6	X6	T6
D2	C5	P5	N5	X5	T5
D3	C4	P4	N4	X4	T4
D4	C3	P3	N3	X3	T3
D5	C2	P2	N2	X2	T2
D6	C1	P1	N1	X1	T1
...

First, obtain information on the disease situation in the area. This information can be obtained either by evaluating the demand for medical treatment in the area or by obtaining it from the Department of Disease Surveillance. For example, after evaluating the demand for medical treatment, we gather data that the most frequent illnesses in this hypothetical area are: cold, appendicitis, children’s pneumonia, hypertension, diabetes mellitus, heart disease, stomach cancer and liver cancer.

Second, the medical payment of each disease, can be calculated by gathering medical payment data from hospitals of all levels in the area. Here, we list these numbers in the second column of Table 1 *in descending order*. For example, in one year there are 2000 cases of cold cured at village-level treatment organizations in the area, and RMB 40,000 Yuan (unit of the Chinese currency) is paid in total. Similarly, there are 1000 cases cured at township-level hospitals at a cost of 36,000 Yuan. At district-level hospitals, 800 cases were cured at a cost of 32,000 Yuan. Finally, 500 cases were cured at the urban-level hospital at a cost of 30000 Yuan. From these costs, we calculate the average cost of curing one case of cold in this area: $C_1 = 40000 + 36000 + 32000 + 30000 \div 2000 + 1000 + 800 + 500 = 32.09$ Yuan. We then use this method to obtain each disease’s average treatment cost in this area: cold, 32.09 Yuan; appendicitis, 2,000 Yuan; children’s pneumonia, 4,500 Yuan; hypertension, 6400 Yuan; diabetes mellitus, 8,500 Yuan; heart disease, 10,600 Yuan; stomach cancer 35,000 Yuan; and liver cancer, 45,000 Yuan.

Third, list the prevalence rates of each disease in the area in the third column of Table 1. Prevalence rates of each disease can also be obtained by evaluating medical treatment demand in the area, or from the Department of Disease Surveillance. In this simulated example, the prevalence rates we obtained are listed in the third column of Table 2.

Fourth, according to the total agriculture population of the area, we calculate the number of cases for each disease, and list it in the fourth column of Table 1. If we suppose the total agriculture population of the area is 3,000,000, then we multiply the total agriculture population of the area by the prevalence rate for each disease in the area, and the result is the number of cases for each disease. We list the simulated results in the fourth column of Table 2.

Fifth, multiply the average cost by the case number of each disease to obtain the total medical payment of each disease in the area, and then list the results in the fifth column in Table 1.

Finally, according to the total medical payment of each disease in the area, calculate the cumulative total medical payment, and list the results in the sixth column in Table 1.

Through the procedure introduced above, we obtain the calculation model, shown as Table 2. To provide a more concrete understanding of the model, we use a series of simulated diseases and prevalence rates for each corresponding disease. Although the simulated data is not the real, it still shows how the model can be applied.

Table 2 - New cooperative medical schemes calculation model in a simulated area

Disease 1	Cost of each disease (Yuan) 2	Prevalence rate (‰) 3	Prevalence case number (10,000) 4 = F×3	Total medical payment (10,000 Yuan) 5 = 2×4	Cumulative total medical payment (10,000 Yuan) 6 = ΣX
Liver cancer	45000.00	0.85	0.26	11475.00	8250.00
Stomach cancer	35000.00	0.95	0.29	9975.00	18225.00
Heart disease	10600.00	1.20	0.36	3816.00	22041.00
Diabetes mellitus	8500.00	2.00	0.60	5100.00	27141.00
Hypertension	6400.00	3.00	0.90	5760.00	32901.00
Children’s pneumonia	4500.00	1.50	0.45	2025.00	34926.00
Appendicitis	2000.00	2.00	0.60	1200.00	36126.00
Cold	32.09	10.00	3.00	96.27	36222.27

In the model, the reimbursement proportion is related to two factors: first, the diseases that it plans to cover, and secondly, the financing standard of NCMS, which is the final determinant of the reimbursed proportion. Economic realities usually dictate that NCMS can't cover all the diseases in the area. Therefore, for a NCMS administrator, one of the most important tasks is to translate the extent of protection that NCMS can provide against severe illnesses into an economic standard with a clear understanding of government budget constraints. In this model, the severe illnesses that NCMS plans to cover are translated into a series of descending average costs of each disease, (See column 2 in Table 1). Several different applications are listed below.

Situation 1 - Calculating the reimbursement proportion when the financing standard and the disease coverage are known

Suppose the financing standard in the area is: 10 Yuan for each NCMS participating member, 20 Yuan per person from regional government(s) subsidies and 20 Yuan per person from state subsidies, with a combined total financing standard for each participating member of 50 Yuan. Now suppose that NCMS plans to cover illnesses whose average cost is more than 6,000 Yuan. Then, in this example, the diseases NCMS planning to cover are: hypertension, diabetes mellitus, heart disease, stomach cancer and liver cancer.

The calculation procedure for the percentage of reimbursement is as follows:

1. Calculate the total amount of the fund: $3000000 \times 50 = 15000$ (10,000 Yuan).
2. Find the cumulative total medical payment of the diseases covered under NCMS in the sixth column in Table 1. In this example, according to the sixth column of Table 2, the cumulative total medical payment of the diseases NCMS plans to cover (that is, hypertension, diabetes mellitus, heart disease, stomach cancer and liver cancer) is 32,901 (10,000 Yuan).
3. Calculate the percentage of reimbursement: $15000 \div 32901 = 45.59\%$.

Situation 2 - Calculating the financing standard when the reimbursement proportion and the disease coverage are known

Suppose the expected reimbursement percentage of the agriculture population in the area is 60%. Now suppose the average cost of diseases that NCMS plans to cover is still more than 6,000 Yuan, then, in this example, the diseases NCMS plans to cover are: hypertension, diabetes mellitus, heart disease, stomach cancer and liver cancer.

Then, the calculation procedure of the financing standard is as follows:

1. Find the cumulative total medical payment of all diseases covered under NCMS in the sixth column in Table 1. In this example, according to the sixth column of Table

2, the cumulative total medical payment of the diseases NCMS plans to cover (that is, hypertension, diabetes mellitus, heart disease, stomach cancer, and liver cancer) is 32,901 (10,000 Yuan), namely, 329.01 million Yuan

2. According to the expected reimbursement percentage, calculate the total amount of the fund that should be financed: $32901 \times 60\% = 19740.60$ (10,000 Yuan), namely, 197.406 million Yuan.

3. Calculate the financing standard: $19740.60 \div 300 = 65.80$ Yuan.

Situation 3 - Calculating disease coverage, when the financing standard and the percentage of reimbursement are known

Suppose the expected reimbursement percentage of the agriculture population in the area is 60%; Suppose the financing standard in the area is: 10 Yuan from each NCMS participating member, 20 Yuan per person from regional government(s) subsidies and 20 Yuan per person from state government subsidies. Then, the total financing standard is 50 Yuan per person.

Then, calculate the diseases NCMS plans to cover through the following procedure:

1. Calculate the total fund amount: $3000000 \times 50 = 15000$ (10,000 Yuan), namely, 150 million Yuan.

2. Calculate the cumulative total medical payment of the diseases that NCMS fund is able to cover: $15000 \div 60\% = 250$ million Yuan.

3. Locate the cumulative total medical payment of the diseases that the NCMS fund is able to cover on the Table. In this example, we find the position of the cumulative total medical payment of the diseases that NCMS is able to cover in the sixth column in Table 2 – 250 million Yuan is found between 22.041 million and 27.141 million. If NCMS plans to cover illnesses whose average cost is more than 8000 Yuan such as diabetes mellitus, heart disease, stomach cancer and liver cancer, it will overspend: $(271.41-250) \times 60\% = 12.846$ million Yuan. If NCMS plans to cover illnesses whose average cost is more than 10,000 Yuan such as heart disease, stomach cancer and liver cancer, it will have a surplus of: $(250- 220.41) \times 60\% = 17.754$ million Yuan.

4. Balance the extent of overspending and surplus, and reasonably adjust the reimbursement percentage and the diseases covered. In this example, we could select to cover fewer diseases such as just heart disease, stomach cancer and liver cancer, because it will result in a surplus of 17.754 million Yuan, which would increase the reimbursement percentage to $150 \div 220.41 = 68.05\%$. We could also select to cover more diseases to cover diabetes mellitus, heart disease, stomach cancer and liver cancer, because it will overspend 12.846 million Yuan, which would decrease the reimbursement percentage $150 \div 271.41 = 55.27\%$. Selection then depends much on the administrator's value judgments. If they prefer a larger reimbursement percentage, they will decrease the extent of coverage. However, if they prefer to extend coverage, then they will decrease the total reimbursement percentage.

Situation 4 - Calculating under dynamic conditions

The applications introduced above are all based on a fixed point in time, but if we could obtain data from a series of continuous years of the total agriculture population and disease incidence, then we could set up a series of time-point models. This would allow us to consider the dynamic economic development of the area while we calculate the financing standard and the reimbursement percentage.

If we have data on the most frequent illnesses in the area, we could also use this model. We could just list the prevalence rates in descending order, then in the same way construct the model and calculate the financing standard, the reimbursement percentage, and the disease coverage.

Acknowledgement

We thank Jason Manto, Yuanju Du at Peking University and Magnus Lindlow at World Bank for their comments. Our work is supported by National Social Science Fund, and Beijing Science Fund P. R. China.

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