DEVELOPING PREMIUM RATES FOR A
PREFERRED PROVIDER ORGANIZATION (PPO)

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ABSTRACT

This paper describes a process for developing rates for a preferred provider organization (PPO). It examines the objectives of the rate structure, the models to construct, and the factors to consider before finalizing rates. The paper contains the skeleton of a rate model and the results of that model's application.

I. INTRODUCTION

In the spring of 1983, Blue Cross and Blue Shield of Kansas City made the decision to develop a preferred provider program. With a target completion date of October 1983, we needed to learn much in a short period. Because preferred provider was and is a relatively new concept, there was not much actuarial literature to guide us in developing rates. The experience with our own health maintenance organization (HMO), Total Health Care, and the exposure it gave us in dealing with a dual choice situation helped us considerably. While the model Blue Cross and Blue Shield developed was specifically for our product structure, it is flexible enough to be used for other product structures.

II. PRODUCT STRUCTURE OF BLUE CROSS AND BLUE SHIELD OF
KANSAS CITY PREFERRED PROVIDER ORGANIZATION

The preferred provider program we developed was not an optional program but a group health benefit program with preferred and nonpreferred providers. An employer would enroll in our program as a replacement for his existing, more traditional group health program. Our program would be his group health program, and we would not allow any other preferred provider options.

To encourage employees and their dependents to use our preferred providers, we designed benefit programs with different benefits for preferred versus nonpreferred providers. The key elements to the benefit differences were:

1. Nonpreferred provider coinsurance reimbursement was less than that of

187

preferred provider reimbursement. It could be 10, 15, or 20 percent less than the preferred provider coinsurance.

2. Out-of-pocket limits for nonpreferred provider services were greater than those at preferred providers. A limit ranging from 2.5 to 5 times greater would discourage using nonpreferred providers.

    An example of these benefit differences would be the following:

Preferred Benefits-	$200 calendar year deductible; 80 percent of the next $4,000, then 100 percent; $1,000 maximum out-of-pocket in a calendar year.
Nonpreferred Benefits-	$200 calendar year deductible; 65 percent of the next $13,714, then 100 percent; $5,000 maximum out-of-pocket in a calendar year.

To become a preferred provider, a hospital or physician was required to provide a discount. The hospitals furnished a discount of at least 10 percent of billed charges in addition to agreeing to certain cost control features. The physician discount was developed by limiting reimbursement to 80 percent of our "usual, customary, and reasonable" (UCR) schedule. Since physicians with fees below the customary level did not have to give us a 20 percent discount, the final aggregate discount used in the rating process was less than 20 percent (i.e., a physician whose fees were 10 percent below customary only gave us a 10 percent discount to get to the fee level 20 percent below customary).

We determined that utilization controls would be necessary so that preferred providers would not offset their discounts with excessive utilization. A preadmission certification system was developed, which included a post-admission review requiring providers to write off any charges for services determined to be medically unnecessary. We also developed incentives for both the preferred hospitals and physicians as another means to limit costs.

The hospital incentive was 50 percent of the savings from hospitals whose inpatient case costs for preferred members were below the target levels established at the beginning of the hospital's contract year. The target levels reflected past inpatient case costs for the preferred hospitals projected to the contract year at the overall consumer price index (CPI) and then adjusted by the hospital's discount. Since the overall CPI was much lower than inpatient case cost historical increases, we felt that meeting the target level would lower our costs. There was no penalty for exceeding the target level except that negotiated price increases in subsequent years would be determined from the target case cost and not the higher actual case costs.

The physician incentive was a portion of the savings from reductions in

inpatient days per one thousand members. For example, if the inpatient days per one thousand decreased 10 percent from prior year levels, then we would pay an incentive of 5 percent of claim payments made to the physician during the year. This included inpatient days for preferred and nonpreferred providers from those groups with our preferred provider program.

III. FACTORS TO CONSIDER

Some factors that were considered as we developed the rating model include:
1. Proportions of persons using preferred providers versus nonpreferred providers.
2. Utilization levels of those using preferred providers versus nonpreferred providers.
3. Changes in utilization due to cost controls with preferred providers.
4. Average cost per service for preferred providers versus nonpreferred providers.
5. Impact of the incentives for providers.

Proportions of Use by Provider

Blue Cross and Blue Shield experience data on proportionate utilization at each provider, both hospital and physician, gave us a base from which we could project the impact of patient shifting. The rating model must consider the increase in the utilization of the preferred providers after the preferred program is installed. The impact on the rates of different levels of shifting must be tested. The level of patient shifting may also vary depending on the customer buying the product. We expect that small groups and individual subscribers will have greater proportionate use of preferred providers than large groups. If the preferred program is offered as an option, then we also expect a very high proportionate use of preferred providers.

Another patient shift issue is variances by hospitals and physicians. Since there are fewer hospitals than physicians, it is easier for a patient to use a preferred hospital. The benefit differential will be larger since hospital costs are greater. Patients may be hesitant to leave their personal physician who is not a preferred provider if they are satisfied with his care. Patient shifting could also vary between inpatient and outpatient services at a hospital since some outpatient treatment is of an emergency nature.

Preferred versus Nonpreferred Utilization Levels

Prior to the PPO, we had a rate that reflected the aggregate utilization of the total group. With the PPO, we were developing two rates—one for preferred providers and one for nonpreferred providers. The model must develop a nonpreferred provider utilization level that, combined with the preferred utilization level, results in the same aggregate utilization of services (not costs) as those prior to the preferred provider program. The type of

patient most likely to shift to a preferred provider is one who has not developed strong ties to a particular physician or hospital, i.e., the young and healthy. This increases the utilization rates of the nonpreferred providers since they are left with less healthy people. We still have the same persons insured in total as before, and these persons had a basic utilization rate that will not necessarily change just because they move from one provider to another.

Changes in Utilization Due to Cost Controls

The model must reflect the controls for costs and utilization included in the preferred provider program. These controls and their impact should only affect the utilization at the preferred providers. Testing the rate impact of several different assumptions is worthwhile.

To the extent that the controls implemented with the preferred providers lower the utilization rate or average cost per service, there may be a lower total group utilization rate or average cost per service. This could be offset by increases in utilization rates or cost per service by nonpreferred providers to compensate for patient and revenue loss due to shifting to the preferred providers.

Average Cost Per Service

The average cost per service is extremely important when combined with the shift of patients to preferred providers. To test the impact of this variable, we needed sound data on the inpatient and outpatient costs per service of each of the providers in our preferred provider operating area. As a minimum, we needed the data for each hospital. If our preferred providers are the higher cost providers, then even with a discount, their costs may be greater than the nonpreferred providers. With any kind of patient shift from the lower cost, nonpreferred providers to the higher cost, preferred providers, we would have a rate increase. While this is unlikely, it does demonstrate the impact of the cost per service at each provider. The model needs to reflect these costs per service by provider to properly measure the discount and patient shift.

Impact of the Provider Incentive

As an inducement to the providers to lower costs and utilization, we developed an incentive system to lower inpatient hospital costs per case and inpatient hospital days per one thousand. The rate model must reflect the cost impact of the potential incentive payments. Our greatest concerns with the incentive were:

1. Lower hospital case costs could be due to a shift in case mix to less

severe cases rather than a real lowering of cost per case. Any incentive system for hospitals needs to adjust for shifts in case mix. We accomplished this by setting a target case cost for all diagnoses except those in the cardiovascular, neoplasm, and perinatal diagnostic categories. These three excluded categories were the most likely to distort inpatient case costs and disrupt any incentive system.

2. For groups with financial arrangements such as Cost-Plus and Minimum Premium, where decreases in claim costs directly reduced the group's cost, the incentive payment would be an additional cost added to the group's settlement or absorbed by the insurer out of its profits. We treated the incentive payment for the group as a claim cost and charged it to the group. The charge was the group's proportionate share of the total incentive payout and not the actual incentive payments from the group's experience.

IV. OBJECTIVES OF THE RATE STRUCTURE AND MODELS

The primary objective in developing a rate structure for our preferred provider program was to develop a set of rate discount factors applicable to existing rates for our comprehensive major medical product or to rates developed from the experience of the group. To develop these factors, we needed a rating model that could:

1. Calculate the rate discount for different benefit options;
2. Reflect benefit differentials at preferred and nonpreferred providers;
3. Reflect the discount at each preferred hospital and the physician discounts;
4. Reflect shifting of patients and cases to the preferred providers;
5. Reflect different levels of utilization by members using preferred providers versus those using nonpreferred providers;
6. Allow us to test different combinations of preferred hospitals to assist in the hospital evaluation process;
7. Reflect the inpatient and outpatient case costs at each hospital, both preferred and nonpreferred;
8. Obtain a rate reduction of at least 10 percent; and
9. Develop separate factors by type of service.

V. BASE FOR DEVELOPING THE RATE MODEL

Since this was a brand new concept, there were no sources of prior experience to use in developing rate factors. We used the Milliman & Robertson (M&R) Health Cost Guidelines as the base for developing costs. The Comprehensive Major Medical Tables would serve as a base for calculating costs for different benefit options and by type of service. Because of the various providers' discounts, we needed to calculate separate costs for:

1. Hospital Inpatient;

2. Hospital Outpatient;
3. Physician—Surgery;
4. Physician—Inpatient;
5. Physician—All Other Services; and
6. All Other Services.

We also needed to develop separate factors for single and family subscribers. A set of base rate factors must recognize medical care costs by type of service and adult versus child costs and must properly calculate the costs of different benefits. We used the M & R Health Cost Guidelines, but a complete set of manual rates could also meet the need. We used our own experience for a sample of groups expected to buy this product to develop the case costs for each hospital in the preferred provider operating area and the aggregate physician discounts for each physician type of service. We had a computerized claim pricing model that priced each physician claim so that we could accurately reflect the value of the preferred allowable charge that was 20 percent less than the UCR level.

VI. RATING FORMULA

The following symbols will be used in the formula:

AC_{pp} = Average claim of preferred provider before discount
AC_{np} = Average claim of nonpreferred provider before discount
u_{pp} = Utilization rate of persons using a preferred provider
u_{np} = Utilization rate of persons using a nonpreferred provider
e = Expense rate
d = Provider discount
b_{pp} = Benefit rate for preferred provider
b_{np} = Benefit rate for nonpreferred provider
x_{pp} = Proportion of persons using a preferred provider
x_{np} = Proportion of persons using a nonpreferred provider
AC = Average claim of all providers before discount
u = Utilization rate of all persons
P = Premium rate before preferred provider
P' = Preferred provider premium
b = Benefit rate for all providers before preferred provider

The values of b will reflect the actuarial values of deductibles, coinsurance, and loss limits for each type of service.

A simplified formula for P, since it is the base from which we developed the rate discount factor, is:

$$P = (u * AC * b)/(1 - e).$$

Before we expand this formula to develop P', we define two other symbols.

B_p = Net claim cost for preferred providers

B_{np} = Net claim cost for nonpreferred providers

These two values are calculated as follows:

$$B_p = u_{pp} * AC_{pp} * b_{pp}$$

$$B_{np} = u_{np} * AC_{np} * b_{np}.$$

Our basic formula for P' then becomes:

$$P' = \frac{(B_p)(x_{pp})(1 - d) + (B_{np})(x_{np})}{(1 - e)}.$$

This is a simplified formula for calculating a premium, but the rating manual used provided us with the values of B_p and B_{np}. Thus, the simplified formula is all we needed, and it begins to recognize the adjustments we needed to make for preferred provider rating. The preferred provider rate discount then equals P'/P.

The goal of the formula and the rate model was to develop rates separately for preferred and nonpreferred providers and then combine them into P'. Therefore, b_{pp} and b_{np} would not be the same since the benefits for the nonpreferred providers are less than the preferred providers. The expense rate, e, was the same for both preferred and nonpreferred, but it was not used commonly for our benefit programs other than preferred provider to reflect the lower basic rate for the preferred provider program.

Since we wanted the preferred provider rating model to properly apply discounts to each hospital and for each type of service, another adjustment was needed.

Let, HP = Hospital Providers, and

TS = Type of Service

To develop a formula for P' that calculates the values of each hospital provider and each type of service, we need:

$$P' = \sum_{TS} \sum_{HP} \frac{(^{HP}B_p{}^{TS})(^{HP}x_{pp}{}^{TS})(1 - {}^{HP}d^{TS}) + (^{HP}B_{np}{}^{TS})(^{HP}x_{np}{}^{TS})}{(1 - e)}.$$

With this formula, we were able to construct a rate model that calculated a rate for each type of service and for each hospital.

VII. CONSTRUCTING THE RATE MODEL

When constructing the rate model, one should use the manual of base rates to allocate the total health care costs into the types of service identified

in section V. Since our base rates were in an adult and child rate category, we used the following formulas to develop single and family rates.

Single Rate = Adult Rate

Family Rate = Adult Rate

+ (.95)(1.25)(Adult Rate)

+ (1.47)(Child Rate)

NOTE: The spouse's portion was calculated as (.95)(1.25)(Adult Rate) and the children's portion as (1.47)(Child Rate) values.

This formula does not reflect variations in costs by age and sex normally used when calculating a rate to charge a group. Age/sex adjustments were unnecessary since the discount factor is a ratio of the preferred provider rate to the base rate and neither is age/sex adjusted. This should not be confused with the adjustments to the utilization rate due to the age and sex characteristics of those persons selecting a preferred provider.

Appendix A describes the basic structure of the rate model we used. The columns in the model identified the following values:
1. Proportion of Benefits
2. Case Costs
3. Net Cost
4. Proportionate Pure Premium
5. Prior Premium Rate
6. Benefit Reduction or PPO Discount
7. PPO premium rate

Explanation of Appendix A

The values in the proportion of benefits column reflected the proportion of total cases for the type of service at the particular provider identified. The sum of the proportions of each provider within type of service should total 1.00. We were fortunate to have detailed experience data that allowed accurate determination of the proportion of benefits (cases) for each hospital provider or physician class. The values in this column were adjusted to reflect the impact of shifts from nonpreferred to preferred providers.

The values in the case cost column reflect the case cost for each type of service at the particular provider. The case cost used by provider was determined from our own experience. The total case cost should be the weighted average case cost for the PPO operating area.

The net cost column value was calculated by first solving for the value of u (rate of utilization) from the total claims expense per member per month

for the type of service. The following formula was used for all types of service:

u = Total claims expense per member per month/average cost per case.

We then used the value of u and applied it to each provider to calculate their monthly claim expense value (equal to u times the case cost for each provider). We assumed that the value of u would not vary by provider. (We did not have any data that indicated differently.)

The values in the case cost and net cost columns can be adjusted to reflect the impact of different utilization patterns and case costs for the employees or dependents that select either the preferred or nonpreferred providers. If you suspect that the persons using preferred providers will be healthier or younger, then you need to lower the values of u or the case cost or both. When adjusting the values of u or the case cost, we modified the values for other providers, because if lower utilizers go to one set of providers then it follows that the higher utilizers will use the other providers.

The value of the proportionate pure premium column was calculated by multiplying the value of the proportion of benefits column by the net cost value by the value of the benefit plan factor. The benefit plan factor was for the preferred benefit level and was determined from the rate manual. This factor reflected the value of deductibles and coinsurance, and counts vary by type of service. We used the same benefit factor for preferred and nonpreferred providers in this column adjusting for the lower nonpreferred benefit level in a later column. The total row value equaled the sum of the proportionate pure premium for each provider or provider class.

The prior premium rate column value equaled the proportionate pure premium value divided by 1.00 less the expense rate. This premium rate is the rate prior to application of any provider discounts or adjustments for lower benefits for nonpreferred providers. The total row value equals the sum of values for each provider.

The benefit reduction and PPO discount column values are the discount given by the preferred provider or the actuarial value of the benefit reduction to nonpreferred providers. The value of the benefit reduction was determined from our rate manual. For the base rate (prior to PPO program) calculation, we used values of 0.00 for each provider or provider class. The total row value is the weighted average of the discounts and benefit reduction factors weighted by the values in the prior premium rate column. We used a discount or benefit reduction for each hospital, but for the physician services, we used an aggregate factor for each physician class (preferred, nonpreferred, or other).

The final column is the PPO premium rate which equaled the prior premium rate value multiplied by 1.00 less the benefit reduction or PPO dis-

count value. This value was calculated for each hospital provider or physician class and then summed to obtain the total rate. The total rate for each type of service was then summed to obtain the total PPO premium rate.

We used this model to calculate the base rate (P) by keeping the proportion of benefits the same as derived from our experience, not applying any shifts, not adjusting utilization, and using a value of 1.00 in the benefit reduction and PPO discount column.

VIII. RESULTS OF THE RATE MODEL

We tested four different benefit levels:

Option 1-	No Deductible Preferred Coinsurance:	20 percent of office visits, office consultation and emergency room services, and other major medical type services.
	Nonpreferred Coinsurance:	35 percent on the services listed in Preferred plus 20 percent on the basic services such as hospital, surgery, and physician inpatient.

	Options		
	2	3	4
Deductible	$ 100	$ 200	$ 200
Preferred Coinsurance	20%	10%	20%
Annual Out-Of-Pocket	$ 500	$1,000	$1,000
Nonpreferred Coinsurance	35%	30%	35%
Annual Out-Of-Pocket	$2,500	$5,000	$5,000

We also tested shifts to preferred providers of 20 and 40 percent over present proportionate use and reductions in utilization of 5, 10, and 20 percent. Table A identifies the rate discount factors for the different benefit options with no utilization or provider shifts from the model.

TABLE A

Benefit Option	Rate Discount Factor
1	12.9%
2	13.7
3	13.0
4	13.9

Table B illustrates the rate discount factors for Option 1 with utilization and provider shifts.

TABLE B

RATE DISCOUNT FACTORS FOR OPTION 1
UTILIZATION REDUCTION

Preferred Provider	Present	5%	10%	20%
Present	12.9%			13.4%
20%			13.5%	
40%		13.5%		14.1%

The rate discount factors shown in these tables are for the hospitals and physicians in our PPO operating area and reflect the discounts of those hospitals and physicians selected to be preferred providers. They are not appropriate for use with any other preferred provider programs. The impact of the utilization changes and provider shifts was consistent with what we anticipated. Subsequent to our initial test runs, we also tested provider shifts so that the preferred providers had 90 percent of the utilization. We found that the rate discount decreased because the provider discounts were less than the actuarial value of the lower benefits for nonpreferred providers. This will not be the case if the coinsurance differential is only 10 percent.

IX. UNDERWRITING CONSIDERATIONS

The underwriting regulations are basically the same as those for traditional group coverage, with these exceptions:

1. The location of employees is very critical. If you have a significant number outside of your preferred provider operating area, then you need to make adjustments to rate discounts since you will have fewer persons eligible to use the preferred providers and receive the discounts.
2. The percentage of employees and dependents enrolled should be higher than the normal 75 percent minimum due to the impact of patient selection of provider that we have identified.
3. You should not allow any other preferred provider options in a group where you have your preferred provider program. This is particularly critical if the providers of the other program are not preferred providers in your program. Since they will be offering discounts also, you will not get some of the patient shifting to preferred providers you assumed in your rating and promised to your providers in order to obtain the discount on charges.

X. RENEWAL ISSUES

Several issues are involved that are not characteristic of the typical group health program when renewing a group that has been in a preferred provider program. Applying a trend factor to the group's experience under the preferred provider program may not be appropriate for projecting next year's rates. Other issues include:

1. Have there been any changes in preferred providers, particularly with the hospitals? If there have been changes, then the rate model will need to adjust the group's experience to reflect the new providers.
2. Will there be any additional shifting to preferred providers in the next year? It is helpful to know the group's provider distribution prior to preferred provider to determine this year's shift and assess whether additional shifting can occur. We also look at proportionate use of nonpreferred providers after one year in the program to determine if additional shifts can occur. For example, if the nonpreferred providers' proportion is 10 percent, then little additional shifting can occur. However, if it is 40 percent, then more shifting should be assumed. We usually test the impact of different levels of shift on the rates before deciding what is appropriate.
3. Have there been any changes in the provider discounts? Obviously, if the discounts for the preferred providers change during the year, we want to use the most current level of discount in the rate model. A decrease in the rate of discount could result in a rate increase greater than trend unless it can be offset by provider shifts or changes in benefit differential.

We definitely want to use the group's experience in the rate model but need to break it into the components of case cost and utilization rate used by the rate model.

APPENDIX A

PREFERRED PROVIDER RATING MODEL

TYPE OF SERVICE AND PROVIDER CLASS	(1) PROPORTIONATE BENEFITS	(2) CASE COST	(3) NET COST $(2) * U$	(4) PROPORTIONATE PURE PREMIUM $(1) * (3) * (b)$	(5) PRIOR PREMIUM $(4)/(1-e)$	(6) BENEFIT REDUCTION AND PPO DISCOUNT	(7) PPO PREMIUM RATE $(5) * [1-(6)]$
Hospital Inpatient							
Hospital 1	XX	XXXX	XXXX	XXXXX	XXXX	XXXXX	XXXXX
Hospital 2	XX	XXXX	XXXX	XXXXX	XXXX	XXXXX	XXXXX
.	XX	XXXX	XXXX	XXXXX	XXXX	XXXXX	XXXXX
.	XX	XXXX	XXXX	XXXXX	XXXX	XXXXX	XXXXX
Hospital 10	XX	XXXX	XXXX	XXXXX	XXXX	XXXXX	XXXXX
Other.	XX	XXXX	XXXX	XXXXX	XXXX	XXXXX	XXXXX
TOTAL	XX	XXXX	XXXX	XXXXX	XXXX	XXXXX	XXXXX
Hospital Outpatient							
Hospital 1	XX	XXXX	XXXX	XXXXX	XXXX	XXXXX	XXXXX
Hospital 2	XX	XXXX	XXXX	XXXXX	XXXX	XXXXX	XXXXX
.	XX	XXXX	XXXX	XXXXX	XXXX	XXXXX	XXXXX
.	XX	XXXX	XXXX	XXXXX	XXXX	XXXXX	XXXXX
Hospital 10	XX	XXXX	XXXX	XXXXX	XXXX	XXXXX	XXXXX
Other.	XX	XXXX	XXXX	XXXXX	XXXX	XXXXX	XXXXX
TOTAL	XX	XXXX	XXXX	XXXXX	XXXX	XXXXX	XXXXX

PREFERRED PROVIDER RATING MODEL—*Continued*

TYPE OF SERVICE AND PROVIDER CLASS	(1) PROPORTIONATE BENEFITS	(2) CASE COST	(3) NET COST $(2) * U$	(4) PROPORTIONATE PURE PREMIUM $(1) * (3) * (b)$	(5) PRIOR PREMIUM $(4)/(1-e)$	(6) BENEFIT REDUCTION AND PPO DISCOUNT	(7) PPO PREMIUM RATE $(5) * [1-(6)]$
Physician Inpatient							
Preferred	XX	XXXX	XXXX	XXXXX	XXXX	XXXXX	XXXXX
Nonpreferred.	XX	XXXX	XXXX	XXXXX	XXXX	XXXXX	XXXXX
Other.	XX	XXXX	XXXX	XXXXX	XXXX	XXXXX	XXXXX
TOTAL	XX	XXXX	XXXX	XXXXX	XXXX	XXXXX	XXXXX
Physician Outpatient							
Preferred	XX	XXXX	XXXX	XXXXX	XXXX	XXXXX	XXXXX
Nonpreferred.	XX	XXXX	XXXX	XXXXX	XXXX	XXXXX	XXXXX
Other.	XX	XXXX	XXXX	XXXXX	XXXX	XXXXX	XXXXX
TOTAL	XX	XXXX	XXXX	XXXXX	XXXX	XXXXX	XXXXX
Surgery							
Preferred	XX	XXXX	XXXX	XXXXX	XXXX	XXXXX	XXXXX
Nonpreferred.	XX	XXXX	XXXX	XXXXX	XXXX	XXXXX	XXXXX
Other.	XX	XXXX	XXXX	XXXXX	XXXX	XXXXX	XXXXX
TOTAL.	XX	XXXX	XXXX	XXXXX	XXXX	XXXXX	XXXXX