

CHOOSING THE BEST HEALTHCARE PLAN IN NORTHERN VIRGINIA FOR NEWBRIDGE NETWORKS

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April 3, 2001

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CHOOSING A HEALTHCARE PLAN FOR NEWBRIDGE NETWORKS

Newbridge Networks, Inc., a small telecommunications company of about 3000 employees doing business in the northern Virginia area, is seeking to provide its employees with a better choice for healthcare benefits. By doing this they hope to attract and keep more quality employees and reduce the attrition rate of their staff. The Expert Choice decision model was selected to help structure the complexity of the decision and to derive ratio scale priorities for each objective. Expert Choice utilizes the Analytic Hierarchy Process (AHP) to model the decision criteria and show the relationships of the goal, the objectives, and the alternatives.

For this paper we developed objectives or selection criteria for modeling this decision by taking a survey of our colleagues and friends. We had them rate each objective with respect to each of the other listed objectives and with respect to the overall goal. They also rated each alternative healthcare plan on how well it met each objective. This data was then synthesized using the Expert Choice modeling software to achieve an overall preference. The synthesis produced charts and reports that ranked the alternative healthcare plans in relation to the overall goal and presented us with the best overall selection based on our input.

ALTERNATIVES

The four healthcare plans available in the northern Virginia area that will be compared are Aetna US Healthcare, CIGNA HealthCare, George Washington University Health Plans, and Kaiser Foundation Health Plan of the Mid-Atlantic States, Inc. These healthcare plans are managed care organizations. Managed care organizations may take any one of the following forms or may be a combination of them:

- Preferred Provider Organization (PPO): Seeks to manage healthcare costs by contracting with a network of doctors who are willing to accept lower reimbursement rates. Patients who have a PPO can select either providers from within the network or opt to pay more to choose a provider who is not part of the PPO network. Typically, PPO's charge patients a deductible.
- Health Maintenance Organization (HMO): Utilized exclusive network providers. Some HMO's use Primary Care Providers (PCP's) at gatekeepers, who must approve any tests or referrals to a specialist. However, other HMO's have open access plans, which allow patient to access any provider or specialist within the HMO network without a referral. Typically, HMO's do not require patients to pay a deductible but often charge a co-payment (e.g., \$10) every time they see a physician.
- Point-of-Service (POS): POS plans allow patients to use providers within or outside of the plan's network, but patients pay an extra fee for seeing a provider outside of the network. Typically, POS plans cover only 70-80% of the physician's charges if a patient chooses to see a non-network provider, and the patient is responsible for paying the remaining 20-30%.

OBJECTIVES

The company's goal is to provide the best healthcare plan for its employees. Employees are interested in both the cost of the healthcare plan and the maximum possible benefits. We selected the following objectives based on our overall knowledge of the healthcare system, brainstorming with some of our colleagues and friends, and by researching within the healthcare industry literature and on-line resources. National standards for evaluating managed care organizations were also consulted. The national standard for evaluating managed care organizations is the Health Plan Employer Data Information Set (HEDIS), which is a performance criteria report card used to evaluate HMOs based on more than 70 measures.¹ HEDIS performance criteria include such measures as quality, satisfaction, preventative health services, disease management, access to healthcare, prenatal care, and provider assessment. HEDIS is maintained by the National Committee on Quality Assurance (NCQA), the primary accreditation organization for evaluating HMOs. All this helped us narrow our focus to objectives that we feel meet the needs of the typical employee at Newbridge Networks.

Cost

Through our conversations with colleagues, acquaintances and friends we have found that cost is an important factor for both employees and the company for whom they work. Both employees and employers want an affordable plan with the kinds of benefits that fit their particular lifestyle. Premiums, co-payments, deductibles, and maximum coverage are specific sub-objectives used to analyze cost as an objective. Many plans place maximum yearly limits on the amount that the plan will pay, which makes it important for some employees who are older or who have potentially chronic or debilitating illnesses to purchase supplemental insurance.

Quality

The quality of a healthcare plan is often difficult to measure, but there are a few criteria or sub-objectives that enable employees and employers to assess the quality of prospective healthcare plans. There are two national organizations that provide accreditation for healthcare plans: 1) National Committee for Quality Assurance (NCQA); and 2) Joint Commission on Accreditation of Health Care Organizations (JCAHO). Most managed care organizations seek accreditation from the NCQA, while most hospitals and healthcare institutions seek accreditation from JCAHO. If a managed care organization does not have accreditation from either NCQA or JCAHO, it is much more difficult for customers to assess the quality of the healthcare plan and raises potential questions about its reasons for not seeking accreditation.

¹ National Committee for Quality Assurance, Health Plan Employer Data and Information Set (HEDIS[®]), <http://www.ncqa.org>

Mental Health

Mental health coverage is usually a feature severely lacking in most healthcare plans. Employers who offer healthcare plans with this coverage may find that they are more attractive to employees. Positive features of such mental health coverage are providing employees with some choice of which physician they see, at least partial or limited hospitalization coverage, and little or no co-payments or other fees.

Optometry

Optometry coverage is an essential feature to any good healthcare plan. Plans that cover lens and frames, contacts, choice of physician and a limit on out-of-pocket fees are much more attractive to employers and employees. Some proactive plans are even offering partial or full LASIX coverage, but often only to employees who have worked for a company for 12-24 months or to employees who wish to pay an additional fee or percent of the bill.

Prenatal Care

Prenatal care is a crucial aspect to any healthcare plan in today's increasingly young, family-oriented, and female marketplace. Plans that offer a higher number of prenatal visits, lactation consultant, lamaze classes, midwife coverage, and higher number of post-deliver in-patient days are more attractive.

Preventative Care

Preventative care is important to everyone involved, including the patient, employer, and especially the healthcare plan's parent company because it seeks to prevent the occurrence of potentially very expensive diseases. A successful preventative care program involves active disease management programs, especially for chronic, expensive, and often debilitating conditions as hypertension, diabetes, asthma, and coronary heart disease. Educational programs that promote employee wellness not only enhance patients' health, but they may also augment employee productivity and decrease worker days lost to illness. Patient self-care handbooks should be mailed to all plan participants and a nurse advice line should be available to both help the patient and to discourage unnecessary and cumulatively expensive visits to the doctor for often minor illnesses. Lastly, early diagnostic programs, such cholesterol, colon cancer, cervical cancer, and mammogram screenings, greatly enhance employee wellness and satisfaction with both the healthcare plan and their employer.

DERIVATION OF PREFERENCES & PAIRWISE JUDGEMENTS

The preferences of employees of Newbridge Networks or any company is largely based on the company's employee demographics. Newbridge Networks, like any other high technology or software company, is comprised mostly of a relatively young, single, "Yuppie" well-paid work force. Quality, choice, convenience, comprehensiveness, and cost are important factors in choosing a healthcare plan. Such employees are not routinely high utilizers of a healthcare plan, do not place much importance on preventative care or other services thought to more useful to older patients, and often place importance in prenatal care in an increasingly skilled female workplace.

In order to determine preferences for the objectives and sub-objectives we developed a survey and discussed it with our colleagues and friends (see appendix). We had them rate each objective with respect to each of the other listed objectives and with respect to the overall goal. They also rated each alternative healthcare plan on how well it met each objective. Information was also ascertained from each of the four healthcare plan's web sites², the Virginia Association of Health Plans web site³, and insight gained from one of the author's experience as a physician in a variety of healthcare settings.

Cost

The sub-objectives of cost used to evaluate the different healthcare plans are premiums, co-payments, deductibles, and maximum coverage. The premium is the monthly cost of the healthcare plan, which can be paid by the employer, employee, or combination of both. However, for the purpose of this project, we will assume that the employee is paying the entire cost of the plan's premium. The co-payment is a small fee (e.g., \$10) that the employee pays each time he visits the doctor's office. Some plans also charge this fee each time the patient uses the pharmacy or other services offered by the healthcare plan. The deductible is the amount that the employee has to pay before receiving "free" (except for the above fees) care from his healthcare plan. The maximum coverage is the maximum amount that the healthcare plan will pay for all hospitalization, prescription, and all other benefits of the healthcare plan. Beyond this limit, the employee must pay for all additional services utilized.

Newbridge Networks does not pay for any part of employees' healthcare insurance costs. The monthly premium is deducted from the employee's monthly income. Therefore, the plan premium is the most important cost sub-objective for most employees. Co-payments are not a crucial aspect of cost, since most plans have a similar co-payment for using their pharmacy or for doctor's visits. This fee is usually \$10.00 per visit. The deductible is more of a differentiating factor, since plans can have quite different

² Aetna U.S. Healthcare, CIGNA Healthcare, Kaiser Foundation Health Plan of the Mid-Atlantic, and United HealthCare of Virginia web sites, <http://www.aetnaushc.com>, <http://www.cigna.com/healthcare>, <http://www.kaiserpermanente.org/mid-atlantic>, and <http://www.uhc.com>

³ Virginia Association of Health Plans web site, <http://www.vahmo.org/directory/index.html>

deductibles. Maximum coverage, although it can be quite different between plans, is not as important as other factors above since the employees of Newbridge Networks are relatively young and healthy, are low utilizers of healthcare, and tend not to ever come close to the maximum coverage limit.

Quality

The sub-objectives we chose to evaluate healthcare plans were board-certified physicians, choice of physician, plan accreditation, patient education, and patient satisfaction. Information about the relative importance of each of these sub-objectives was ascertained from the individual healthcare plan's web sites, the National Committee of Quality and Assurance (NCQA) web site, and an actual survey of 18 individuals who served as a representative demographic sample of employees of Newbridge Networks (See Appendix A).

Based upon the survey, patient satisfaction and choice of physician appeared to be much more important than hospital or plan accreditation, patient education, or board-certified physicians. When the relative importance of patient satisfaction and choice of physician were compared, the respondents to the survey rated patient satisfaction as more important. These results are understandable in light of the fact that more patients are seeing alternative medicine providers (acupuncture, ayurveda, etc.) than traditional providers. One of the healthcare plans, George Washington University Healthcare Plan, even offers alternative medicine at its Center for Integrative

Patient satisfaction measurements of healthcare plans are based on surveys filled out by patients. The survey used by most managed care institutions in the U.S. is the Consumer Assessment of Health Plans (CAHPS).⁴ These surveys include such questions as overall satisfaction with plan, choice of primary care physician and specialists, quality of medical care by primary care physicians, customer service, concern for well-being, likely to re-enroll, likely to recommend plan, explanation of treatment, and time doctor spends with you.

Mental Health

Mental health coverage was evaluated using the sub-objectives high number of visits allowed, choice of physician, and hospitalization coverage. As with the sub-objectives of Quality discussed above, choice of physician is the most important factor for most employees in evaluating mental health coverage. The number of visits is less important, since employees of Newbridge Networks are relatively young and low utilizers of mental health coverage. For the same reason, hospitalization coverage is not very important because the demographics of Newbridge Networks results in low utilization of mental health coverage.

⁴ Agency for Healthcare Research and Quality, U.S. Department of Health and Human Services, <http://www.ahrq.gov/qual/cahpsix.htm>

Optometry

Optometry coverage was evaluated using sub-objectives choice of physician, lens and frame coverage, contacts coverage, lasix coverage, and high number of allowed visits. Choice of physician was again the most important factor in choosing optometry coverage, with high number of visits and lens and frame coverage being less important. Lasix and contacts coverage were less important factors, probably since these have traditionally not been covered by optometry plans.

Prenatal Care

Prenatal care is an increasingly more important aspect of healthcare plans in today's increasingly female workforce. Patient education and Lamaze classes are more important than other measures, but only if number of post-delivery inpatient days is not restricted. In addition, high number of allowed visits to the obstetrician is important. Lactation consultant and midwife coverage are still considered rare in prenatal coverage, so their absence in a healthcare plan is not a major factor. However, plans that offer these "luxury" items would probably be much more competitive than other plans, all other factors being equal.

Preventative Care

Preventative care services are becoming increasingly more important as today's healthcare consumers become more educated and health conscious. The most important sub-objective in evaluating preventative care services is a nurse advice line, where employees can call 24 hours per day to ask routine questions before deciding to go to the Emergency Room for potentially non-emergent issues. Educational and disease management programs, such as cholesterol screening, diabetes, hypertension, and weight loss programs, which are aimed at detecting and proactively preventing diseases before they become serious, are also very important. Less important are a patient newsletter and self-care handbook, and these factors would probably not differentiate healthcare plans since they are usually offered by most healthcare plans.

JUDGEMENTS

Judgements were made to derive priorities for alternatives, objectives, and sub-objectives based upon conversations with Newbridge employees, written surveys from Newbridge employees, the healthcare plan company web sites, and information from the National Committee on Quality Assurance and Virginia Association of Health Plans web sites. It is important to note that in customer surveys of Newbridge employees, it is often employee perception that determines priorities rather than objective comparisons. For example, Aetna is perceived by most consumers to be a more expensive healthcare plan than most plans, but CIGNA is very similar with respect to this objective.

Alternatives With Respect To Lowest Level Objectives

The alternatives of healthcare plans were Aetna, CIGNA, Kaiser, and GWU healthcare plans. These alternatives were evaluated against the lowest level objectives of cost, quality of care, mental health coverage, optometry coverage, prenatal care, and preventive care as listed below in the discussions of each objective.

Aetna and CIGNA are similar healthcare plans and have similar monthly premiums, but Aetna is slightly more expensive. Kaiser and GWU are both significantly less expensive healthcare plans, with Kaiser being a little more expensive than GWU. Aetna has higher co-payments (i.e., approximately \$20 per visit), with the other three healthcare plans having similar co-payments (i.e., approximately \$20 per visit). All four healthcare plans have similar deductibles, but GWU and CIGNA have slightly lower deductibles. Kaiser has higher maximum coverage, followed by GWU and CIGNA, with Aetna providing the lowest maximum coverage.

Quality of care was assessed both from employee surveys as well as objective information from the NCQA web site. Employee surveys were largely subjective, since very few employees spent significant time researching healthcare plans' web sites, information packets, or any other detailed objective source of information. Board-certified physicians were not a very good differentiating factor in choosing a healthcare plan since all four healthcare plans employ all or mostly board-certified physicians. GWU ranked slightly higher in board-certified physicians, since all attending physicians at their clinics and hospital are board-certified and generally leaders in their respective specialties. However, it is important for customers to realize that much healthcare at a university-based healthcare plan is conducted by non-board-certified residents and fellows under the supervision of attending physicians. Aetna ranked slightly higher in board-certified physicians, followed by CIGNA and then Kaiser. GWU ranked highest in choice of physician, followed by Aetna, Cigna, and then Kaiser. Kaiser ranks lowest in choice of physician most likely because it has the highest number of patients and poorest access to healthcare. The plans with higher number of enrolled patients and higher patient-to-physician ratio generally rank lowest in choice of physician, since patients must settle for whomever they can get an appointment with. Accreditation, which was solely assessed from the NCQA website information, was equivalent at Aetna, CIGNA,

and Kaiser, who all received NCQA ratings of “Commendable.” GWU received a rating of “Rating Pending,” so they received a lower ranking in accreditation because their accreditation status of pending casts some doubt on their plan’s quality. Aetna ranked higher in patient education programs, followed by GWU, but both plans have very proactive patient education programs. CIGNA ranked third, followed by Kaiser, who both had considerably variety and quality of their patient education programs. Patient satisfaction was assessed by the NCQA’s HEDIS patient satisfaction nationally standardized survey. Aetna ranked highest in patient satisfaction, followed next in order by CIGNA, GWU, and Kaiser. Kaiser ranked lowest in patient satisfaction, probably because of having too high patient-physician ratio and access problems.

Mental health coverage was a generally less important objective than other factors in choosing a healthcare plan, but the alternative healthcare plans nevertheless differed considerably in their rankings with respect to the lowest level objectives. Aetna ranked highest in choice of physician, with identical but lower rankings for the other three healthcare plans. Aetna ranked highest in choice of physician, followed by GWU, CIGNA, and Kaiser, who all had similar rankings for this factor. Aetna ranked highest in hospitalization coverage, provided the most comprehensive benefits. Kaiser ranked second for this factor, followed by similar but lower rankings for CIGNA and GWU.

For optometry coverage, Aetna ranked highest in high number of visits allowed, with identical but lower ranking for CIGNA, Kaiser, and GWU. Aetna also ranked highest in lens and frame coverage and contacts coverage, with the other three healthcare plans ranking the same but lower. Lasix coverage was universally poor for all four healthcare plan alternatives considered, but Aetna provided the best coverage for this new and relatively expensive service. Kaiser and GWU ranked next for this factor, with CIGNA providing the lowest Lasix benefits. Choice of physician was best for Kaiser, followed by similar ratings for Aetna and GWU, with the lowest ranking being CIGNA. Kaiser received the highest ranking for choice of physician because they do not provide in-house Optometry benefits, but rather allow the patient to choose any community provider on a quite large “approved” list of providers. Aetna and GWU provide in-house Optometry coverage, while CIGNA simply provides less choice of physician and lower overall optometry benefits.

For prenatal services, Kaiser ranked the highest in high number of visits allowed, followed by Aetna and CIGNA, with GWU ranking lowest in this category. Kaiser has a large and very active OB/Gyn department and utilizes nurse midwives and physician assistants to a large extent, which increases their ability to provide higher number of visits. GWU ranked lowest in this category since they utilize almost solely physicians for prenatal visits, which limits their ability to provide as much service as other healthcare plans. Kaiser similarly ranks highest in lactation consultant and high number of post-delivery in-patient days allowed, followed by identical rankings for Aetna and CIGNA, with GWU ranking lowest for lactation consultant services but CIGNA ranking lowest for number of post-delivery in-patient days. Aetna ranked highest for patient education/lamaze classes, followed by CIGNA and Kaiser, with GWU ranking lowest in this category. Aetna and CIGNA ranked identical and highest for midwife coverage,

followed by Kaiser, with GWU ranking last. GWU health plan provides very limited patient education/lamaze classes and midwife services.

For preventive services, Kaiser ranks highest for disease management program, educational programs, patient self-care handbook, and nurse advice line. Kaiser administrators and physician leaders place very high importance on preventive care programs as a way to reduce costs and enable effective healthcare delivery to a larger number of plan enrollees utilizing less physicians per patient than other healthcare plans. CIGNA and Aetna ranked next highest for disease management programs, with GWU ranking lowest. Similarly, Aetna and CIGNA ranked next highest to Kaiser in educational programs, but Aetna ranked slightly higher than CIGNA, with GWU again ranking lowest in this category. Aetna ranked highest for the patient newsletter sub-objective, since it simply provided a much more comprehensive and superior newsletter, with the other three healthcare plans ranking identically and lower, providing a much more limited patient newsletter. Aetna, CIGNA, and GWU ranked the same but lower for the patient self-care handbook than Kaiser, the difference being primarily the higher quality of the Kaiser self-care handbook. The three other healthcare plans ranked much lower for a nurse advice line, since none of them provide a 24 hour nurse advice line. However, Aetna ranked slightly higher than CIGNA in this category, with GWU ranking lowest. GWU ranks lowest for a nurse-advice line since they provide very limited services in this category, preferring to simply utilize their acute care clinic and emergency room to answer any questions that patients have outside of normal provider appointments.

Sub-Objectives With Respect To Objectives

The sub-objectives (as indicated below) were assessed with respect to the objectives of cost, quality of care, mental health coverage, optometry coverage, prenatal care, and preventive care based almost solely upon surveys of employees of Newbridge Networks. Employees were asked to compare the relative importance of the various sub-objectives against each other with respect to the particular objective. For costs, premiums were the most important factor, with maximum coverage being the least important factor. Maximum coverage is relatively unimportant to Newbridge Networks employees since they are relatively young and healthy and would rarely have the need to utilize enough healthcare services to approach the maximum amount of healthcare cost coverage. Deductibles are a little more important than co-payments, probably because most of the healthcare plans have the same co-payment (e.g., \$10 per visit). Such homogeneity of co-payments across the four healthcare plans being considered renders this sub-objective relatively unimportant in differentiating the choices of alternatives.

For quality of care, patient satisfaction was much more important than all other factors, with choice of physician being the second most important factor. Newbridge Networks employees considered these two factors more important than objective measures of quality, such as healthcare plan accreditation, board-certified physicians, and patient education. Placing a heavy importance on patient satisfaction and choice of physician reflects the relatively high education and independent-minded character of the workforce

of Newbridge Networks. Although NCQA and JCAHO accreditation were slightly more important than board-certified physicians, it is important to note that all four healthcare plans being considered staff their clinics and hospitals with more than 98% board-certified physicians, so this is not a good differentiating factor in evaluating choice of healthcare plan.

For both mental health care coverage and optometry coverage, choice of physician and high number of allowed visits were the most important sub-objectives. This again reflects the relatively high educational, socioeconomic, and independent-minded character and status of the Newbridge Networks workforce. Mental health hospitalization coverage was the least important factor, probably the Newbridge employees are relatively young, health, and low utilizers of mental health services. For optometry coverage, lens and frame coverage was the most important factor after choice of physician and high number of visits allowed. Lens and frame coverage is somewhat of a “luxury” item for employees but is becoming an increasingly more important differentiating factor in choosing a healthcare plan. For the significant large percentage of employees of computer and technology companies, such as Newbridge, who wear glasses and/or contacts, good optometry coverage of frames and lenses is important in encouraging an employee to choose this healthcare plan over one that does not offer this service. Contact coverage is less important than lens and frame coverage, probably because this has not traditionally been offered as a benefit by very many healthcare plans. LASIX is the least important optometry coverage since it is a new procedure and almost not healthcare plan offers significant benefits regarding this new service.

For prenatal care, patient education/lamaze classes and high number of post-delivery days allowed were important, with lamaze classes being a little more important to Newbridge employees. The large number of educated and health-conscious childbearing-aged employees at Newbridge Networks place more emphasis on lamaze classes and post-delivery days than other factors. High number of visits allowed was next in importance, with lactation consultant and midwife coverage being less important. Midwife coverage is still a relatively rare healthcare coverage and is not extremely popular among patients, who mostly prefer M.D. physicians to deliver their babies than nurses. Lactation consultant coverage is gaining in popularity, particularly with recent education efforts and endorsements from the American Academy of Pediatrics, but is still not an extremely widespread practice.

Among preventive services, a 24-hour nurse advice line is considered by most Newbridge employees to be the most important factor, but is not a crucial differentiating factor in choosing a healthcare plan since almost all plans provide this coverage. Educational and disease management programs are next in importance after a nurse advice line. Such programs are mostly popular to female employees, who place importance on such preventive services as pap smears, mammograms, and childhood immunizations. Men statistically use preventive services less, but such programs increase in importance as men reach older ages when disease prevention becomes more important. A patient newsletter and self-care handbook were ranked least in importance, probably because

people in general want to speak directly to healthcare professionals about health issues rather than look up such information in newsletters or handbooks.

Objectives With Respect To Goal

The objectives of cost, quality of care, mental health coverage, optometry coverage, prenatal care, and preventive care were assessed with respect to the goal of choosing the best healthcare plan for employees of Newbridge Networks based again almost solely upon surveys of employees of Newbridge Networks. Employee preferences were evaluated using this technique and were unique to the particular demographic constitution and preferences of this company. Quality of care was considered by most employees to be the most important aspect of choosing a healthcare plan, with cost being the second most important factor. Other characteristics, such as mental health coverage, optometry coverage, prenatal care, and preventive care, were substantially less important than quality of care and cost. However, comparisons of their relative importance reveals insight into the preferences and demographics of employees of Newbridge Networks. Mental health coverage was less important than the other factors, probably because the employees of Newbridge Networks are, as a whole, relatively young, well paid, successful, and free of significant of mental health issues. It is difficult for such successful and well-paid professionals to have achieved so much education and success in their lives with concurrent mental health problems. Next to quality of care and cost, prenatal care was the next most important factor, pointing to the relatively large number of young, successful, educated, childbearing and family-oriented women in the company. Preventive care was slightly more important than Optometry coverage, but still less important than quality of care, cost, and prenatal care.

SYNTHESIS

In order for an organization to make a rational decision on a complex issue such as we are working on here, the decision makers need to know which alternatives best achieve their varied objectives, they must be able to synthesize their data. That is what the EC modeling software does for us. Once we have entered the judgements described above into the software, the information is synthesized to achieve an overall preference with respect to our goal and based upon how we ranked our objectives and sub-objectives.

Aetna US is the best healthcare choice for the employees of Newbridge Networks based on the subjective judgments and survey data we made in this model.

SENSITIVITY ANALYSIS

A performance sensitivity graph (Figure 1 below) shows how each alternative performed with respect to each of the major objectives. Near the lower part of the graph, you will notice the relative importance of each objective represented by vertical bars.

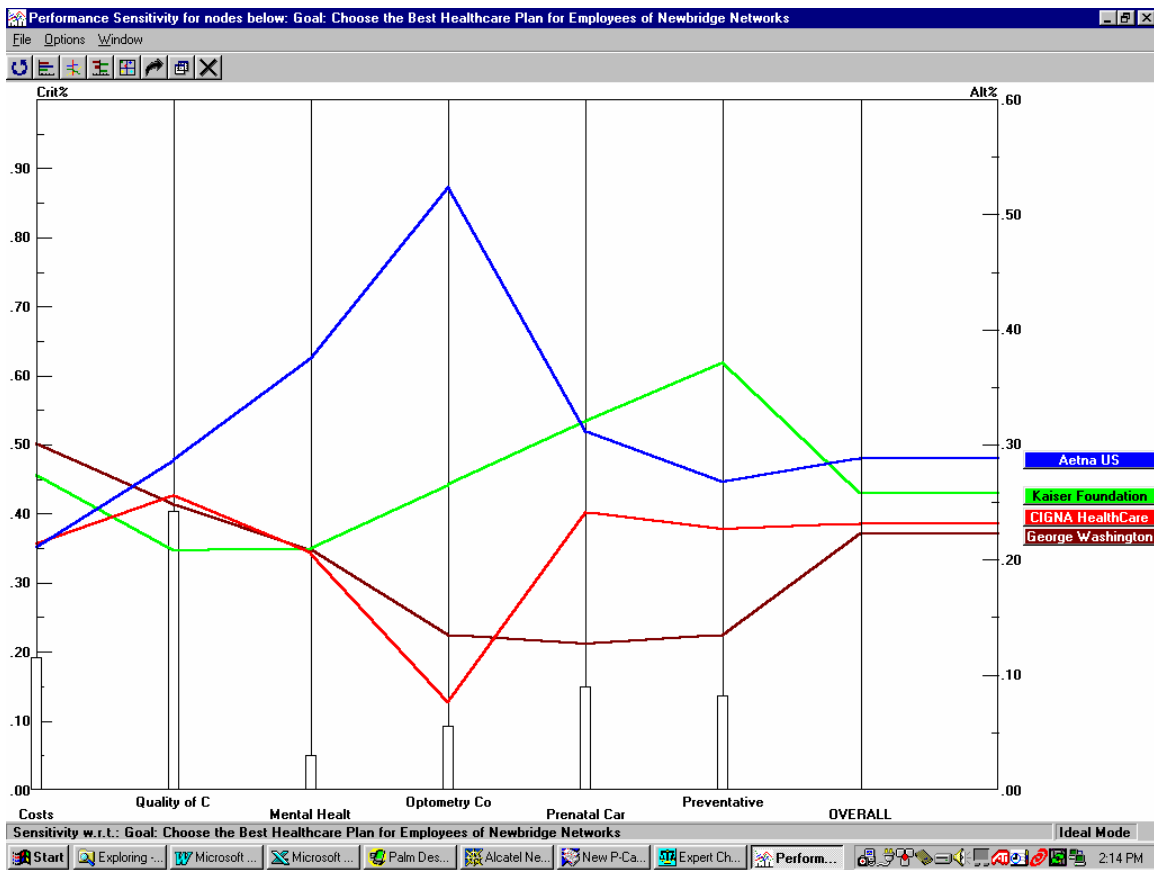


Figure 1 – Performance Sensitivity

The performance of each alternative with respect to each objective is shown on the graph. Overall performance of each alternative is shown on the vertical line at the far right hand side of the graph.

Ordinal, interval and ratio relationships are shown in the graph. For example, Aetna US, depicted by the blue line segments, is forth best for the cost objective, best for quality and optometry, second best for prenatal and preventative care, and the best overall alternative. Notice that in addition to this ordinal information, the graph also accurately depicts interval and ratio relationships among alternatives with respect to each objective. For example, the graph shows a very small interval between the George Washington and CIGNA Healthcare alternatives with respect to the optometry objective, but shows a very large interval between Kaiser and Aetna.

Also, the interval between the best overall alternative, Aetna, and the second best, Kaiser, is extremely large with respect to mental health and optometry, significant with respect to quality, nearly equal with respect prenatal care, and Kaiser is slightly better with respect to costs and preventative care. This is important and shows that the way we developed our objective preferences was very instrumental in how our decision was modeled.

Ratio interpretations are also quite insightful. A dynamic sensitivity graph of the original model is shown in Figure 2.

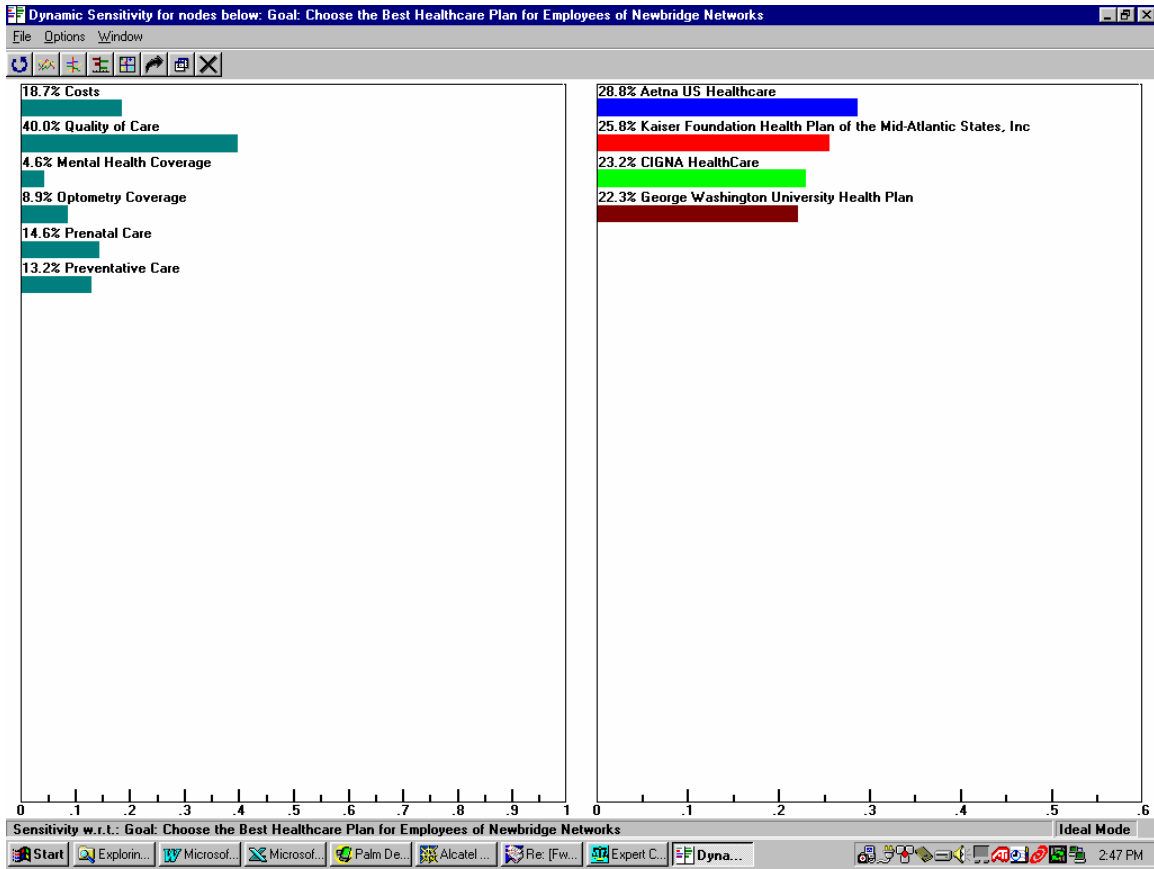


Figure 2 – Dynamic Sensitivity

Suppose that we thought that the importance of Preventative Care might become more important than the 13% shown. Preventative Care is the objective on which Aetna’s closest alternative, Kaiser, scored significantly better than Aetna. By pulling the preventative care bar to the right, each of the other objectives bars decrease in proportion to their original priorities. The overall priorities of the alternatives change as well. The dynamic sensitivity graph with the preventative care objective increased to double its original value is shown in Figure 3.

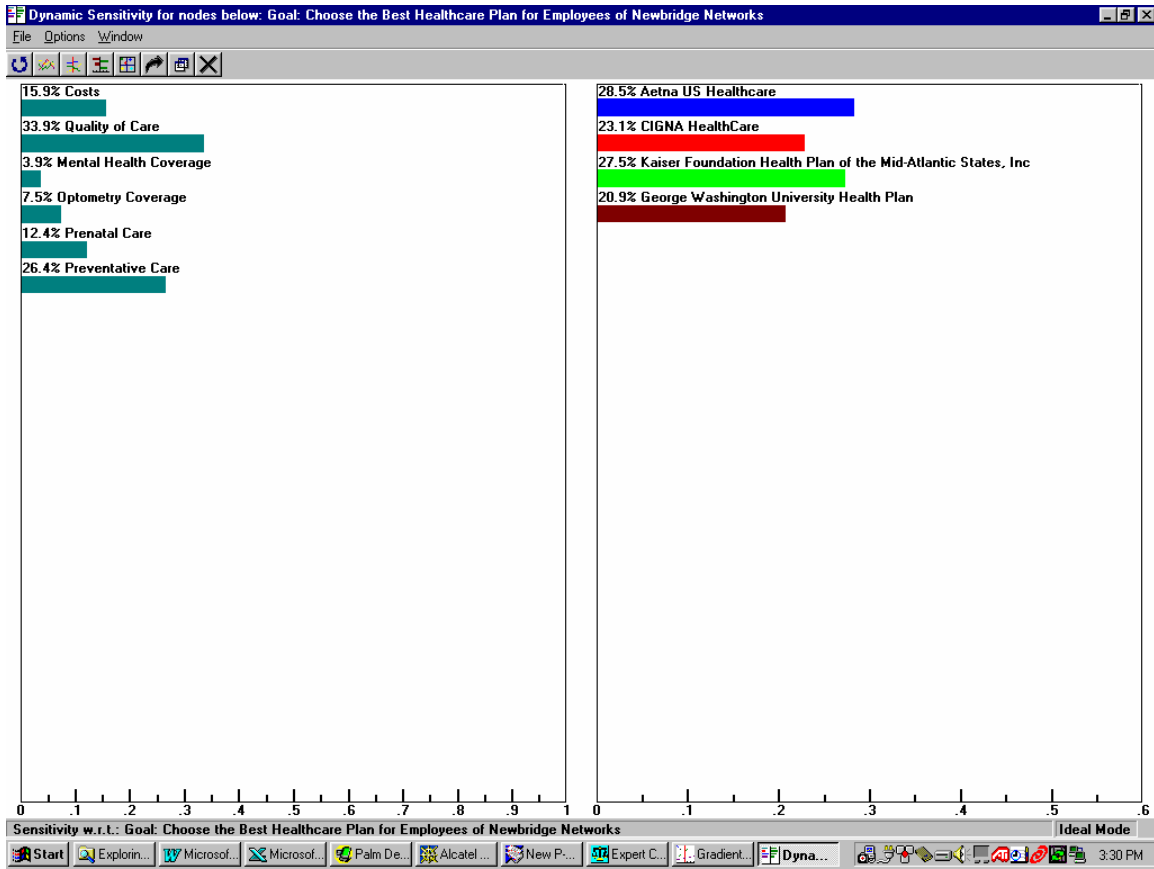


Figure 3 – Dynamic Sensitivity After Doubling Preventative Care

The overall priority of the Aetna US alternative decreased while the priority of Kaiser increased. However, Aetna is still the preferred alternative. In fact, if you were to decide that costs or quality or any of the other alternatives was twice as important as originally judged, Aetna would still be shown to be the best choice. Thus, the original model is basically insensitive to even a doubling in priority of any individual objective.

A gradient sensitivity graph for the preventative care objective is shown in Figure 4.

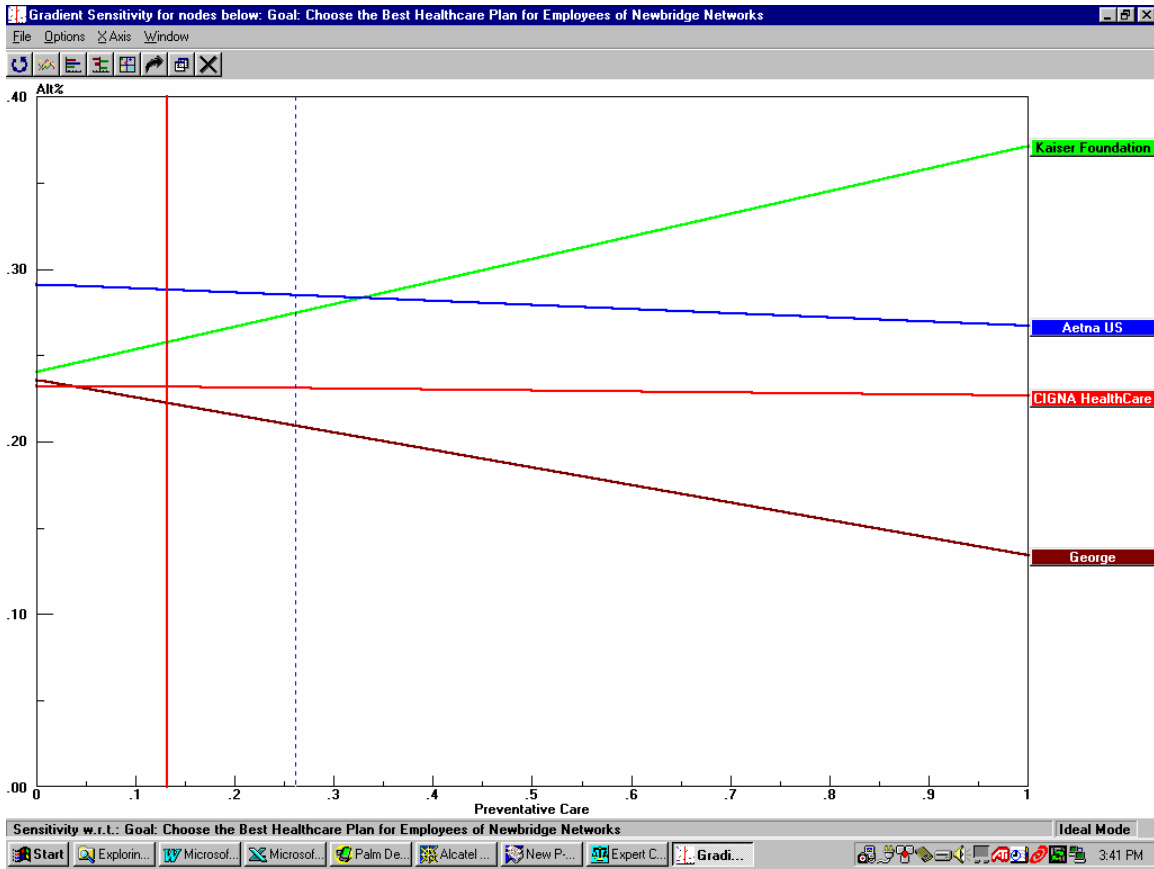


Figure 4 – Gradient Sensitivity

The red vertical line shows the original priority of preventative care is about 13%. The slope of each of the other alternative's lines represents the rate of change in priority of the alternative as the priority of preventative care is changed. For example, the priority of the Aetna alternative would decrease while that of Kaiser would increase if the priority of the preventative care objective were increased by moving the red bar to the right. The dashed blue line in the gradient sensitivity plot corresponds to doubling the importance of the preventative care objective on the dynamic sensitivity graph. Aetna is still the preferred. However if preventative care were increased to beyond about 35%, Kaiser would become the preferred alternative.

A graph of the differences between the top two alternatives is shown in Figure 5.

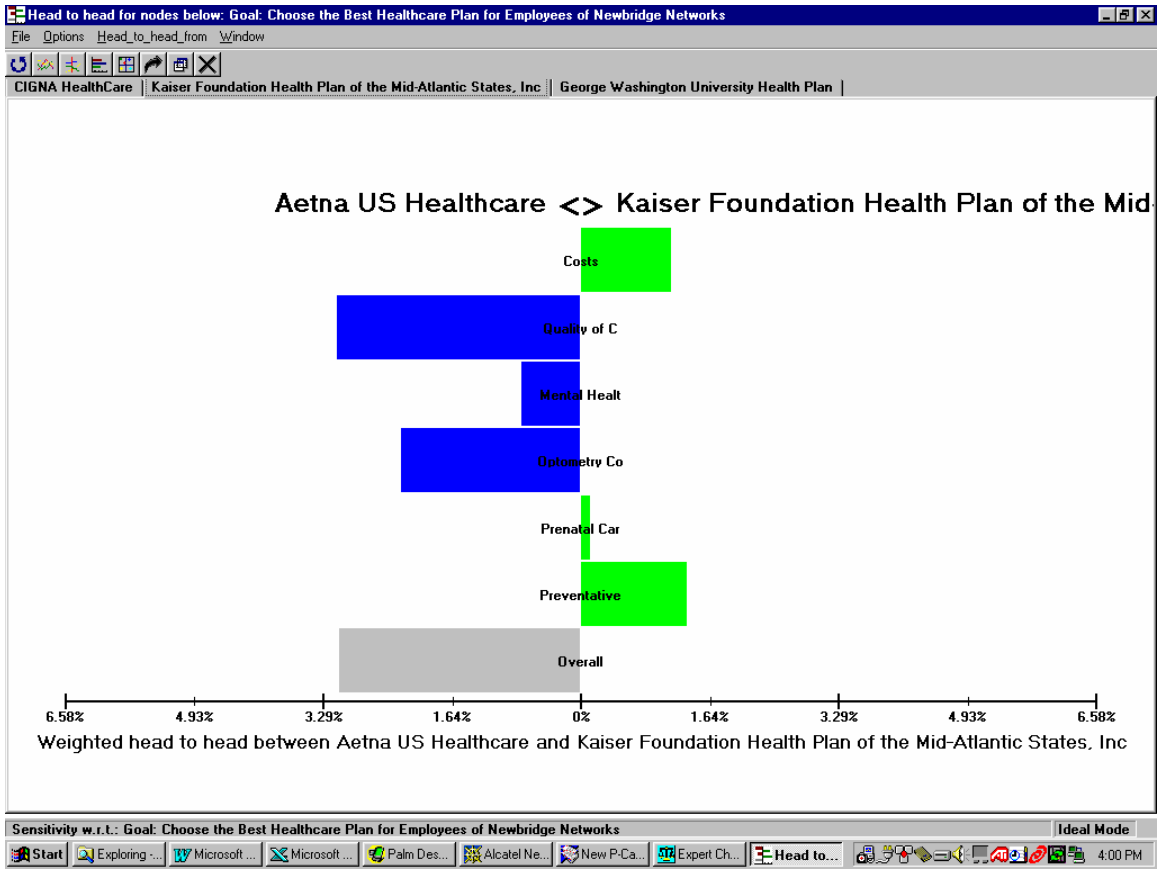


Figure 5 – Difference Sensitivity

Aetna is preferred to Kaiser on quality and optometry by a very large margin, and slightly on mental health. Kaiser is preferred to Aetna preventative care and costs, but less so on prenatal care.

JUSTIFICATION AND CONCLUSION

The human resources department at Newbridge Networks was presented with the results of this decision model. We explained that the Expert Choice modeling software we used incorporates the analytic hierarchy process that allowed us to model this complex decision in a structure that shows the relationship of the goal of selecting a good health care plan to the selection criteria and the alternative plans that we compared. We explained that based on our modeling, Aetna U.S. Healthcare is the best choice of HMO for Newbridge Networks.

The performance sensitivity analysis above (Figure 1) clearly illustrates that Aetna ranks higher in most objectives evaluated for this model, including Quality of Care, Mental Health coverage, Optometry coverage. Aetna is also ranked very high in Prenatal Care and Preventive Care. The only deficiency of Aetna in this model is ranking last in Cost, but employees of Newbridge Networks are demographically mostly young, well paid, and single and, hence, would probably be more interested in high quality healthcare than saving a little money on monthly premiums.

Choosing a healthcare plan for a company is a complex process that must take into account many factors. Employees and employers must work together to decide which objectives are the most important and decide based upon careful, detailed, iterative, and dynamic analysis of all variables involved which healthcare plan best serves the best interests of all stakeholders involved.

Overall, the presentation of our results to the human resources department was favorably received. They agreed that they would use the information we had presented them as they continue to formulate their healthcare offering. It was difficult however, to convince them that our modeling was conclusive and Aetna was indeed the best overall choice.

APPENDIX

Appendix A: HMO Choice and Quality Survey of 18 Individuals

HMO Survey (Thanks for filling this out!)

Directions: Just place an "X" along the row between Factor A and Factor B indicating the relative importance of one factor over the other in choosing an HMO.

Major Objectives - Importance Ranking																				
	<u>Factor A</u>	<u>Factor B</u>	9	8	7	6	5	4	3	2	0	2	3	4	5	6	7	8	9	
		Scores																		
1	Cost	Quality of Care	0	4	5	7	5	6	5	-4	8	8	5	6	5	7	0	5	6	7
2	Cost	Mental Health Coverage	5	5	-7	0	5	4	0	4	2	0	0	0	2	4	-5	0	6	5
3	Cost	Optometry Coverage	0	5	-7	3	-5	2	4	4	4	6	4	4	4	5	-2	0	2	5
4	Cost	Prenatal Care	0	4	-7	4	-9	8	5	7	9	8	5	-3	2	7	5	-9	9	6
5	Cost	Preventative Care	0	0	0	7	-9	6	4	3	9	8	4	4	5	7	0	4	2	-7
6	Quality of Care	Mental Health Coverage	5	-5	-7	-4	0	4	-8	6	-8	-8	-8	-3	0	-3	0	-5	-7	6
7	Quality of Care	Optometry Coverage	8	-5	-7	-7	-5	3	0	6	-8	-6	0	-3	0	-2	0	-5	0	-7
8	Quality of Care	Prenatal Care	8	-5	-7	-5	-9	8	0	8	-2	-4	0	-6	0	-7	0	-5	0	-9
9	Quality of Care	Preventative Care	8	-5	-7	0	-9	-6	0	3	-2	2	0	-3	0	-7	0	-5	0	-7
10	Mental Health Coverage	Optometry Coverage	8	5	0	6	-9	0	8	0	7	8	8	6	6	4	4	0	7	6
11	Mental Health Coverage	Prenatal Care	8	5	0	6	-9	8	8	7	9	8	8	-3	7	7	6	0	7	-8
12	Mental Health Coverage	Preventative Care	8	5	0	0	-9	-3	8	-3	9	8	8	6	8	7	3	0	7	8
13	Optometry Coverage	Prenatal Care	8	5	0	-7	-9	9	8	7	8	6	8	-4	7	0	3	-6	8	-8
14	Optometry Coverage	Preventative Care	8	0	0	0	0	5	8	-3	8	4	8	6	7	3	-3	0	2	8
15	Prenatal Care	Preventative Care	8	-7	0	3	9	-6	0	8	0	-4	0	6	4	0	-5	5	0	8
16	Board-Certified Physicians	Choice of Physician	0	-7	5	5	5	7	-8	0	0	0	-8	4	8	6	4	7	5	8
17	Board-Certified Physicians	Hospital/HMO Accreditation	0	6	2	5	-9	6	5	0	0	-5	5	-6	5	6	-2	2	0	-8
17	Board-Certified Physicians	Patient Education	0	0	0	5	-9	0	5	-4	-3	4	5	-6	5	6	6	3	-2	-7
18	Board-Certified Physicians	Patient Satisfaction	0	2	0	5	5	7	0	-6	0	5	0	5	6	6	8	8	-2	8
18	Choice of Physician	Hospital/HMO Accreditation	0	6	3	2	-9	0	5	0	-3	-6	5	-6	-3	-6	-4	-8	0	-8
19	Choice of Physician	Patient Education	0	-7	-3	0	-9	0	0	5	-3	0	0	-6	0	-6	-2	-8	0	-8
19	Choice of Physician	Patient Satisfaction	0	0	3	0	0	7	0	5	-3	0	0	5	0	5	2	4	0	0
20	Hospital/HMO Accreditation	Patient Education	0	-6	0	2	-9	-7	0	4	-3	4	0	0	0	4	4	0	4	4
20	Hospital/HMO Accreditation	Patient Satisfaction	0	2	0	4	9	7	0	4	-2	7	0	5	3	3	8	6	0	8
21	Patient Education	Patient Satisfaction	0	5	0	-4	9	7	5	0	5	4	5	5	5	3	5	6	0	8