Health Care Policy Alternatives

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1 INTRODUCTION

The current mode of analysis of HealthCare expenses is based upon the analysis of the microstructure, namely the unit costs. Thus, the effort is on reducing the cost per visit, the administrative costs, the cost per procedure and the other such micro cost elements. In contrast, there have been several studies performed that have addressed the HealthCare system from a macro approach. Specifically, viewing HealthCare delivery from the perspective of the diseases and disorders that lead to morbidity and mortality. This paper takes the latter approach and using this then looks at the micro approach. From this, therefore, one can then obtain a more effective means to develop public policy alternatives to HealthCare.

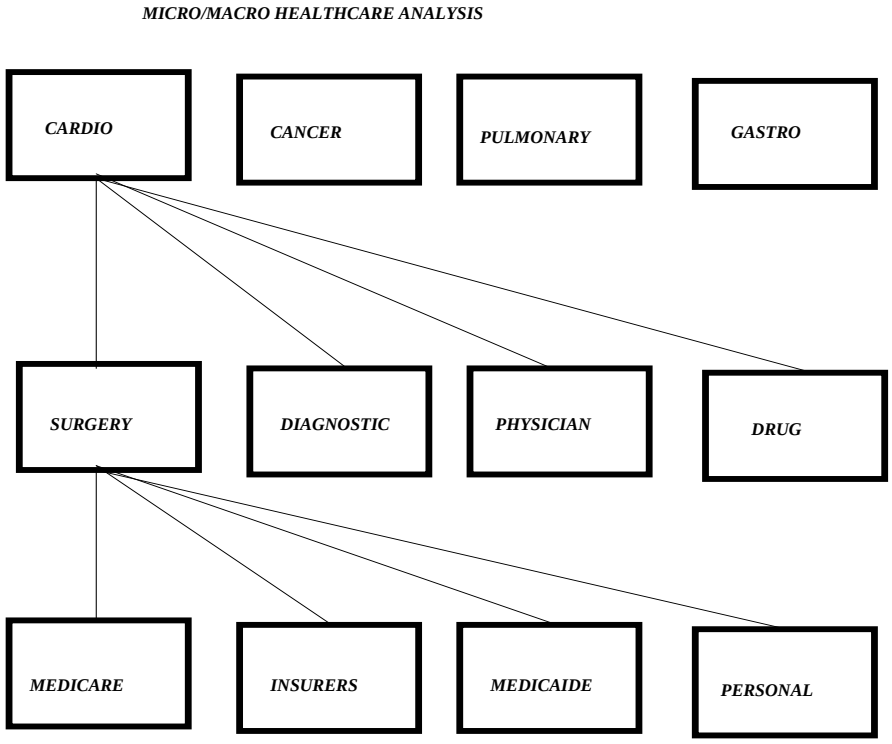
We begin by considering the three level approaches to HealthCare; disorders and diseases, procedures and unit costs, providers and payment systems. Figure 1.1 depicts the elements of these three layers. Let us consider these in some further detail:

Diseases: These are the ultimate drivers in any health care system. Clearly, reducing diseases reduces the demands on the system, no matter what the unit costs are. There are many things that can be done to reduce the disease profiles of a society, from immunization, to education to extensive screening and testing. It will be argued in this paper that the current mode of health care delivery inadequately addresses all of these three strategies to input or demand reduction. As a measure of the elements in this category we shall use the ICD-9 list of diseases and disorders.

Procedures: The procedures are the set of medical intervention steps taken from the time the patient presents with the set of initial symptoms until resolution. The current CPT codes represent an adequate list of typical procedures. With procedures there are two factors; the number and type of procedures performed and the unit cost per procedure. Of the latter, the unit cost is composed of labor, overhead and other costs. Thus to reduce costs, the number of procedures per disease can be reduced, the unit costs can be reduced or the elements of the unit cost. We shall argue that there are elements of the unit cost that are directly amenable to cost reduction. Unfortunately, the procedures are less amenable.

Providers: The providers are the third leg of this process. The providers pay in one of several ways. The independent third party insurers pay on a fee for service basis, Medicare pays on a DRG basis for hospital care and Medicaid pays a low total fee schedule rate. There are costs for the payment element. The costs are the direct costs of the insurer but there are also the indirect costs of the physician and all other players in the food chain. Specifically, as we shall show, 30% of all Medicare claims in New York are rejected on first pass. Ultimately physicians give up totally on 20%. This just increases the burden on third party payers.

Figure 1.1 Paradigms of Micro and Macro Analysis

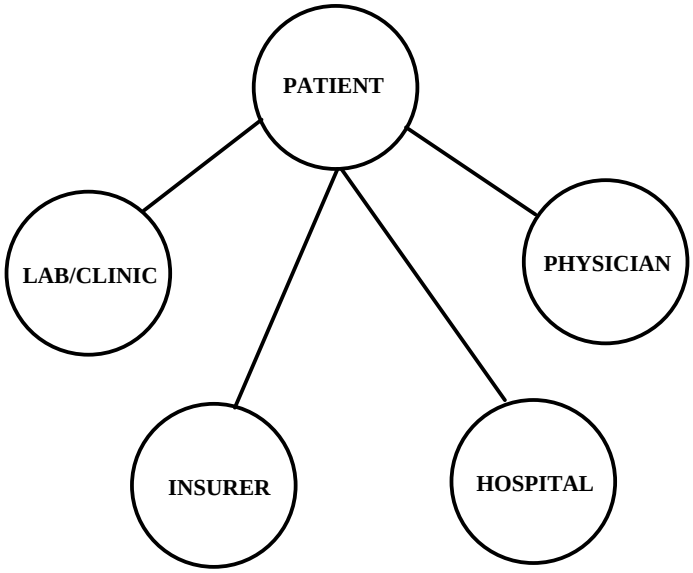


In this study we shall first focus on the patient and the disease process, recognizing that it is the driver of the total health care economic process. Specifically we shall focus on demand. Then we shall focus on the unit cost elements in the process. We shall examine the totality of unit costs and then detail the cost elements showing where significant savings may be made. Finally we shall detail the results on new and innovative payment structures.

The study ends with a set of detailed policy recommendations in each of these three areas. The study is fundamentally based upon a detailed economic model that is built around this fundamental paradigm of three layers.

As we move forward, Figure 1.2 will be used to demonstrate the interaction between all of the players in this study. From an economic point of view we must evaluate the effects and impacts on all of the players in this area. From a public policy perspective it is necessary to determine the impact on the players in the dynamic of the delivery of quality health care.

Figure 1.2 Key Players and Linkages



The relationship of each of these players is key to understanding how to change, by policy factors or inherent controls, the overall costs structure. Health care must be viewed from both the demand and supply side. The over-riding goal is demand reduction for the improvement of quality of life.

To develop the policy issue we pursue a five point analysis. Specifically;

Epidemiological: First we review the epidemiological factors in this process. The demographic base of health care consumers if one of these elements. The second element is the distribution of diseases in this population. The argument made in this paper is that it is the demographic and disease profile that drives the entire process and not the unit costs. The unit costs are a reflection of internal operational efficiencies or inefficiencies.

Measurement and Management: Having established the basis of diseases and demographics as the ultimate driver, we then demonstrate how this can be measured on a micro basis and how this measurement process can be tied to quality of care delivery. We argue that price control is not the issue. Efficiency, productivity, and quality of care are the factors. We further argue that to better understand the direction to go in restructuring the HealthCare establishment it is necessary to do so in a fashion that ensures quality care. To provide quality care and in turn gains in productivity requires a paradigm shift in measurements regarding the results. This is a critically new mode of observation.

Technology Factors: Technology is the enabling agent for introducing productivity changes. The current approach to HealthCare is highly fragmented and there is a great deal of criticism of the technology that is applied. We develop a technology policy direction and provide three cases for study of how a totally integrated technology system and approach can achieve significant productivity gains.

Operating Cost Elements and Control: The epidemiological elements of the study show where the drivers are for the HealthCare field. The cost elements show where the expenses are going. The approach is to drive down the drivers as inputs to the HealthCare system, and to then also reduce the unit costs through productivity. Having shown the impact of technology, we then, in this area, develop a broad set of rules for the management of the cost side. Again, measurements and management of the quality of care and the process of care is the key element.

Policy Implications: Herein lays the most difficult choice to proceed. Policy relates to who gets what and who pays for what. We first develop a philosophical alternative base for the delivery of HealthCare. It is essential to understand what the underlying world view is that we are using in approaching HealthCare and from that see if committing world views lead to the same results. We develop an approach to policy development that uses the deconstructionist approach taken in other areas.

2 A HEALTH CARE DEMAND MODEL

The first step in developing an analysis and set of policy alternatives for Health Care is the development if a viable model for the demand function for this area. In this section we develop such a function and show that it is a complex interrelationship between the underlying population dynamics, the genetic structure of the population, how well it currently takes care of itself, and how well it can do, so in the future. Specifically, we develop a dynamic demand model that also combines the cost factors in the demand model. There are three factors that must be considered in such a model;

(i) Underlying structure of zero cost demand. Namely, how health is the population and what is the unit demand at a zero cost structure.

(ii) Dynamics of zero costs demand are related to actions taken today and their effect on the demand at a later time.

(iii) Cost sensitive demand can be obtained through free market pricing information and the implications of procedures on price.

We first review some epidemiological factors and then develop the zero cost based model. Finally, we use studies of cost based demand to structure a cost based model.

2.1 Epidemiological Factors

The overall epidemiological factors are the basis of the macro approach. In this section we review some of the key factors that show where the funds are currently flowing in the context of diseases, rather than procedures. In the context of the data recorded, the approach is to focus on the ICD-9 data rather than the CPT codes, which are micro and procedure related.

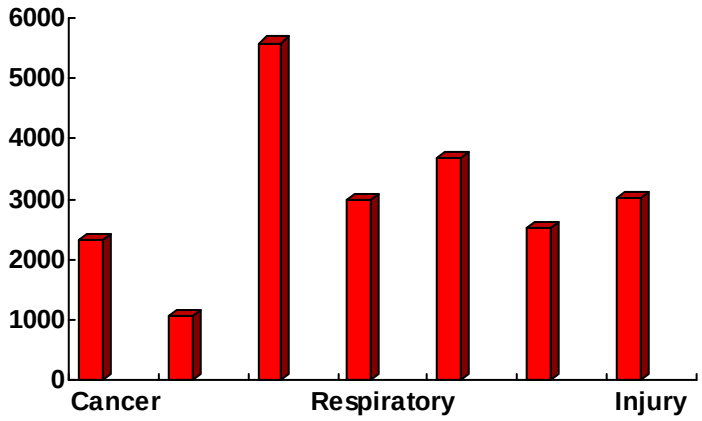
Figure 2.1 depicts the comparison of the number of patient discharged from hospitals in 1987 for the indicated diseases. The following observations are important.

- *Circulatory diseases are the dominant diseases. Almost three to one to neoplasia, the circulatory diseases take the most significant toll.*

- *Digestive, respiratory and injury admissions are also greater than neoplasia.*

- *AIDS is not even listed in this category. In 1992, the AIDS related discharges is estimate at less than 100,000, which is a factor of ten less than the smallest on this chart, namely for endocrine disorders.*

Figure 2.1 Hospitalization Rates Based upon Major Diseases



Now when one focuses on neoplasia, there are four major neoplasia that dominate; lung, breast, colon and prostate. The prostate rate is almost that of females, both in occurrence and in mortality. The colon rate is more comparable, and the lung rate is still disproportionate.

The following observations can be made:

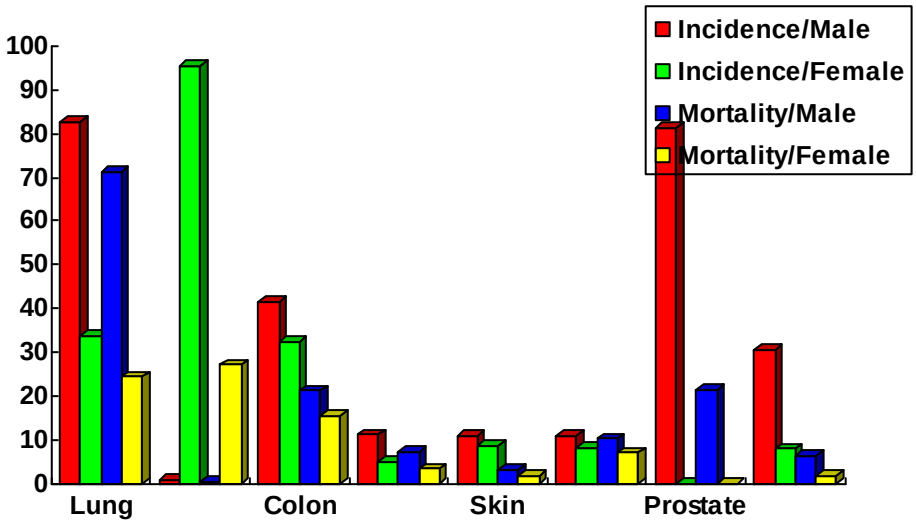
- *Lung cancer is primarily caused by the use of tobacco. It is estimated that there is a twenty year gestation period and that if tobacco is eliminated that this carcinoma can be reduced by a factor of one hundred.*

- *Breast cancer can be reduced in mortality and morbidity by effective mammography.*

- *Colon cancer can be eliminated by bi-annual colonoscopy. It also has a twenty year gestation period and has been noted by Vogelson it can be eliminated if the polyp, adenoma, is removed before turning into an adenocarcinoma in situ.*

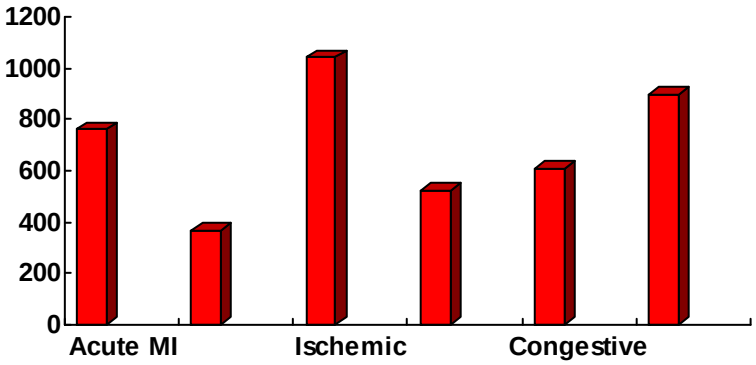
- *Prostate cancer can be eliminated by the use of the PSA test, the prostate specific antigen. PSA allows for early detection and reduction of mortality to a very low number and a dramatic reduction in morbidity.*

Figure 2.2 Rates per 100,000 of Primary Cancers



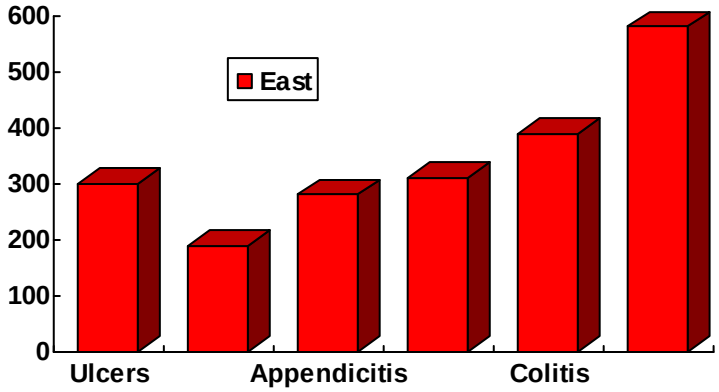
The greatest disease in terms of mortality and morbidity is cardiovascular diseases. These diseases, as shown in Figure 2.3, account for the most hospitalizations and a dominant portion of the health care budget. Acute MI, Atherosclerosis, and ischemic disorders are heavily related to smoking and diet. In effect they are manageable through careful and consistent monitoring, management and care.

Figure 2.3 Cardiovascular Rates

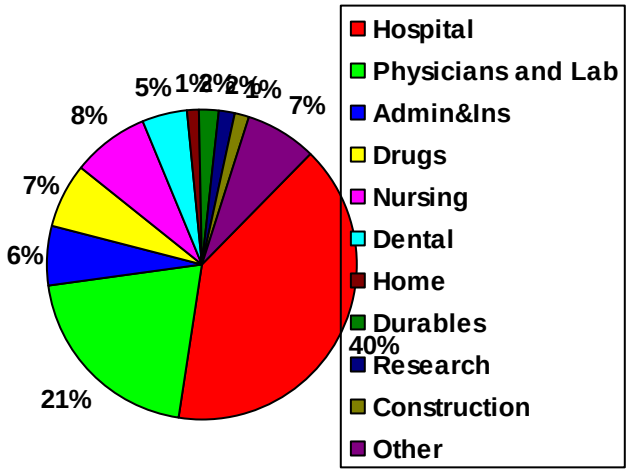


Gastrointestinal disorders rate third in the overall categories. These are generally not related to direct external impacts although they are related to stress and possibly diet.

Figure 2.4 Gastrointestinal Diseases



In the following section we shall take this disease rate structure and blend it into the cost base. We can see from the above summary, however, that there are a finite set of diseases that contribute to the most significant costs. The most common being the top five cancers (lung, breast, colon, prostate, and lymphatic), and heart diseases. These are the big hospital expenditures. They yield the most costs in the system. The total expenditure based upon the 1992 HHS expenditure base are shown in the following chart:



What this chart tells us is simple. The dominant expenses are related to physician and hospital care. As we shall see, this care costs a great deal because of the infrastructure. These costs are controllable, and it will be the goal of this paper to show how these controls can be affected. We cannot expect to achieve costs controls by making people better. We must focus on controlling costs by doing things better.

2.2 Zero Cost Demand Models

The zero cost demand model takes into account many factors of demand that are endogenous factors. Specifically, let us define the probability that a person will get a certain disease at a certain time as conditioned on the following factors:

(i) Demographic: The age, sex, education, and their demographic factors will be a condition. Let us define the demographic factors by the general vector, **d**.

(ii) Genetic: The genetic makeup of a specific population will also presuppose an individual for a certain disease. It is known, colon cancer, melanoma, heart and cardiovascular diseases are all genetically linked. Let us define the genetic factors by the general vector, **g**.

(iii) Environmental: There are similarly environmental factors, such as sun exposure, pollution exposure, food additives, etc. that will pre suppose one for disease. Let us define these factors by the vector, **e**.

(iv) Life Style: Let us define these factors by the vector, **s**.

(v) Health Care Availability: Let us define these factors by the vector, **a**.

(vi) Price or Cost: Let us define these factors by the vector, **c**.

Finally, let us define a disease, or disease state, **m**, as a certain disorder or set of disorders. Then we can define the probability density of a disease given the set of conditioning variables as:

$$p\left(m/d,g,e,s,c,p;t\right)=probability\_density$$

Now, the probability of a disease m, in period T, say a year, is given by the following:

$$p\left(m/T\right)=\iiint\ p\left(m/d,g,e,s,c,p;t\right)p\left(d,g,e,s,c,p/t\right)dddgdedsdc$$

What this states is that there is an underlying random process system that can be modeled and that these probabilities can be developed and furthermore that there is a control process that can shift the sets of probabilities.

Let us consider a set of examples. Start with the demographic factor, d. We know that with birth and death type dynamics in the population that the d vector distribution is of the dynamic form;

$$\frac{dd}{dt}=f\left(d,t:\right)$$

Here we assumed that this function is independent of the other variables. However, we know that this can be expended to include, g, and other factors. For each of the other viable we can generate a similar equation for the dynamics. Specifically, if we define:

$$x = \begin{bmatrix} d \\ g \\ e \\ s \end{bmatrix} = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix}$$

Then we have the general expression;

$$\frac{dx}{dt} = f\left(x, t:\right)$$

Knowing these dynamics, we can then generate a model for the probability density for m; specifically, we append m to the x vector;

$$x = \begin{bmatrix} d \\ g \\ e \\ s \\ c \\ m \end{bmatrix} = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \\ x_6 \end{bmatrix}$$

Then we can write;

$$\frac{\partial p}{\partial t} = L^{+}\left(p : t\right); L^{+} = Forward\_Operator$$

This states the following in simple terms;

- The dynamics of the six general state variables can be determined from the dynamics of the human population.
- The probability of any variable can be determined via the dynamics of the process and the underlying relationship between the processes.
- The disease state are well defined statistically in a dynamic fashion through a random process description.

Now we can take this model and develop several key conclusions. Let us consider the following elements in a population. Let N(t) be the total population at time t. Then we have from the standard birth and death equations:

$$\frac{dN(t)}{dt} = \lambda(t)N(t) - \mu(t)N(t);$$

where; $\lambda(t) =$ *birth rate,* $\mu(t)$*= death rate.*

Now we also note that if this population is getting ill at a certain rate then we have;

$N(m,t) = p(m/t)N(t) =$ *percent with disease m at t;*

and;

$\mu(t) = \int p(m/t)\eta(m)dm;$

where $\eta(m/t)$ *is the death rate of disease m.*

Let us now consider the costs associated with each element. Let C be the associated unit costs per disease per person, and let us define the total costs as:

$$C_{Total}(T) = \sum_{m=1}^{M} C_m N(m/T)$$

Let us assume that there are M diseases. Let us assume that we order them in ascending order of frequency, namely;

$m = 1;$ *if* $p(m = 1/T) > p(m = k/T); \forall k;$

etc.

Then we can set the costs to;

$$C_{Total}(T) = \sum_{m=1}^{M} C_m p(m/T)N(t);$$

$$= \sum_{m=1}^{M} C_m p_m N$$

If the cost per disease is further ordered by the descending order of costs we may obtain another sequence. Further is we order the sequence by total costs per disease per person we have;

$$C_{Total}(T) = \sum_{m=1}^{M} C_m p(m/T) N(t);$$
$$= \sum_{m=1}^{M} C^m N; where\ C^m = C_m p_m$$

However, in this case we do not have descending cost units.

Now consider two cases. Case 1 is the current costs, and Case 2 are the costs when we change the distribution in disease states. We shall assume the following:

Case 1: Existing Distribution

Let us assume the current distribution of diseases and costs per disease. Then the total costs are;

$$C^1{}_{Total}(T) = \sum_{m=1}^{M} C^m N$$

We can order these by decreasing costs per individual.

Case 2: Distribution After Health Redistribution

Let us now consider two disease states. Let k be colon cancer and let j be myocardial infarction. Let us assume that we have a simple case where we perform a colonoscopy on each person every year and through that we recognize and eliminate colon polyps from every individual. Let us assume that C of the disease k is the costs per person of this colon cancer reduction. Let us simplistically assume that all people eventually die, and that if it is not colon cancer it is a myocardial infarction. Then we move those from the colon cancer file to those in MI. The costs are shifted as in the following equation:

$$C^2{}_{Total}(T) = \sum_{m=1}^{M} C^m N = N(C^k + C^j + \sum_{m=1; m\neq k, j}^{M} C^m)$$

The cost difference between case 1 and case 2 are:

$$C^1_{Total} = C^k_1 + C^j_1 < or > C^2_{Total} = C^k_2 + C^j_2$$

which simply stated is that merely "curing" one disease may do nothing more than shift the costs elsewhere. This leads to the following theorem:

Theorem: (Fundamental Theorem of Health Cost Containment)

For any population, and any disease distribution and any costs profile, a reduction in cost can be achieved if and only if the unit total costs are summarily reduced. No cost reduction is necessarily achieved by the elimination of any single disease state without a commensurate in the second order disease state.

3 MEASUREMENT AND MANAGEMENT OF QUALITY AND COST

Quality assurance in health care focuses on the issue of the effective procedures being applied for the proper disorder. Cost containment focuses on the need to use the least number of effective procedures while keeping quality at an acceptable level. This section addresses the confluence of these two issues and recommends an approach that dynamically and adaptively co-opts the physician into the process of assisting in both directions, while minimizing the inherent conflict.

This section also addresses the needs of the Health Care Payment Providers to assure the delivery of the best quality service for the most cost efficient means. The objective of the processes developed in this section is to define a set of methodologies that can provide for the analysis of and subsequent recommendation of practice patterns for the delivery of quality health care at minimum cost levels. The overall methodology is to use an existing base of physicians and to collect profiling and practice data from this selected base. From this data the following key results can be obtained:

(1) **Practice Patterns:** These will be sets of correlations between presenting symptoms and the related procedures. Practice patterns will be developed across patient profiles and not just across physician profiles.

(2) **Physician Profiling:** This will be the provision of physician practice methods versus the practice patterns of the patient group. In effect, physician profiling will allow for banding of practice patterns to establish methodologies to recognize large variants in terms of treatment modalities.

(3) **Practice/Physician Management Systems**: The study will provide for several Architectures for systems that will measure both patterns and profiles and will be designed to assure maximum quality of care for minimum cost. The quality will be correlated with pattern analysis and the cost with relative profiling.

(4) **Economic Impact Analysis:** The study will provide a detailed economic analysis of the impact of the use of the proposed Architectures in the delivery of services via a Third Party Insurer.

(5) **User Acceptance:** A preliminary study of user acceptance will be part of the study. The users will be both payment systems companies as well as physicians. Patient feedback will also be important.

The study methodology will use a selected and representative base of physicians and will use the system as a means to collect data on a real time basis. The software will be

modified to collect data and process it to meet the profiles required for analysis. Specifically, two analysis systems will be developed;

(1) **Practice Patterns:** This system will track patients across a set of physicians and will also track the patient through both in-hospital and out of hospital procedures (viz. radiological and lab studies). The pattern will be on presenting symptoms and procedures performed. Cross correlation of procedures and procedure sequencing will be performed. Consider the following examples which will be used to develop the concept of Practice Patterns.

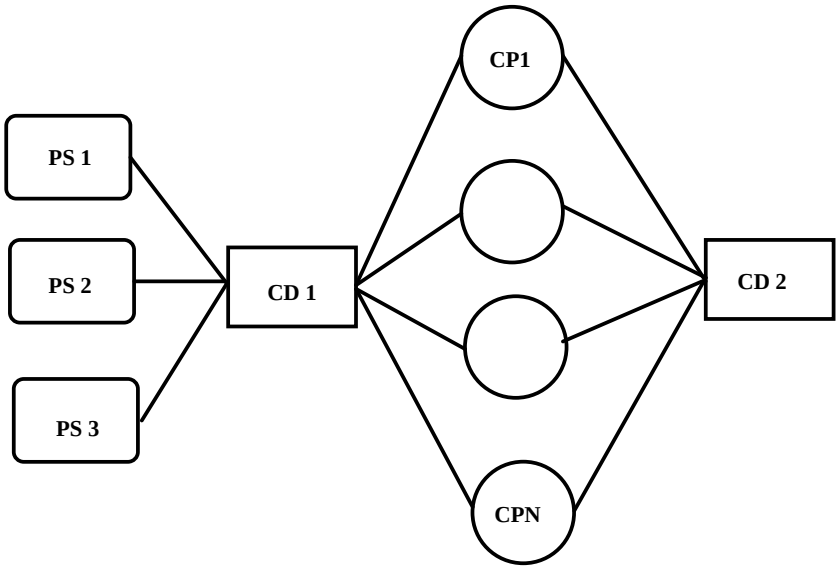
Example 1*: A patient goes to a physician's office complaining of palpitations. The physician performs a standard examination of the patient and then performs an ECG. The results are negative. The physician then sends the patient to the hospital to perform an echocardiogram and to perform a Holter monitor test. The echocardiogram presents the findings of a mitral valve prolapse and the Holter demonstrates a ventricular premature contraction from an ectopic pacemaker. The patient is then placed on beta blockers to control the arrhythmia and sent to a cardiologist for further examination. The cardiologist then determines that surgery should be performed to repair the mitral valve. The surgery is performed and the patient has an uneventful recovery.*

Example 2*: A patient presents with a family history of colon cancer. A sigmoidoscopy is performed annually but the patient has a first degree relative and two second degree relatives who have died of colon cancer. The patient is referred to a gastroenterologist who performs a colonoscopy using s flexible endoscope. The findings are negative. The procedure is recommended biannually henceforth.*

Example 3*: A patient goes to a physician complaining of non-specific symptoms in the naso and oropharyanx. The patient complains of "feelings" of blockage, swelling, and obstructions. The physician sends the patient to an otolaryngogoligist who performs an endoscope exam and sinus X-rays. The results are negative. The patient still has the symptoms. The patient begins to suffer weakness and a noticeable increase in the white count. The physician performs a wide variety of diagnostic tests with no results. An MRI is suggested for the brain, cranial nerves, and lower brain stem, along with all sinus cavities. The results indicated a wisdom tooth that has pierced the paranasal sinus and resulted in a staph infection. The patient undergoes surgery, hospitalization and medication*

There are three elements common in each of these three scenarios; presenting symptoms, diagnoses, and procedures. Figure 3.1 depicts the process of symptoms, diagnosis, procedures, and diagnosis. Let us define PS as the presenting symptom, CD as the current diagnosis, and CP as the current procedure. Then Figure 3.1 depicts the dynamics of this process.

Figure 3.1

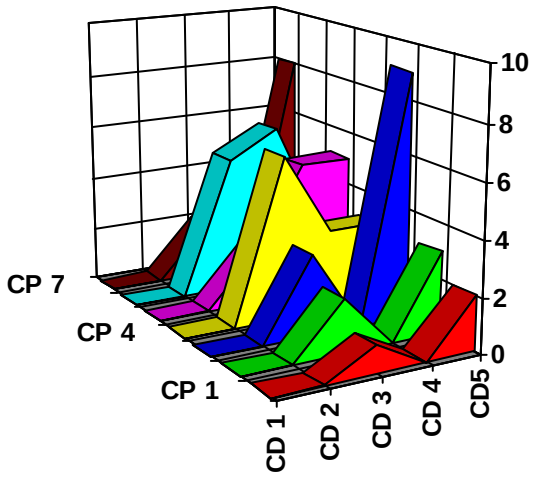


In the above Figure we show the progress from presenting symptoms, through initial diagnosis, through procedures and to final diagnosis. The purpose of the Figure is to demonstrate the sequential and iterative nature of the physicians handling of the patient. We can look at these three variables in several ways. These ways will lead to Practice Patterns. The analysis classes are as follows:

Class I: Presenting Symptom { P S*, CD, CP }

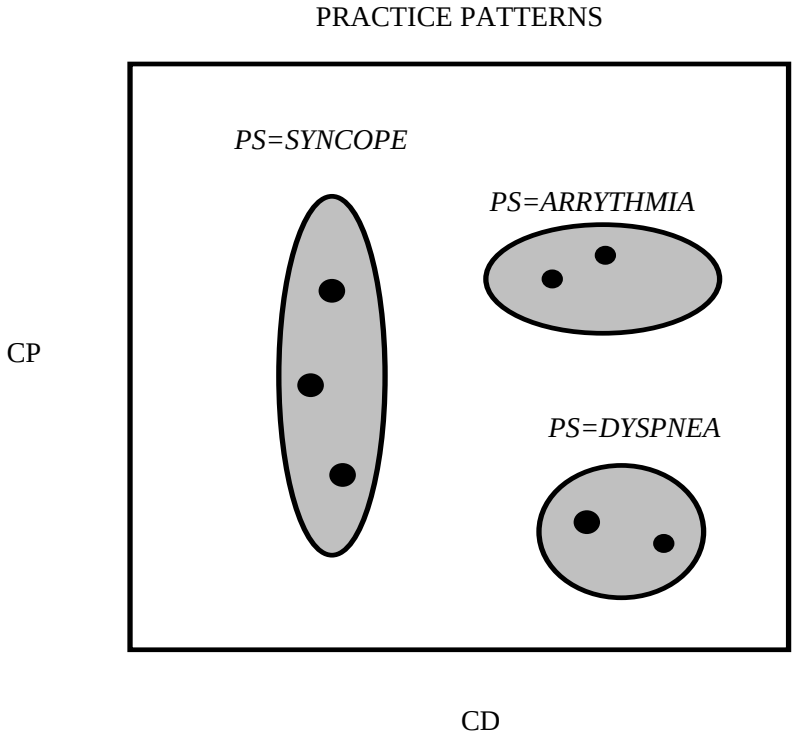
In this class we start with a constant PS and shows the number of CD and CPs that correspond to this PS. This is shown in Figure 3.2.

Figure 3.2: Class I Results



On this Class I chart we depict, for a fixed PS the set of possible CD and the set of CPs that are performed. The height of the elements shows the frequency that this **{CD, CP}** pair is found in this PS. Another way to view the Practice Pattern is to look at clusters from the perspective of Presenting Symptoms. These are shown in Figure 3.3.

Figure 3.3 Class I Practice Pattern

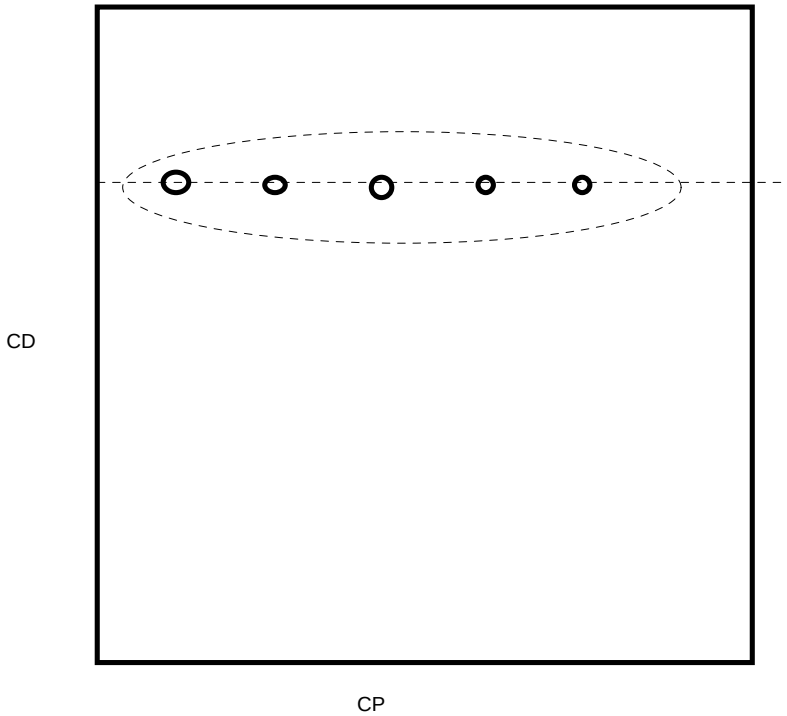


The above Figure depicts a set off critical factors in the delivery of HealthCare. Specifically it notes that if there is a PS of some fixed nature, then there are a set of CP and CD that typically match this PS and furthermore, there are probabilities that these sets occur. This is the basis of differential diagnosis. This also is the basis of determining whether a physician is effectively and efficiently performing Procedures to determine the proper diagnosis and effect the proper cure.

Class II: Current Diagnosis { P S*, CD*, CP }

In this class we fix the current diagnosis. Specifically, we also fix the presenting symptoms along with the diagnosis. Then the variable is the Procedure. Thus we fix PS and CD and vary CP. We show this in Figure 3.5.

Figure 3.5



What the above Figure shows is that for a fixed set of presenting symptoms and a fixed set of current diagnosis there are a set of current procedures that are commonly found. From a HealthCare perspective this is a measurement tool that allows for the management of two items; cost containment and quality of care. From the cost containment perspective, this methodology allows for the measurement of all procedures and to determine if a single physician has gone beyond the bounds consistently with the application of excessive procedures. From a quality perspective, the opposite can b done. Namely, is a single physician not performing a set of procedures for the symptom/diagnosis pair.

Class III: Current Procedures { P S, CD, CP* }

This is a default case that has no current significance.

(2) **Physician Profiling:** The system can track within physician groups, the variance of procedures. The system allows for the development of clustering methodologies to allow for the selective analysis of whether a specific physician is performing within accepted pattern norms.

Practice Patterns, Quality of Patient Care, Physician Profiling and Cost Containment are four major related areas that of current concern in the overall delivery of Health Care.

All too often there is the implicit assumption that Quality of Care may suffer at the reduction of cost factors in the delivery of service. However, studies have shown that certain practice patterns can be impacted upon that may directly reduce costs while at the same time maintaining equal or better levels of patient care quality.

Practice Patterns are a set of specific actions that are commonly grouped in addressing the resolution of a set of presenting symptoms and the establishment of the protocols necessary to address the current diagnosis. The Physician Profiles are the second set of statistical data sets useful in overall analysis. We combine these in an integrated electronic data analysis and transaction driven approach.

The system objectives are twofold. First, to determine a set of measurement schemas that will integrate the factors of care and cost that can be used in a proactive fashion to minimize the overall deliver costs of health care. Second, to develop a methodology and framework for the implementation of a system that will be both accepted and implemented as an industry standard in the management of effective health care delivery.

The system methodology focuses on the impact such a system will have on the three key players; patient, physician, and payer . On the patient, the focus is on three variables. They are;

(1) **Quality of Care:** This is achieved on the basis of monitoring the mortality and morbidity as well as the development of the appropriate measures of patient quality of care. Such qualities of care may require closer and ongoing contact with the patient.

(2) **Cost of Service:** This measure determines the cost to the patient directly and indirectly of the service. The cost will be determined on the sequence of procedures and their absolute and relative cost structures. The propensity to use and follow suggestions is measured. It is not the intent to supply any direct feedback to the patient in terms of procedure cost or efficacy as part of the patient self selection process. Latter studies may be performed to determine if the patient, themselves, may provide a control node in the determination and control of overall health care costs.

(3) **Perception of Control:** The intent is to determine if the patient has a view of the ability to control the expenditure process or that of quality of care. This measure will be important when viewing the overall ability to control costs at all points.

The system provides impact on the physician in the following areas.

(1) **Quality of Care**: Does the availability of procedure profiling and cost factors have an impact of the quality of patient care available. How will the physician determine that impact and how does the physician measure the quality of care.

(2) **Cost of Service:** Can the physician use the unit costs and the total procedure set costs as a means for determining the overall sets of procedures that should be performed for a given acceptable level of quality.

(3) **Relative Practice Pattern:** Are practice patterns alterable with the availability of suggested results. Will a computer based system provide the basis for that stimulation.

(4) **Practice Impact:** What are the impact areas in a practice to make such a system effective. Does this reduce or increase costs in other areas. How does a system or service of this type make the physician more productive on an overall basis.

The overall objective is the need to ensure that cost containment for quality care delivery can be maximized. Cost containment is a process that is not just focused on a single control point for a procedure but a more holistic approach to evaluating patterns and their implications to quality of HealthCare delivery.

(1) **Quality of Care:** All quality measurements as appropriate for patient and physician.

(2) **Cost of Service:** The ability to create control nodes in the delivery system, via the physician or patient, to monitor and control the overall cost of delivery. The intent is to manage the process as a total entity, and not just provide local cost minimization. To manage, it is first necessary to measure, and then monitor.

(3) **Measurements Available**: The measurement process supports the cost effort. Clearly the physician profiling and practice pattern analysis is essential as is the related unit cost analysis.

(4) **System Alternatives:** The approach has shown how to understand the alternatives to implementing the system. These alternatives clearly have impacts on cost, acceptance and expansion. This study will include a detailed analysis of these.

(5) **Overall Acceptance:** Acceptance by patients and physicians is critical. The acceptance is at a professional and personal level.

The key steps in the methodology are as follows:

(1) Selection Of Physicians

(2) Establishment of Pattern Data

(3) Establishment of Profiling Data:

(4) Development of Software interfaces

(6) Selection of Patient Base

(7) Capture of Data

(8) Analysis of Data

(9) Development of Results

The Pattern Data includes but is not limited to the collection of the following fields of data, indexed on a per patient basis.

Patient_Name

Presenting_Symptom

Presenting_Date

Contact_Date

Procedure_N

Result_N

Diagnosis_N

The intent is to be able to capture patient data, indexed by patient and sequenced on time of occurrence, and also indexed on physician. For example, if we consider the collection of ICD9 and CPT codes alone, then we can view a single patient sequence as follows. Let the index J represent a patient, let the index K,L or M represent a specific physician, and let the index N represent the time sequence, where N=1 to N_{max}. Then a sample collection of patient data may appear as:

{ ICD(J,K,1), CPT(J,K,2), CPT(J,L,3), ICD(J,K,4),CPT(J,K,5), ICD(J,M,6), CPT(J,M,7), CPT(J,M,8), ICD(J,K,9) }

This sequence demonstrates a sequence of diagnosis, tests, and a final diagnosis that led to resolution. This sequence is on a single patient.

From this data, we can then assess the clustering of CPT's, for example, when the presenting ICD, namely ICD(J,K,1) is constant, as the Practice Pattern. Thus we define a practice pattern as, P(ICD(J,K,1)), as:

P(ICD(J,K,1)) = { { CPT(J,L,N)}, for all that occur 99.5%}

That is, a practice pattern is the set of all sequence sets that occur in response to ICD presented 99.5% of the time.

We can also assign an expected cost to each of these Practice Pattern sets. Specifically, knowing the costs per CPT, we can develop an expected cost, EC(P(N)), where we define P(N) as a specific practice pattern. Thus;

EC(P(N)) = Sum of Costs of all patterns weighted by frequency.

This cost factor and other statistical variates such as its variance may also be obtained. Thus if we further define Var(P(N)) as the variance of the pattern P, and Dev(P(N)) as the standard deviation, we may then ask another question. Specifically;

If we define P(N,p) as the practice pattern set of:

P(N,p) = P(ICD(J,K,1)=N,p)

where;

P(ICD(J,K,1)=N,p) = { {CPT(J,K,n)}, for ICD(J,K,1)=N and all that occur p% of the time}

then we may ask;

"What is the value of p% so that the actual cost C is less than a number C_{max}, q% of the time"

Namely, what set of procedure sets, or equivalently acceptable practice patterns, allow for cost minimization. To be most precise, we must also bound this with a quality of care variable.

Profiling relates to the performance of the physician sets rather than the patient sets. Specifically, if we use the same data sets gathered in the practice pattern analysis, then we can segment the data sets by physicians. Specifically, we can chose physician K^* as a sample set and then consider the specific practice pattern sets;

P(ICD(J,K*,1),p)

We can then define a distance measure that allows for a cluster analysis procedure to determine if any physician is at variance with accepted practice patterns. We can also take measures of cost effectiveness by physician as well as quality of care measurements by physician. The latter are determined using standard morbidity and mortality measures correlated by ICD sequences [1].

The techniques proposed in this study are those of cluster analysis and clinical trial statistical methodologies. We will also apply standard cost measures, obtained from the database to determine the cost measures. The quality of care measures will be obtained using standard morbidity and mortality data available.

The system provides answers to the following sets of questions:

(1) What is a statistically valid Practice Pattern methodology and is implementable in the general physician population.

(2) Can Practice Patterns be obtained consistently and with accuracy via an electronic system.

(3) What are the cost and cost effectiveness factors with the deployment of a Practice Pattern System.

(4) What is a statistically valid Physician Profiling System and is it implementable in the general population.

(5) Can a Physician Profiling System be developed and operated consistently and with accuracy in a dynamic fashion via an electronic system.

(6) What or who are the cost control nodes for the implementation of these systems. What behavior modifications are necessary and how can they be implemented. What Point of Service Systems will allow for the implementation of these concepts.

[1](See Hennekens & Buring, pp. 61-62).

(7) What impact with cost control nodes have on Practice Patterns and Physician Profiling and what will be the overall cost effectiveness. In addition, how implementable is the approach.

The system provides a first order economic and financial analysis of the impact that a system of the type will have on the delivery of quality health care. The impact will include the effects on the patient, the physician and the Third Party Payer. Previous studies have already indicated that cost savings of 13% are obtainable by merely presenting cost data on procedures, even if there is only a single source of the procedures (Tierney). Variants that can be studied are:

(1) Cost impact on procedure sequencing from single procedure providers.

(2) Cost impact on individual procedures when there are multiple providers.

(3) Impact on cost from pattern awareness to the physician.

(4) Impact on cost from individual profiling data provided to the physician.

(5) Impact on cost by patient participation in pattern awareness.

(6) Impact on cost by patient awareness of physician profiling.

These variants each determine a possible control node to the management of costs in the delivery of health care. The two major controllers are the physician and the patient. The effects or response are the practice patterns, the physician profiling and the cost elements. The patterns, profiles and costs, if provided in a free market context, will also allow for free market cost competition and cost minimization. The results by Tierney et al have clearly shown that a simple feedback to the physician controller with cost information on a single procedure will result in a 13% cost reduction on those procedures.

The Architectures for the delivery of this information include the following elements:

(1) **Point of Service System:** This is the physician station that is located at the point of service. It may be a standalone PC or just a Card reader with limited key annotation capabilities.

(2) **POS Software:** This will be an overview of the software resident in the POS hardware unit. The approach is to use a like platform and develop an overall modular structure.

(3) **Networking**: This will be the communications architecture to interconnect all of the stations.

(4) **Human Interfaces:** This will be the interface to the system, service, data etc. that will act as the control node in the overall system. This interface must be effective in activating the changes in the behavior of the physician and the patient.

(5) **Central System:** This is the major software resident in a server or at the third party insurer to support all data capture, analysis, tracking and to facilitate transaction support.

(6) **EFT Interfaces:** Part of the acceptance is the ability to provide ease of reimbursement. The EFT, electronic funds transfer system, assists in that process.

The methodology has outlined the system to estimate cost per procedure and the application of the clustering of such costs. This analysis is a micro analysis of the underlying procedures. The macro cost analysis that will be performed addresses several other areas:

(1) **Physician Costs**: What are the costs in current physician practices that would make the acceptance of such a system of this type a productivity enhancer to the practice. Are there segments to the user base that have higher acceptance factors.

(2) **System Costs:** What are the costs for the deployment of such a system. These costs are the development costs, the unit deployment costs and the ongoing operating costs. The study will determine if there are cost minimization attainable.

(3) **Cost Effectiveness:** This analysis will determine the cost savings is the implementer of the system. Specifically it will provide the results of savings to cost and provide an effective rate of return on the investment.

(4) **Cost versus Quality:** An analytical framework will be developed to provide a tradeoff analysis of the cost and quality of care factor.

4 TECHNOLOGY FACTORS

The HealthCare market growth is a result of several factors. First, there is clearly an "unmanaged" care system in place that leads to the escalating costs of HealthCare delivery. Second, the system has inherent inefficiencies in that it is still managed in a twelfth century guild context. There are small practitioners that manage small businesses that in reality in a mega-industry. Third, there is a disparity of care delivery that results in exceptional care in certain areas in certain geographical locations with less than adequate care in other specialties in differing geographical locations.

The overall Goal of a healthcare reform can be simply stated.

"To ensure universal quality healthcare at the most cost effective price."

The three operative terms are universality, quality and cost. The plans developed in this portfolio are a step toward s attaining this goal. They are all based upon a six point strategy, as described below.

(i) **Productivity Improvements:** Develop a system of healthcare delivery that fits paradigms of comparable service businesses that measure and manage the delivery of service efficiencies and organize to maximize this effectiveness. In essence, measure, organize, and re-measure to gain productivity.

(ii) **Cost Awareness:** All health care professionals and the customers, the patients, should be aware of the costs or prices. Namely, the patient and the physician should be made aware to the cost of the sets of possible procedures and the risks. The patient and the physician as a team must make a cost effective decision. Angiography as a means for diagnosing coronary disease is an expensive and risky procedure. Alternative therapies that address both the symptoms and the underlying disorder may be equally efficacious if the patient and the physician are made aware of the costs. The physician must have that awareness across procedures as well as providers. Thus lab tests must also be priced by test as well as by vendor.

(iii)**Alternative Awareness: T**he alternative procedures must be made aware to the patient. These procedures are not only costs based but risk and efficacy based. MRIs are a very effective tool in diagnosing disorders and have a low risk profile. Angiographies are invasive and have higher risks. The patient must become part of the choice process along with the physician. The patient must become an economic choice selector in the process.

(iv) **Centers of Excellence:** Not every hospital can perform heart transplants, kidney transplants, and neurosurgery. The Center of Excellence strategy recognizes that large geographical areas need to join together to select what institution has which facilities. This is for both interventional as well as diagnostic facilities. The New Hampshire plan is

one that takes a total state view of such care, having a single tertiary teaching hospital act as the primary center and refocus from that for other select centers. This clearly puts the burden on the Hospital system and not just on the individual hospital.

(v) **Electronic Transaction Intensive:** Paperwork is the bane of healthcare. No other industry, other than the regulated monopolistic telephone companies, can sustain the burden of the paperwork that exists in healthcare. From the physician's office through the clinical and administrative realms of the hospital, there is an excessive amount of paperwork. It is essential that electronic transaction systems be put in place that are - integrated and meet standards of interfaces. This will result in increased productivity, enable the efficient use of centers of excellence, reduce the cost of creating and handling the paper, and allow an enabling capability to measure, monitor and manage the expenditures, the productivity, and the quality of patient care. Transaction systems, using both text and multimedia formats, are at the heart of the structural reform.

(vi) **Quality Care Management:** Having the transaction capabilities allows for the monitoring of all patient care on a real time basis. It is the ability to monitor the rate of diseases development, the relative and absolute performance of physicians and hospitals, and the interactive informing of physicians of better alternatives and options. It is interventional as well as monitoring. Measurements assure the consistent delivery of quality care. Variance in physician or geographical mortality and morbidity can be determined at the micro level. These can then be addressed and resolved. Standards for quality can be communicated, updated and improved. Quality care can then follow more closely the most effective and efficacious approaches available.

The six point strategy articulated above can be met through the use of four key technologies.

(i) **Multimedia Communications**: Multimedia communications is more than just the technology for combining video, voice and data. It is a paradigm shift in interpersonal communications. It is an enabling technology for the use of multimedia data elements, such as real time voice, text that is stored, images and real time video, in a fully conversational mode by a group of participants. Multimedia communications is a - confluence of technologies that is end user driven, focuses on the seasoning of users together.

(ii)**Multimedia Databases:** Disparate date elements in multimedia databases must be associated with one another in a temporal, spatial and logical context. Multimedia database technology allows this to happen. It permits the binding together of voice segments, annotating with a mouse a full motion video element.

(iii)**Networking**: The higher level applications and data elements must be able to flow effortlessly and cost effectively over national networks. There must be a network infrastructure available to enable this. The network at its minimum must be dark fiber. It

cannot be a centrally controlled Bell System network which provides too little too late, such as ISDN.

(v) **Transaction Networking:** Transactions must be at the heart of the technology. Each interaction must be monitored, measured, logged, billed, and evaluated. This means that behind the technology of interaction is a technology of transaction. The transaction network enables the price tag mechanism that is so critical for the natural forces of economics to play themselves out.

The business concepts are all focused on the overall goal and are consistent with the six point strategy articulated. Moreover the business concepts use the technologies that have been determined to have the maximum impact. Three such opportunities have been plotted on Figure 1 where the dimensions are the value per transaction, or equivalently the cost, and the number of such transactions per day. At the top extreme there is the submitting and receipt of results of a lab test. Low cost/value but high rate of frequency. At the bottom right is the surgical staging necessary for the excision of a glioma and postoperative treatment. This is very intensive, costly, and has a low rate of occurrence.

The following concepts are current examples of how technology may be applied to reduce costs and improve the quality of care.

o HEALTHNET: This concept focuses on the interactions on the individual physician level. It starts as an office practice management system and then evolves into a full practice management system. It allows fully interconnected patient transaction management of bills, records, hospital interfaces, lab and clinic interfaces. It is a text, image, video, and voice management system. It is a Point of Service terminal that allows entry into the physician's network.

o RADNET: This is a managed Care entry point. It recognizes the need for managed cared to gain better control over diagnostic procedures. It further recognizes that non-invasive imaging modalities are becoming more significant and that full physician networking will be part of better patient care. It further builds o the Center of Excellence concept. It provides the capability of improving the efficiency of radiologic imaging from a center of excellence to a Managed Care network, thus reducing costs in some cesarean excess of 50%.

o MEDSTAGE: The intervention intensive efforts of surgery and invasive diagnostic require considerable time and duplication. This business concept is focused at improving the nature of this area and again uses the Center of Excellence approach, but expanding and institutionalizing on the Regional basis. It provides a service to physicians and surgeons in improved surgical procedures from staging to post operative management.

We shall develop these concepts in some detail as we show how to reduce costs.

5 COST FACTORS

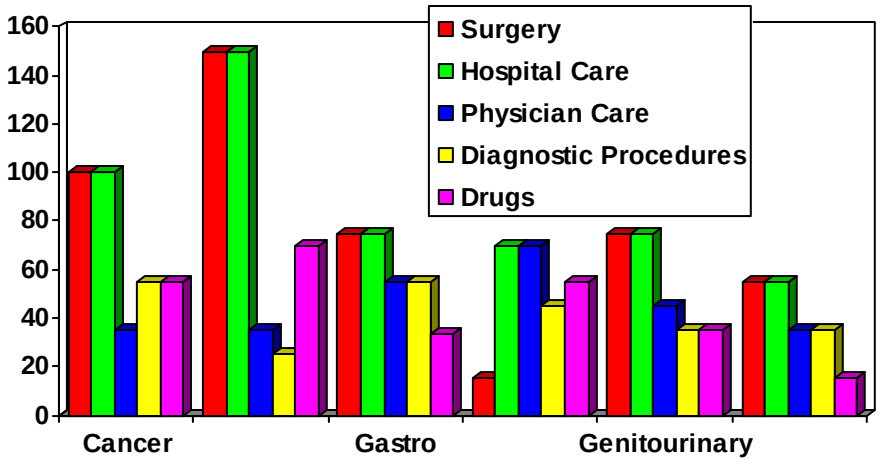
The approach taken thus far in this paper has been to focus on the underlying diseases macro factors and then to correlate them with the micro cost factors. In this section we develop a detailed correlation analysis of the macro factors with the cost base.

Let us begin by developing an analytical model of the cost base:

Let $C_{CPT,ICD}$ be the unit cost of a procedure, CPT=N, for a diagnostic result, ICD=M. Let K_{ICD} be the number of cases per year for a specific ICD, and $N_{CPT,ICD}$ be the number of procedures of this type for this disorder performed in a year. Then clearly, the total cost per for each ICD is :

$$C_{ICD} = \sum C_{CPT,ICD} N_{CPT,ICD} K_{ICD}$$

Figure 5.1 Cost and Cause Map



As we discussed in Section 2 the costs in health care are a combination of disease rate and cost per unit disease treatment. If we assume that disease rate is displaceable, namely following the fundamental theorem presented, one disease will displace another after it is cured, or simply put we have not conquered death, at least i the time frame of this policy paper, the only controllable supply factor is cost. More than 60% of the costs are physician and hospital related. We now focus on two approaches that are case studies that show how these costs can be reduced. The cases are as follows:

Case 1: Physician Electronic Practice Management

This case shows how a fully electronic physician office management system, helps with the complete transaction flow and reduces costs, increase quality care and improves overall productivity. This system also is the basis for better practice management and physician profiling systems. This approach is what is currently done in the credit card arena. We see this today as a set of technologies that enable the transaction processing at stores and other retail establishments. We argues that it is readily applicable to the physician's office.

Case 2: Multimedia Transaction Management in Hospital Imaging

This is a case study of applying the technologies that we developed in the prior section to the delivery of imaging services to the hospital environment. It is an analog to the physician environment. The savings are comparable.

The author argues that these are cases that the author has personally developed and operated and the savings are clear. The savings are also secondary by reducing drug and lab costs as discussed.

5.1 Physician Cost Reduction: Transaction Management

Medical Practice is both the provision of the healing arts and the management of a business. The business aspect of a practice is one which has take a significantly lesser role in the minds of many practitioners and thus may have resulted in the incorporation of many inefficiencies. In this paper we discuss the practice as business concept and demonstrate how significant improvements in practice management can be achieved. As a result of these structural efficiency improvements, it is argued that overall patient - quality of care can also be improved. The results in this paper are based upon data accumulated over the past two years of addressing specific practice management issues.

The physician's office management is based upon a careful balance of quality patient care and intermittent business management. The primary function of the physician is the care and management of their patients. However, the management of the practice requires both an understanding of the practice as business as well as the tools necessary to effect that management process. In this paper we describe several case studies of office management practice and discuss the key areas of practice management optimization. It has been shown that improvements of 10% to 25% in combine revenue control and cost containment can be achieved.

At the heart of the effective management of a practice as business is the implementation, use and optimization of a computer based system that allows for the management, processing and tracking of all key office financial factors. Practice - management requires that three major factors be focused upon:

(1) *Effective collection of receivables:* Specifically, the billing process must be viewed as the revenue generation porches and leakage from that process must be kept to a minimum. All bills must be entered, processed, tracked and collected. Lost revenue must not be left on the floor either out of lack of knowledge or through frustration with the process.

(2) *Maximum productivity for reduced expenses:* Inefficiency in the various elements of the practice management can increase costs and significantly reduce the flow to the bottom line. Redundant manual processes are not only prone to errors but all too frequently increase costs due to these inefficiencies.

(3) *Timely management of cash:* Cash flow is the heart of any business and in turn that of any practice. The focus should not only be on revenue collection but on the flow of cash in the practice. This means that the systems in place address the issues of receivables, payables, and changes in working capital. Thus, any system put into operation must deal with the whole flow of cash through the practice and optimization should occur in that area.

In this paper we address the issues of managing a practice, recognizing that it is a combination of both process and tools. The process aspect is one that starts with a recognition of the practice as business and allows for a deconstruction of the various business elements of the practice and places measure of performance on each of them. The tools part of the effort will show that to effectively implement the process portions, tools other than just good thinking are necessary. With the advent of the personal computer, networked systems and the interfacing with large scale computer systems, the tools are now becoming available at a cost effective level. This paper will focus on the confluence of process and tools.

Current Office management can be viewed as a process that begins with the patient entering the office and ends with the collection of the fee for the services rendered. The management of the office is divided into two major economic dimensions; revenue and expenses. Revenue is generally based upon an accrual system that recognizes the revenue at the time of service. Expense, similarly is based on an accrual system. We first will deal with the revenue issues and then with the expense factors.

The revenue process is shown in Figure 1. The flow is first shown as patient processing and then the submission of the of the bill for processing. The options for billing are as follows:

> (1) *Cash/ Fee for Service:* This fraction of the practice provide for instant cash into the receivable flow and thus does not represent a major factor in cash flow management. However, many practices have a decreasing number of their patients in this pool.

(2) *Managed Care:* The introduction of managed care systems has had a significant impact in the West and is moving East as they are improved an demonstrate their effectiveness in containing costs for major corporations. The impact of Managed Care systems that a contract is entered into by the Physician with the sponsoring company. The contract stipulates the fee accepted, the payment time and the mechanism for submitting claims. Typically significant delays occur in a Managed Care system as well as an increase in the non-collectibles. Thus the physician participating in a managed care program is faced with lower revenues per service, longer time to collect, increased non-collectibles due to a variety of causes, and finally an increase in the total billing costs. However, many of the managed care programs now have electronic interfaces and thus will allow for better control of several of these variables leading to lower losses.

(3) *HMO/PPO:* The HMO/PPO contract with a third party physician typically is also a contractual agreement that specifies the fee for service and thus is similar in many ways to the Managed Care program. The difference is that a HMO/PPO system may cover many companies and thus is not company specific. The same problems occur with this system.

(4) *Medicare:* Medicare may be a dominant factor in many practices. Specifically for the Internist, the Ophthalmologist, the Cardiologist etc. a growing number of the patients are Medicare covered. Medicare currently support electronic billing and currently requires the physician to prepare the patients billing information. Medicare must also be billed first and the fee structure is highly regulated. Assignment of Medicare is becoming more frequent and the Physician may face a growing demand from both patients

(5) *Third Party FFS Assignment:* The classic method of payment for many years has been Fee for Service (FFS) with a third party insurer. This is the now almost fifty year old paradigm in HealthCare insurance. In most practices, however, this form of payment is infrequently put in the assignment pool. In contrast, the - patient pays either at the time of service or after billed and then is personally responsible for the processing with the insurer. Thus, this form of reimbursement is of limited impact on practice financials.

(6) *Medicaid:* State reimbursement plans are notoriously low and excessively delayed in reimbursement. Little if any work has been done in automating this area and the differences from state to state are staggering. The concentration on this area leaves one with the impression that there is still a great deal to be - accomplished before Medicaid can be integrated effectively into the practice payment system.

Current office management practices fall into one of three extremes; manual in-office systems, service bureaus, and computerized in-office systems. They can be characterized as follows:

(1) **Manual In-Office Systems (MIOS):** In this case the patient and billing information are collected manually and stored in the patient record and billing files, In extremis, the patient billing file may be nothing more than a 3" by 5" index card system with a rolling summary of bills and receipts. The two sets of filing systems are separate and independent. The advantages of such a system is that it requires no technology, is manually under the control of the physician, and costs nothing in terms of capital or - training. The disadvantages are that such a system results in very labor intensive bill preparation, tracking, auditing and is subject to the vagaries of the office manager. The most serious drawback is not the labor intensiveness of the approach it really is its lack of frequent auditability. Such system become prone to revenue "shrinkage".

(2) **Service Bureaus:** The service bureau approach starts at the same point of the MIOS approach of manual collection of information. It then results in placing all of the manual information in the hands of a third party to perform all of the processing and collections efforts. The advantages of such an approach are that they are predictable in cost and eliminates the concerns of managing the process internally. The disadvantages are significant. Quality of service bureaus may vary greatly, most are themselves manual and do not provide adequate audit information, and some even have ethical or legal problems.

(3) **Computerized In-Office Systems (CIOS):** The CIOS approach uses a computerized system on premise that enters all patient information, all billing information, prepares the bills and electronically transmits the bills, if appropriate, the proper agencies. The advantages of such a system are obvious. First they provide auditability and control back to the practice. All the information is available and trackable at any time. Second, the systems are focused on delivering a cash flow management process to the practice which is what desired. Third is, the records are kept in an orderly and retrievable fashion. The disadvantages are those of computer systems. First is the issue of computer phobias. These however are lessening with the advent of user friendly interfaces, window environments, artificial intelligence front ends and all of the other tools that help the end user. The second disadvantage is the issue of user acceptance. namely, a computer changes the routine, it disturbs the current work flow, and it can cause emotional dissonance in the office staff. Quite frankly, so did the X-ray machine, and even the stethoscope. This must be dealt with as a human issue of office management through training and education and through leadership and direction

We will now focus on the use of computers in this environment and delineate the efficiencies and bottom line impacts to a practice.

The revenue collections flow has been shown in Figure 2. Here we have shown the bill preparation and the submission to one of several channels. The channel prepares, transmits and processes the bill. The net result is acceptance and payment, rejection, - loss due to some endogenous or exogenous factor. In this Figure we show that typically bills in these channel may pass without error 70% of the time, are rejected and re submitted 20% of the time and are lost or are non-collectable 10% of the time. We shall discuss the reasons for loss.

As we have discussed above, there are several mechanism that result in loss of cash from the practice. They naturally fall into two categories, the revenue loss and the expense burden. The details on each are:

(1) **Revenue Loss:** Revenue loss may occur from several courses.

i. Improper Billing: The submission of a bill that has been improperly prepared.

ii. Unfilled Bills: Bills that should have been filed but that have been neglected.

iii. Rejected Bills: Bills that have been filed, properly prepared, but rejected for other than procedural reasons.

iv. Lost Bills: Infrequent as it may be, some of the bills are lost after processed. Unless properly tracked, these bills are not followed up on.

(2) **Expense Flow:** This area of collections flow relates to the specific elements that are in the practice for managing the flow of revenue. Namely the elements necessary to manage this flow in terms of direct and indirect costs. This will be discussed in detail in the next section.

The issue of infrastructure management is the one that combines the revenue management with the expense management, resulting in the management of working capital. Figure 3 shows the flow of funds from the point of practice collection to the net operating income number. The infrastructure of the practice is composed of four elements as regards to the billing process. These are shown in the Figure, specifically:

(1) **Billing Costs:** In a practice there are costs per bill in the preparation and mailing of the bills that need to be processed. For example, with patients who would pay in cash may in 30% of the cases require the bill to be sent rather than pay at time of service. Thus 30% of the cash patients, say 25% of the practice, or 7.5% of the patients per month get bill sent who should have paid in cash. Medicare patients on assignment also fall in this category, as do assignments on all other bills. Finally, all - HMO/PPO or Managed Care programs require bill submission. It is not unreasonable for 50% of the practice to be billed in some form. The cost

per bill may frequently be a percent of the bill, for example 8% of the bill amount. Thus for this simple case, 8% of 50% is 4% of the gross revenue being the billing costs. In a $500,000 gross revenue practice, this amounts to $20,000 per year.

(2) **Administrative Staff Costs:** There are costs of administering the preparation of forms, filing and retrieving billing data, preparing and managing the billing operators. The typical practice will have a half time person at a loaded cost of $20,000 per year.

(3) **Accounting Costs:** The preparation of the practices annual tax returns typically is based on an hourly charge. The charge is clearly dependent to the amount of prepared information on revenues and expenses that are available. Typically an electronic based system will reduce the accounting fees by a factor of two or more.,

(4) **Imputed Interests:** Working Capital is the difference between Accounts Receivable and Accounts Payable. In essence it is what is owed the practice but not collected less what the practice owes but has not been paid. If the practice has a large working capital number it means that the physician is financing their patients, and that the money used to finance patients could to get a return even in a simple interest bearing account. Simply stated, for a $500,000 per year gross practice, having 90 days, or 25% of the years revenue in receivables, and having this in 40% of the cases says that $50,000 is the working capital value. At 8% interest, this is a loss of $4,000 from the practice.

This simple study states that for a $500,000 practice, $50,000 may be lost in these four channels. Practice management focuses on reducing these internal inefficiencies. Combine this with a10% non collectible rate, this total is a $100,000 loss from the - practice or 20%!

Office Practice Management systems are based upon standard practices that have been manually introduced into office practices. Recently computer based systems have been introduced into practices to address many of the issues that have been discussed in this paper. These systems have been introduced in several forms. Some have evolved from the older minicomputer systems that were originally developed for Hospital systems. - Recent versions use PCs as the base platform and work as standalone systems.

In this section we present several examples of systems and describe their functions and Architectures. We also discuss how these systems may be used to address the reduction and possible elimination of the losses discussed is the past section.

An office management system that is computer based performs the following set of functions (See Hudson):

(1) **Registration:** This must take all pertinent patient information that is necessary both for the practice as well as for the billing process. This system must be intelligent enough to correct all mistakes that could latter cause billing errors. For example, simple issue such as zip codes, dates of birth etc. must be properly filled in and Medicare information fields must be complete. Any system must assure the integrity of the - registration fields.

(2) Accounting: This module of the system must track all receivables, must do aging and must be integratable into a full accounting package to enter payables as well and have a full chart of accounts. Since the patient system is revenue focused it looks primarily at receivables or cash into the practice. It does not have to be a full accounting system.

(3) **Electronic Billing:** The system module must interface into all Medicare systems as required, and into such third party systems as NEIC, GTE and others. It must also be flexible enough to deal with HMO/PPO and Managed Care electronic systems.

(4) **Reports:** All types of reports must be available. In addition the system should allow for flexible report preparation.

(5) **Correspondence:** Patient and other physician communications and correspondence should be available. This may include standard follow up letters and custom responses.

(6) **Reminders:** Patient reminders are critical. Mammogram, colonoscopy, indirect opthalmoscopy etc. procedures must be tracked over fixed periods. Office staff may change but the system must remember these. Thus any computer system must have a fail safe reminders capability.

(7) **Scheduling:** Patient scheduling may be computerized or may best be left in "the Book". The choice her is up to the practice but the need is still there to register the patient.

(8) **Forms:** The system must prepare forms of all types. These are the HCFA, Workmen's Comp, Camp/School Physicals and many other forms. These may be practice specific, but with the use of laser printers, flexible form creation is readily available.

(9) **Rules Updates:** Any effective system must have a rules engine and a rules update process. This is especially true in the time of changing Medicare rules and other reimbursement rules. The vendors must demonstrate how effectively they can keep the system up to date with these changing rules. If they are not kept current, all of the efficiencies discussed will disappear.

These functions are then providing a computer database with all of the information that may them be cross referenced, retrieved, processed, transmitted, or displayed to perform all of the tasks in the office management process.

The features that are necessary in any such CIOS are those that make it both functionally easy to use but also upgradeable in the context of a growing practice or changing reimbursement environment. These features are;

*(1) **Ease of Access:** The end user interface of any system must be easy to understand, access, and recover from. There should be a flexible window type design, avoiding the menu approach of dated systems. Menus reflect minicomputer/ mainframe computer styles of the 1970's, whereas the windowing environment is the paradigm of the 1990's.*

*(2) **Flexibility of Data Base:** The data base must be flexible and handle all types of fields that can be entered. In addition the database must allow for the use by many users in a transaction mode with minimum delay in processing.*

*(3) **Modularity of Design:** The design must be modular, allowing the practice to get what is needed, to build by adding new modules, and to allow the modules to be updated, each as needed. Some system are all one lump of computer code. This makes for an - inflexible design and system.*

*(4) **Extensibility of the System:** An extensible system is one that easily allows growth; both in terms of new users and new uses. Atypical system may start out as a single workstation and then may expand into a network. The network may be on premises or between premises. The system must be able to grow in any direction.*

*(5) **Communications Enhanced:** The system must be able to communicate in many modes. Simply, it must have a modem to deal with electronic claims. But it must also allow for other communications in such areas as on-line in-office hospital admissions, the entering and receiving of pathology, x-ray and lab tests, and the access of medical information. This means that higher data speeds must be supportable and the system may also have to deal with images.*

All of these features should be considered in choosing a system for a practice. The lack of any one feature could result in a situation that would require a replacement and the change over costs could be quite significant.

In order to fully understand the impact of electronic office practice systems we have taken two examples of practices that have used the system and the impact on the practice with the introduction of an electronic billing system.

The practices analyzed have fallen into two categories; a high volume low fee per visit practice and a low volume high fee per visit practice. The former may be that of an Internist or Pediatrician and the latter that of a Gastroenterologist.

The first step in analyzing any practice is the delineate the practice factors that must be measured and then placed into the tradeoff analysis. In this analysis we have considered the following factors:

(1) **Gross Revenue: T**his is the total revenue booked to the practice. Simply it is the sum of all visits at the fee charged per visit.

(2) **Non-Collectibles:** These are the fraction of all assigned or non cash collection items that are never obtained as cash from revenue that was actually booked. For example, assume that a practice has Third Party (TP) assignments, Medicare (MED) and a managed care (MC) program. Assume that there is a percent of the gross revenue for each that can be measured. For example, a$500,000 per year practice may take 10% assigned Medicare. Now assume that of that $50,000 of Medicare, 20% is not collected. Then the non-collectibles for MED is $10,000 for this practice. This analysis must be done for each non cash revenue item. As appoint of reference, it should be noted that only with a computer based office system is this reasonably possible to do.

(3) **Expenses:** These expenses are the allocatable expenses of the practice related solely to the billing and business functions. They do not relate to any of the clinical function of the practice. Specifically, as we have already noted they are; billing costs, administrative costs, accounting costs, and interest costs. We have already discussed how these may be calculated. Adding these up leads to the net indirect expense for the practice.

(4) **Practice Gross Margin:** The PGM is the gross revenue, less all non-collectibles, less all indirect allocatable billing and business costs. Namely it is (1)-(2)-(3) as described above. This is the net revenue for the practice.

The analysis that we performed for both types of practices was to take the existing practice numbers in the above categories, and then introduce a compute based billing system and to determine the impact on the practice PGM. The excess cash flow, ECF, is

the difference of PGM(Before) less PGM(After). The ECF is a measure of the impact on the practice due to automation. These two case studies provide the physician with a simple tool to determine the effectiveness of a computer based system on their practice.

CASE 1: *This is a case of a low volume in patients but high fee per service. This is typically a GI practice in a sub-specialty. In this case there are 40 patients per month with $1,000 per patient. We can show this practice and details all of the assumptions. The DR are the day's receivable for the TP, MED and MC patients. The distribution of patients is also shown. The cost of computer system is shown as $12,000 for a single practice, which is a retail prices for a system. The results show a gross revenue of $40,000 per month and an ECF of almost $2,000 per month when the electronic system is introduced. This leads to a 6.9 month payback on the system.*

CASE 2: *This case is that of a Internist practice of 480 visits per month at 20 minutes per visit. The same spread of payors was used. Here the ECF is about $1,500 per month resulting in a 8.8 month payback.*

The details in the differences in the practices are both volume related and cost of money related. However, both practices clearly show the impact in the costs by reducing the non collectibles and controlling the indirect expenses.

We have shown the dimension of the operating loss issues in a medical practice, we have also shown how to eliminate these in a practice, and have shown that an electronic office management computer system will directly impact on these factors and will allow the physician manage the practice as a business.

We have specifically developed a methodology for any practice to determine the net impact from a financial point of view from the introduction of an electronic office management system. The example shown clearly demonstrate that a 3 to 6 month payback is achievable with such systems.

5.2 Hospital Cost Reduction: Medical Imaging[2]

The use of imaging technology has been focused primarily in the areas of diagnosis. There have been recent developments in combining this basic technology with two other technology areas; databases and communications. The database elements provide the basis of PACs systems and the communications elements have been directed towards terminal to terminal connection. This paper presents the results of a trial in the Boston area among four major Hospitals to determine the impact of a multimedia

[2]McGarty, Investigative Radiology, and IEEE JSAC, 1992.

communications system that deals with multiple image modalities and at the same time is integrated into the Hospital Information Systems. The results of this effort fall into two major categories. The first demonstrate the effectiveness of multimedia communications as an integrating and expanding technology that allows for more effective diagnostic methods. The second is a detailed study of the cost impact of such systems. The primary conclusion is that under certain specific patient loads, the use of this technology in combination with a HIS results in a 40% cost savings. The third conclusion from the study is that this system also allows for the integration of a full transaction based capability into the hospital, and thus has significant impact on the hospital's working capital management problem. It is believed that this is the first study that has addressed the fully integrated imaging and transaction impacts from both an operational and cost perspective.

Imaging in the Hospital environment has taken on various modalities, ranging from plain file techniques, through MRI, CAT, PET, Nuclear Medicine and other forms. The processing of these images has been primarily focused on the diagnostic aspects and generally the focus is on s single set of images in the context of the current diagnosis. The introduction of PACs systems was driven by the need for better image management of existing images, and the ability to retrieve these images once stored. The focus of a PACs system is generally on the management of plain film systems, although it has been expanded in certain cases to other modalities.

The concerns of the Radiologist are frequently different from those of the attending physician or of the specialists on consult. Generally, the latter are more interested in the combination of diagnostic data, the imaging portion being just one element of that entire set. Thus PACs serves the specialist and in most cases does not impact the needs of the other physicians. More importantly, the PACS systems are not integrated into the overall Hospital Health Information System (HIS). The HIS provides for the maintenance and updating of patient records, but in addition it must also be viewed as the transaction processing systems for the Hospital. An HIS terminal is in effect a Point of Service (POS) terminal, that if properly integrated can be an integral part of the Hospital overall financial management system.

In this paper, we present the results of a one year effort with four hospitals in Boston. These Hospitals are Brigham and Women's, Children's Hospital, Massachusetts General and the New England Medical Center. The trial was focused on the ability to provide a multimedia communications system that provided both intra and inter premise information systems that were integrated into the Hospitals information system. The trial has the following objectives:

o To determine the usefulness of electronic imaging to both the imaging specialist and attending physician.

o To evaluate the effectiveness of shared conversational environment for the determination and evaluation of patient records and evaluation of the patient condition.

o To evaluate the cost effectiveness of incorporating an electronic imaging system into a fully integrated Hospital Information system.

o To determine what the performance factors for a fully integrated system would be and to develop models for the projection of performance and system sizing.

o To understand the ability to integrate a transaction based system into the Hospital environment. The emphasis here was on the ability to record each procedure, relate it to the appropriate CPT and DRG codes, as appropriate, and to tie this in with a real time billing capture system.

This paper presents a summary of several of the key findings of this study. As indicated, our emphasis was not just on the technology, but also on the end user acceptance as well as the operational and financial impact of the system on the hospital operations.

The imaging environment consists of multiple modalities at multiple locations. A great deal of effort has already been expended on imaging management and storage systems. PACs systems are typically focused on the management and storage of plain film type images and they are directed on improving the productivity of the imaging specialist. The current system that has been developed uses PACs as a set of input and data storage elements but does not in any way try to duplicate the PACs functionality. In this specific network, the following types of image modalities are connected:

o Plain Film: This is a digitized plain film system that is used in several of the institutions.

o MRI: The MRI systems are present in MGH and Brigham and are connected to remote reading and processing facilities. In the case of the Brigham, the connection will tie back to the Connection Machine supercomputer on the MIT campus.

o CAT: The standard CAT interfaces using ACR-NEMA interfaces are employed.

o Nuclear Medicine: Automatic 256 by 256 and 512 by 512 Nuclear Medicine image capture systems are connected. They typically have data captured by a standalone system and are connected to the system in a server architecture.

o Cardiac Catheterization: At the NEMC the cardiac cath lab has its digitized outputs directly networked to outlying hospitals for cardiologist evaluation.

o PET: A PET system will be connected in 1991 at the Children's Hospital.

The network includes the imaging devices, the display terminals and the interconnections to the databases, communications network and the Hospital Information System.

The end users of the system and their applications are as follows:

o **Radiology**: This user is the primary specialist in the evaluation of the imaging results. The current methodology is the use of plain film in the determination of the potential pathology. The existing mechanical systems allow for rapid and efficient review of lain film. The systems are typically connected to a voice transcription system that allows for the non real time transcription of the radiologists findings.

o **Nuclear Medicine**: This area of sub specialty focuses on the results of specific scans to determine lesion type and location and o also determine the metabolic functioning of organ specific sites. Current systems capture the information on a digital format and then support a transcription system for voice reports.

o **Cardiology**: The cardiologist may use the result from specific imaging modalities to determine the specific types of stenosis, occlusions or inflammations. There are currently done on the basis of hand drawn results prepared by the radiologist and then sent to the cardiologist with a copy of the transcribed report.

o **Surgery**: The surgeon has a general need for imaging results for both surgical planning and staging. The ability to use the images from MRI and CAT systems in a surgical staging process has resulted in several cases in a 50% reduction in the overall surgical procedure time. For example, in the area of maxial facial surgery, it has been repeated that a reduction in operating room time from six to three hours has been achieved.

o **Urology**: The system has been developed for utilization in the area of urology. In particular, there is a need by the urologist to determine the cause of renal system blockage and this is accomplished by a nuclear study

o **Neurology**: The study of such neurological disorders that are metabolic in nature, rather than a lesion based disorder. The use of this system in the evaluation and staging of therapy for such disorders as Multiple Sclerosis has resulted in significant reduction in patient morbidity.

The imaging requirements have been developed in conjunction with multiple departments in various operational modes. Specifically, the following represent the overall requirements that were used for the development of the system:

o Ready access to multiple sources of image information stored on different machines in different formats and in different locations.

o The sharing of the information amounts distributed users at the same time possibly on different display devices.

o The ability to process the images for the purposes of enhancement and evaluation by application software that may be developed by the end user.

The ability to transport the images of high quality and high resolution in less than one second and to be comparable in end user satisfaction to any mechanical system currently available.

o The ability to combine and deconstruct complex multimedia objects including video, voice, text, image, and pointer motion, in a shared environment. The overall network is depicted in Figure 2. It depicts the interconnection of all the users in the inter-facility network. This includes the following major links:

o DS-3 Links: These are 45 Mbps links that are the backbone of the image transfer system. The 45 Mbps link allows for the transport of a 2,000 by 2,000 pixel display, with 12 bits per pixel in about one second.

o DS-1 Links: These are 1.5 Mbps links that are used to support the transport of slower response images. For example, at this rate, a 256 by 256 cardiology display at 8 bits can be transmitted at 3 frames per second. This is about one fifth real time for a typical film based system.

o DS-0 Links (ISDN): These are basic rate ISDN channels at 64 Kbps. These channels are useful for the non real time transfer of images for the inter facility use of remote diagnosis in non time critical fashion. In addition, such a system allows for some session interaction and support.

The system that has been developed in the Boston Trial is structured in four major software layers. These layers support various types of functionality of the network. From the communications perspective the system architecture has four layers. These are:

o Applications: The applications layer is focused on connecting the end user to all of the external resources necessary to perform their duties. For example these applications layer connections may include other users, applications programs, databases, and transaction systems to record patient care, expenses and assure the proper charging of the patient record with collections of insurance payments. One of the most important features of the applications layer is that it provides an Applications Programmers Interface (API) to developers to allow them easy access to the functions of the lower layers. This interface is supported by a set of program calls termed macros.

o System Services: The system services are an embodiment of a distributed system architecture using a client server model for the means of distribution. In the trial system in Boston, the design was based around a UNIX (TM AT&T) based system. This design also allowed for a fully open architecture design environment. The stem services supported are these of session, mail, file and directory. The access to these services is though a programming language called primitives. The system services part of the design is the upper layer of the distributed Architectures. This upper layer, just under the applications is also called the Shell layer.

o Network Services: The network services are the lower layer of the above mentioned architecture. Network services provides two functions: interface to the system services and interface to the physical transport. The physical transport id the most important function since it allows any end user to access any type of transport in a transparent fashion. It further allows the applications developers to provide a bandwidth on demand capability through the primitive calls, aging not having to have direct control over each transport medium. In the current configuration, the system supports FDDI, Ethernet, Token Ring, DS1 , DS3 and ISDN.

o Transport: This is the lowest layer of the network. It is the new physical transport described before.

The four services supported in this system are:

o **Session:** This service provides the underlying functionality for shared conversationality amongst the users as well as applications programs,

databases, and other network Input/Output devices. It supports four major elements; synchronization of the multimedia objects, dialog management between the session users, activity management of the underlying transactions, and event or network management. The Session Service uses the standardized model of OSI Layer 5 protocol. Modifications and enhancements have been made to these areas based upon the structures of simple and compound multimedia objects. (See McGarty) Images are transferred using the Sun (TM) NFS protocols. Attempts to transfer using an out of band signaling have resulted in significant delays.

o **Mail:** this is a multimedia mail service that allows the users to create compound multimedia objects and file, store, retrieve and mail them to any other users on the network

o **File**: This allows for accessing of different databases that may have different elements of the multimedia data objects. These data objects must be accessed on different devices, at different locations and stored in different file formats. The file system is a front end device that assist in this process. The current system uses a separate from end processor for the accessing of clusters of databases on different machines.

o **Directory:** The most difficult task in a system that has multiple users, uses and devices is the ability to find what one is looking for when it is needed. This is accomplished in this system with a multimedia directory service.

The applications currently supported are:

o **Report**: This application is focused on the imaging specialist and allows for the analysis of image, post processing of the image and the annotation of the image by voice, text or other manual means. It supports the filing and retrieval of this information.

o **Rounds:** The rounds applications is a simpler application that supports the attending physician on the patient floor.

o **Consult**: This application allows for the comparing and commenting upon of results that have been obtained by a imaging specialist. In the current system this applications is being used in the New England Medical center for cardiac catheterization.

o **MGH R-Star (TM)**: Massachusetts General Hospital MGH) has developed its own internal PACs system and the above system is being

integrated as the underlying network infrastructure to the R Star application. (See Taffe)

o **Surgical Staging**: At Brigham and Women's, the use of three dimensional MRI reconstruction in surgical staging for both maxial facial and neurosurgery as been developed, again using the system as an underlying fabric.

The overall system performance is currently being tested and a detailed analytical model for the system is being developed. Specifically, the system is viewed as a fully distributed operating system with an adjunct fully distributed database capability. The system is currently designed taking into account the distributed facilities of the UNIX (TM, AT&T) operating system and its functions. The client-server structure of the architecture is built around the seven layer OSI model for computer communications allowing for an open architecture and the use of existing models for design and analysis.

The performance measures were divided into two major categories. The first are those that relate to the productivity of the service in the Hospital environment and the second relate to the specifics of the system operation.

o Productivity Performance:

o Increased utilization of imaging specialist due to reduced access time for images and records.

o Increased availability of records stored from previous examinations.

o Minimization of applications development time for new end user applications.

o Reduce costs on a per exam basis.

o Allow for the increased throughput in each imaging facility.

o Attain the acceptance of both imaging and non imaging physicians in the use of the system in patient support environments.

o Allow for the ready integration into the existing hospital HIS system.

o System Operation Performance:

o Provide a response time per users that is comparable to or better than current physical systems.

o Provide for an availability on an end to end basis in excess of 99.8%.

o Provide for transport that does not require any image compression techniques.

The detailed systems performance analysis has been performed and the results are presented elsewhere. At this point, however, it is clear that a fully distributed architecture provides for the optimum performance. Specifically, if the OSI layer 5, Session Services, are provided in the end user terminals, rather than in a central node, the delays and response time are significantly reduced. Detailed analytical models are currently being developed at MIT to determine the performance in an analytical form.

In the cost model we have developed a methodology that was based upon the operations of existing imaging centers and have made it extensible to other centers. The model consists of the following elements:

o **Information Workflow Model (IWM)**: This model consists of a detailed analysis of the current work in an imagining center, carefully measuring and documenting each step that is required for the delivery of a service, determining the time taken for that step, and determining the type of person involved in that step. Specifically, the approach first details all of the steps in the delivery of the procedure. Then measurements on made on each of the steps to determine the average and minimum times required. Then each step is examined for its ability to be replaced or enhance by a computer based system. Then, the interaction of the steps are determined, and the interaction is evaluated on the impact of en electronic information system. A total system flow diagram is then prepared.

o **Cost Allocation Model (CAM):** For each step in the IWM, a detailed cost allocation procedure can be performed. This procedure is based on a three element model that includes the operations driver, the productivity factor and the unit cost. This model is extensively developed in McGarty [89]. Specifically, each task element has a cost, C_k, associated with it. C_k is given by;

$$C_i = \sum UC_{ij} P_{ij} D_{ij}$$

where;

o UC represents the unit cost of labor j on task i.

o P is the productivity of task i by unit contributor j.

o D is the driving factor for the cost i.

Thus we can consider the driver as the number of patients, the productivity of a task as the number of minutes per patient as determined from the IWM, and the unit cost the fully loaded salary of the worker on that task.

o **Economic Performance Model (EPM)**: The EPM combines the results from the IWM and the CAM into a detailed tradeoff model that allows for the dynamic analysis of the total cost and operations structure.

In this study we have performed a detailed analysis of three hospitals, with three different departments. Specifically we have analyzed the radiology, nuclear medicine and cardiology imaging departments in the hospitals. We now present a detailed analysis summary of the nuclear medicine facility. We have considered three differing scenarios. They are:

o **Case I (Current)**: This is the current operations and the results of the IWM.

o **Case II (Imaging System Only)**: In this case we introduced the imaging system into the operations of the department. This has resulted in significant reductions in tasks and i the resulting reduction of costs.

o **Case III (Fully Integrated Image and HIS System)**: In this case we further integrated the HIS into the imaging system t determine the increased savings. It is clear from the IWM model that there is a further reduction in tasks. These are reflected in the overall cost reduction.

We have used costs factors for this department and have performed a detailed economic tradeoff analysis. Specifically, we have parameterized the cost per exam as a function of the total exams through the department, doing so for each of the three cases. This clearly shows the following:

o At high levels of utilization, the unit costs are fairly constant. This means that there are clear scale economies in that the average costs equally the main costs.

o At the lower levels of utilization there is a five times greater unit cost that must be borne by the facility, primarily due to the lack of utilization.

o The impact of imaging results in a 40% unit costs reduction in the flat region. The added impact of HIS interface is a total 45% reduction but

only a 5% greater than imaging alone. Thus imaging systems integration has the most dramatic impact on the system performance.

o These results, although prepared based on a single imaging modality, have been directly extended to other modalities

The detailed cost allocation analysis for the full scale costs of Cases I, II and III are presented in McGarty and Sununu.

Each time a procedure is performed on a patient, whether directly or otherwise, this is viewed as a transaction. The objective of the overall system design is to be able to capture all such transactions. Furthermore, a transaction has two elements, the revenue generating side and the expense creating side. The capture of each transaction assumes that the system is capable of handling both sides of the transaction equation.

In the context of an overall Hospital operations, the revenue capture is reflected in the accounts receivable file while the expense structure is the accounts payable. The difference of the two is the working capital requirement for the institution. The effective management of a hospital is the management of the cash flow. The key ingredient in cash flow management is working capital management. Moreover, to improve the hospital systems operations means focusing not only on cost reduction but also revenue capture. Both result in better working capital management. Thus this current system design is ultimately focused as reducing the overall working capital requirements for the health care institution.

The transaction process is demonstrated. Here we have shown the capture of the information on all transactions, an essential capability of this distributed network, and the management of the payables and receivables. On the receivables side, it is essential to have an electronic interface into the Medicare, Medicaid, and third party insurer networks. In the current system this is accomplished by means of POS stations, workstations providing existing services, via special purpose software. The current design has used the Probity product of LaPook Lear Systems. The Probity product acts as a front end in the POS (Point of Service) system and provides for the capture of the information on each patient transaction. The system also provides a back end processing interface for the transfer of the billing records electronically to the insurers. This is especially critical given current requirements of insurers. The system also allows for an Expert System based interface to minimize the usage of improper billing numbers.

This trial has led to several early conclusions. They are based upon the testing of the system in an operational environment and it is the contention of the current study that the results are projectable to other institutions in other environments.

o Multimedia Systems Applications must be developed by the users to meet the specific needs of the local institution. The development

environment must be flexible enough to allow for the implementation of applications that are transparent to both the communications channels as well as the specific structure and storage locations of the data.

o Multimedia Systems must be integrated into the overall HIS environment. A stand alone system allows only for cluster communications and cluster applications. These may be adequate for local acceptance, but it is essential to have not only hospital wide acceptance, but community wide acceptance.

o Transaction based environments allow for the optimization of the working capital management of the Hospital environment. The system must integrate the utilization of staff time, the application of staff resources, the use of inventory items, and must allocate these to specific codes that can be billed electronically to the appropriate carrier. This focuses the process on managing working capital, specifically accounts receivable and accounts payable.

o Cost savings in an operation context of an imaging center can be achieved if there is an adequate throughput in the center. Frequently, the level of utilization is so low that fixed costs significantly outweigh the variable and thus the centers are inefficient. This is especially true of specialty imaging centers such as Nuclear Medicine.

6 POLICY IMPLICATIONS

To adequately develop a set of policy positions it is necessary to clearly understand the underlying philosophical and political beliefs or world views of the developer. In this section we first review the sets of possible world views and then extend them to the policy areas. Finally, we combine these elements to develop a commons set of policy items that may seem most appropriate for the widest set of belief sets. It is critical to understand where each position is in the spectrum of beliefs. Without this, the convergence of the policy positions into an effective, implementable, and sustainable HealthCare reforms will not occur. All too often, the policy makers start with and retain their own delimited belief set. This may lead to short term results but long terms failure. It is clear that this approach of nearsighted and closed policy development cannot allow to exist in the current crisis situation of HealthCare.

6.1 HealthCare Philosophical Alternatives

We shall follow the more recent work of Dougherty in analyzing the four major positions on HealthCare philosophy in the context of a political environment. Dougherty has developed a framework that is essential in order to deal with the belief set of the differing policy areas and furthermore Dougherty has provided a basis for developing Policy Goals.

The four schools of thought, as described by Dougherty, are as follows:

Utilitarianism

Utilitarianism as defined by Dougherty is:[3]

> *"... the moral act is that act whose consequences have the greatest moral utility. The act tends to realize the greatest possible amount of good, the least possible amount of bad, or the best possible ratio of good to bad. Utilitarianism thus insists on measuring the morality of an act by the empirical upshot of the act, not by any theoretical claims about rightness or wrongness of the act in and of itself."*

Utilitarianism assumes that there is some objective function that can be defined, measured and optimized. It assumes, for example, that the net worth of society can be measured and that the impact of a HealthCare policy can be defined and measured in terms of that function. It suffers from dealing on global averages, from assuming some measurable quantity that singly is optimized, and by the definition of the objective function. This philosophy is one in which the decision is pushed back one step into the

[3]Dougherty, p. 35.

objective function. In effect, it is a philosophy whose objective function is, in effect, the philosophy.

Egalatarianism

Again Dougherty defines Egalatarianism as follows:

> *"This general theory of human rights is egalitarian, since it is based on the claim that as persons we are fundamentally equal. Since we are equal in this fashion, others have a duty to treat us this way and we have a right to be so treated. Rights, then, are basic and equal. Short of being overridden by another right or by a catastrophe that temporally suspends the normal moral presuppositions of social life, rights are morally prevailing entitlements not to be set aside for any reason of utility."*

This is a direct extension of eighteenth century thought, clearly an extension of Rousseau and Jefferson. It inherently assumes equality. It further mandates equality. The inherent problem with this philosophy in it pure sense, is that in a capitalist society is mandates equality downward and further enhances equality upward. Egalatarianism works as a leveler of the middle class in a capitalist society, allowing those who are financially better off to prosper at the expense of the lower classes. Unless one eliminate capitalism, therefore, and reinstitutes communism in its purest sense, egalitarianism will not function.

Libertarianism

To quote Dougherty again;

> *"Emphasis on person's freedom as rational agents is at the core of libertarianism...For the libertarian, the only true rights, the only primary entitlements that must be socially guaranteed, are negative rights of noninterference...Rights to freedom of speech, religion, and assembly are the rights to be free from coercion by others, especially the government. The so-called positive rights of access-rights to education, employment, housing, and a decent standard of living- are not rights for the libertarian, but are manifesto assertions of desiderata."*

It is clear that in this context libertarianism is a belief in the individual and is a strict interpretation of the Constitution of the United States. The Federalists in many ways were libertarians. The Jeffersonians were the egalitarians. Thus the cultural difference and that arguments ensuing are based in the founding of the United States. Clearly the Declaration of Independence, as written by Jefferson is an Egalitarian document. The Constitution, as promulgated by Madison, Hamilton and Jay in the Federalist Papers is

libertarian. The United States is ruled by the Constitution and not the Declaration of Independence.

Contractarianism

Contractarianism is a form of political philosophy that assumes the existence of a social contract between the governing and the governed. As stated by Dougherty:[4]

"The grounds for Contractarianism can now be stated more precisely. Justice in a society is defined by the basic principles for distributing primary social goods that would be adopted unanimously by free and rational persons behind a veil of ignorance, which would render them equal and mutually disinterested. Although this hypothetical construct is complex, the moral point at issue is simple. One should choose morally the way one would choose rationally under conditions that made bias impossible. Or put in other terms, one should do in real circumstances what one would do in ideal circumstances."

The last sentence in the definition is revealing. It, in essence, is the difference between the two schools of rational thought as described by Sowell; unconstrained and constrained visions. Sowell defines the unconstrained vision in the following terms:[5]

"... the unconstrained vision is the conviction that foolish and immoral choices explain the evils of the world-and that wiser or more moral and humane the social policies are the solution. William Godwin's Concerning Political Justice drew upon and systematized such ideas found among numerous eighteen century thinkers- ..Rousseau, ...and in economists like Thorstein Veblen and John Kenneth Galbraith, and in the law with a whole school of advocates of judicial activism, epitomized by Ronald Dworkin in theory and Earl Warren in practice."

Sowell further defines the "Constrained" vision:[6]

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[4]Dougherty, p. 96.

[5]Sowell, A Conflict of Visions, p. 37. It should be noted that Sowell's "Vision" is the same as Kuhn's "World View". The latter is preferred because Kuhn has thought through the process in detail for the scientific area and this has been applied by McGarty, Architectures, in the development of public policy in telecommunications. It is the basis of the deconstructionist approach developed by McGarty in the area of policy analysis and development. The world view approach is based upon a set of paradigms, that is basic examples or experiments that are used as the basis and justification of all subsequent actions within the confines of that world view. Specifically, if we were to use the example of the computer and relate it to the human mind, then we may readily relate all further actions to humans from what we do with computers.

> *"... the constrained vision sees the evils of the world as deriving from the limited and unhappy choices available, given the inherent moral and intellectual limitations of human beings. For amelioration of these evils and the promotion of progress, they rely upon the systemic characteristics of certain social processes, such as moral traditions, the marketplace, or families. They conceived of these processes as evolved rather than designed- and rely on these general patterns of social interaction rather than the specific policy designed directly to produce particular results for particular individuals and groups. This constrained view...found in Adam Smith, the authors of the Federalist Papers,...Milton Freidman and Friedrich A. Hayek..."*

We can take these two world views and see how they apply to the Contractarianism school and in addition see how it directly applies to all schools. The schools are fundamentally built upon one of these two world views. If we follow Doughery one step further, he makes a fundamental statement about the contractarian school;[7]

> *"Next in importance to liberty is opportunity. But since opportunity is shaped so directly by wealth, contractors would have to decide on a principle for the general distribution of wealth before considering principles to govern opportunity."*

As seen, the Contractarianism school is an unconstrained school. It assumes the existence of an absolute moral law, and a law that is known to all, or at least to the select few who make it. It further assumes that this moral law is one that demands and requires equality through distribution. Namely, it assumes that those with disproportionate shares of wealth must be redressed and reapportioned. Equality is the driving factor. As stated by Rousseau:[8]

> *"To find a form of associations which may defend and protect with the whole force of the community the person and property of every associate, and by means of which, each, coalescing with all, may nevertheless obey only himself, and remain as free as before. Such is the fundamental problem of which the social contract furnishes the solution....These clauses, rightly understood, are reducible to one only, the total alienation to the whole community of each associate with all of his rights; for, in the*

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[6]Sowell, Visions, p. 38.

[7]Dougherty, p. 97.

[8]Rousseau, Social Contract, pp. 17-18.

first place, since each gives himself up entirely, the conditions are equal for all; and, the conditions being equal for all, no one has any interest in making them burdensome to others...In short, each giving himself to all, gives himself to nobody...we gain the equivalent of all we lose, and more power to preserve what we have."

The Social Contract has an overriding moral power of existence. It, in Rousseau's mind, has the equality that idealistically derived from the government in Geneva, as perceived from Annency.

In contrast, the constrained view is a view of the evolutionist. The evolutionist theory states that there are fundamental differences that those differences lead to a strengthening of the species and that competition is the essence of survival. It is built around the paradigm of the DNA molecule, which makes for fundamental differences in each human. Differences of physical appearance, accomplishment, contribution, and the ability to effect terror.

The Contractarianism school fails to take into account several key factors as they relate to HealthCare:

- *Not all humans are created equal when it comes to their own health. There are genetic diseases, there are levels of immune response limitations, and there are levels of emotional and personal control that effect health.*

- *HealthCare Providers differ in the quality of their care. A cardiologist at Massachusetts General Hospital is not the same as one at Staten Island Hospital. Similarly, the cardiologist in Sri Lanka may also differ. There are value judgments based on measurable differences in mortality and morbidity.*

- *Health care is not a Commodity. I cannot buy ten pounds of oats in HealthCare at one locations and ten pounds at another, and merely use price as the comparison. In fact, it is the Darwinian imperative that makes for differences in location.*

- *People are not equal in incentive. Smoking is a clear example. Some individuals begin smoking and continue, knowing full well of the consequences. People drink alcohol, consume excessive fats, fail to exercise, and consume illegal drugs. The question is one of what responsibility does the individual have to himself and society. Is there a fundamental quid pro quo.*

It is for these reasons that Contractarianism is fundamentally flawed. It is an unconstrained world view, driven by a moral imperative not accepted by all, denying the fundamental Darwinian imperative, and commoditicizing the individual and the care.

6.2 HealthCare Goals

Having discussed the above four schools of thought, and placed them in the two conflicting world visions, we can approach the issue of HealthCare goals from two perspectives. We can state a set of current ones and then deconstruct them, or we can use the construct developed to pose goals in terms of this construct. We propose to do the latter.

In a recent analysis of the positions of the past Presidential Candidates, Angell has prefaced their positions with six Goals. Specifically:[9]

- **A Health Care System should be Coherent:** Angell means that it must be easily understood. It is not clear that this can be readily achieved but the assumptions is that all of the players in the system can understand it from the point of view of its operations.

- **It should be Universal:** This is a simple statement yet is has many implications. Angell follows that with the quote, "Health Care should be regarded as a benefit of citizenship". Regrettably, the drafters of the Constitution did not include this despite Angells wishes.

- **It should be Comprehensive**: It should in Angel's terms cover all aspects.

- **It should be structured to contain costs.** She emphasizes caps and global restraints. As recently demonstrated by Stevens, global caps are ineffective and do not function in an open and capitalistic market. The goal is laudable but the strategy to achieve it is questionable. Possibly allowing free market forces to play are more effective.

- **It should be paid for fairly.** Angell argues for the Federal Government paying for the system. Admittedly, fairness is key, a free market approach, under a Government policy directive is more efficient. It helps clear the cost inefficiencies from the market. Government funding just institionionalizes the inefficiencies.

- **It should foster the morale of the doctors and the patients**. Clearly the patient as the demand side of the equation should bear the burden of the purchaser more clearly, and the physician as the supplier should also. Again free market factors may help her also.

[9]Angell, NEJM, uses these as prefatory to the positions of the candidates.

In the remainder of the Angell article, there were the presentations of Bush and Clinton. We shall focus on the Clinton proposal because of its clearer structure.[10] The Plan has the following eleven elements:

1. **Establish a National Health Board to Control Costs.** This is a Global Caps initiative.

2. **Establish a core benefits package**.

3. **Provide Universal Coverage.** Employers are the focal point by requiring that they provide Health Insurance of participate in the Government Plan.

4. **Establishment of Health Networks**. This will be a result of Government incentives to the network providers.

5. **Insurance Reform.** This means guaranteed access and the use of expected cost not historical costs.

6. **Special Provisions for Small Employers**. The ability to purchase from a Government Managed Policy Pool.

7. **Medical Malpractice Reform.** The development of alternative mechanisms for dispute resolution.

8. **Cost Containment.** This is primarily a direct attack on the pharmaceutical industry, specifically on advertising and extensive R&D.

9. **Enhanced Preventive and Primary Care.** This means the establishment of a National Health Corps and expended Government sponsored and managed clinics.

10. **Long Term Care.** This implies expanding the Medicare coverage.

11. **Health Education and Personal Responsibility.** This is a request for the individual to maintain their own health and use the National System wisely.

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[10] See the position for Bush written by Sullivan, pp. 801-804. This presentation is almost content free and is predominately a diatribe against Clinton. Unfortunately this could have been a clear opportunity for the Republicans to develop free market approach as has been developed in other venues. This response is in many ways a mirror of the ineffectiveness of the 1992 Republican Campaign. A simple and clear presentation appears in Weinberger. The Republican free market position is stated there in four points; mandate universal coverage through employees, let private insurers be the implementers, the Governments role is that of standard setter for the minimum level of benefits, and use co-payments as a demand limited.

Let us compare this to an alternative proposal described in detail by Feldstein:[11]

1. **Universal Coverage**: Feldstein argues that all people must have health care. He treats Health Care as any other insurance, allowing the individual to buy it in a free market; like auto, property, life and other insurances. He insists that everyone show on their Tax returns that they are insured for the next year. Failure to do so will result in the taxpayer defaulting to a possibly Government sponsored and managed plan. Thus the incentive is to retain choice by buying the insurance. Further he argues that the ***obligation is on the insured and NOT the employer***. This is a dramatically different approach but one that economically forces the demand side of the market to come into play. Unlike the Clinton plan which fails to recognize free market factors, the Feldstein Plan build on consumer choice and responsibility.

2. **Catastrophic Coverage Based Upon Income:** The insurance required would be income dependent with a cap for catastrophic coverage. The Basic Insurance therefore is a basic coverage less a deductible that is income dependent. It is uncertain from the Feldstein plan how this will be accomplished, and how equitable this is for the individuals employed by companies as compared to those self employed. However, Social Security already functions in this fashion, yet it has a cap, this would not. Feldsetin argues for a fixed percent of gross income for the deductible, up to a max of 10% of the gross income. He further allows the purchase of an Enhanced Insurance Package for excess coverage, such as a common umbrella liability package.

3. **Tax Credit Funding for Lower Income:** For lower income individuals, the program would be funded on a tax refund credit, usable only for the purchase of health care premiums.

4. **Fund Medicare and Medicaid Functions by Tax Credits and through Private Channels:** Medicare and Medicaid would be eliminated. They would be handled by the Tax Credit funding mechanism.

5. **Remove the Tax Subsidy from Employer Purchased Plans:** The individual would be responsible for the coverage purchase and the policy would be with the individual and not through the employer. This is as it is with auto, life and property insurance today. It automatically creates a portable system, one that enhances choice and one that throughout the credits process allows coverage during times of unemployment.

[11]Feldstein. The author presents a detailed financial analysis of the Health Care Economic market. The details are clearly and cogently argued.

6. **Reform the Insurance Market:** With the insurance market a free and open market, all buyers may then purchase in a competitive fashion from a wide variety of suppliers; managed care entities, HMOs, PPOs etc. In addition no person can be denied insurance for prior existing conditions. Rates would be controlled at the state and not at the federal levels.

There are five plans that have been proposed for Health Care as discussed by Faltermeter. They are summarized in Table 6.2.

PLAN	FUNCTIONS	SPONSORS	CONTROLS
Canadian Plan	• Government Run • Tax Supported • Global Limits • Single Plan • No Choice • Mandatory	Rep Russo	• Government Budgeting. • Patient Limits by Waiting. • Rationing of Service. • Control of Physicians by Government.
Play or Pay	• Employers must pay Minimum. • Or pay new taxes. • National Guidelines. • Government Oversight	Rep. Rostenkpowski	• Payers and providers managed by Government.
Consumer Choice	• Mandated minimum package. • Individuals pay direct and not through company. • Tax credit pays for low income and unemployed. • Extra coverage purchasable by individual. • Individuals must pay deductible proportional to their income.	Heritage Foundation	• Market Forces. • Individual Choice. • Individual Responsibility. • Quality Driven Results
Managed Competition[12]	• Managed Care HMO Type entities, only. • Elimination of private practice. • Government approves all Groups. • Government Manages the Program through the National Health Board. • Government sets accountability standards	Jackson Hole Group	• Government mandated Caps. • Employer screened plans. • Assumes individual is not capable of making individual decision. • Assumes that providers and insurers are inherently unethical and need control. Assumes that Federal Government is the best point of control.

As has been indicated by Farrell, one must be careful in not saying all the negative about Health Care. It has significantly improved the quality of life for the older generation,

[12]See the papers by Simmons et al, and by Relman. These recent NEJM papers details some of the elements of Managed Competition. All of these papers reflect upon the Enthoven Plan. Levy and Hill also summarize these efforts.

over 65, and has provided employment for a large portion of the economy. One must be careful in having this become a generational war. Discrimination is not only racial it can also be generational. The Constitution protects all such classes.

6.3 Policy Implications

The following policy implications result from this paper.

Demographic Factors

No matter how one tries to eliminate one disease, another disease will take its place, under current understanding of health care. Thus the issue from a policy perspective is disease management not elimination.

Quality and Measurement

Quality of health care delivery is a measurable and manageable process. The quality of the care is related to the results in terms of both cost and patient perception.

Cost and Productivity

Costs in health care must reflect the costs of the services rendered to the individual. This will allow the ability to control demand.

Structural and Organizational

Competition through service, quality and costs is a clear means to control the overall costs structure. The management of this should be like any other free market service.

Access and Availability

Access and availability should be as open as possible.

6.4 Payment Alternatives

There are several state based plans that are currently in place. Several, of these are as follows:

- **New Jersey:**[13] This plan has several key points; First, patients will no longer be directly billed and added 19.1% surcharge for the uninsured. Second, the state's

[13]Friedland discusses the key issues of this plan.

800,000 uninsured are to find insurance from their employers. Third, Hospitals are freed from rate controls. They are allowed to compete. Fourth, use the state unemployment trust fund to fund the unemployed.

- **Florida:** [14] Florida is to establish a state run Community Health Purchasing Alliance, which is run by the state and purchase health care from insurance companies and resells it to the individual. It is what Gov. Chiles calls a Managed Competition approach. The state has 13.5 residents and 2.5 are uninsured. Considering that Florida has the largest number of citizens over 65 and covered by Medicare, and that 65 % of the uninsured earn under $25,000 per year, the rate for uninsured as to available base is in excess of 35%. If we use the national averages of 35 million uninsured with 250 million population, Florida has almost 8% of the uninsured with 5% of the population. One questions the statistics.

- **Hawaii:** [15] The program is funded by Sate Revenues. Hawaii has the highest tax rate in the United States. It is managed by the Hawaii Medical Services Association.

- **Massachusetts:** [16] Approved a universal health care law in 1988. The State also had comprehensive malpractice reform.

- **Oregon**: [17] This is the most far reaching plan. It allows only 597 procedures. None other. It also sets a global budget. If the budget is to be exceeded, the list of 587 is shortened, until the budget is met.

- **Minnesota:** [18] The state has a cost control commission and the commission controls hospital expenditures. The state provides state subsidized insurance. The plan is funded by a cigarette tax, 2% tax on hospitals and health care providers, and 1% on insurer's gross revenues.

6.5 Proposed Strategy

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[14]Rohter, the article describes the Florida Plan.

[15] Dukakis, this paper describes several of the plans, including Massachusetts.

[16]Dukakis, ibid.

[17]Steinbrook.

[18]Yawn et al, and Miles et al.

We have established a set of goals for health care and have compared several systems. We recognize the need for competition, for a system open equally and equitable to all, a system open to continual innovation, and the rapid clearing of incorrect ideas through market forces. The system we propose is as follows:

Choice: All buyers of healthcare have a choice of any provider. Choice is critical for both patient acceptance and from the perspective of clearing the market. Healthcare is an economic good. Failure to see it as such will result in the continuing distortions in market pricing. Choice ensures the preservation of any semblance of a demand function in healthcare. Take the demand function away, and price escalation will ensue.

Quality: The quality of healthcare delivery if managed by the government in a centralized fashion correlated with the payment and performance system. Those providing low quality care will be penalized as per the law. Quality can be measured and monitored. This will be necessary as part of the role of the providers themselves or of the payors or buyers.

Demand: Demand will be reflected by the consumer being aware of the price, aware of choices, by being responsible for the first 3% of their gross revenue in direct out of pocket expenses per year. If we assume that the average cost per person per year for healthcare in the United States if slightly in excess of $3,000, and we assume that the average family income is $33,000 per year, then each family will be responsible for $1,000 of 2.5 times $3,000, or a total per family of $7,500. That leaves $6,500 to be taken up elsewhere.

Catastrophic Relief: No personal would be responsible for any expenses in excess of 5% of their annual gross income of their health care expense per year. The cap amount of 5% would be covered by a Government master tax system across the Board, based on a graduated income tax system. There are two types of catastrophic relief: diseases such as cancer and other terminal diseases or chronically debilitating and ultimately terminal disease such as Multiple Sclerosis. The second is the sets of disease of old age such as heart disease and other disease in the non-working older population. It is know that over 50% of an elderly persons healthcare expenses, namely Medicare related, occur in the last six months of their life. These are catastrophic. If we perform and analysis on the data at hand we find that 10% of the healthcare dollars are spent on such expenses, or about $80 billion, or average to $300 per person per year. This should be covered by a catastrophic tax on all workers, which is essential part of the current FICA elements.

Cost Control: Costs control is determined by introducing choice, providing pricing information, managing demand and supply through an open economic flow with the patient pay system below the 3% cap level. Cost control has been shown achievable b first by electronic physician and hospital management. This can and will reduce costs by up to 20%, reducing administrative, physician, and hospital expenses. This is $160 billion in target reductions, or $750 per person per year.

Availability: Healthcare insurance coverage is obtainable from a common carrier type insurance system which charges the same price to all subscribers no matter what their age or no matter what their health status. The system would cover the expenses over 3% of the gross annual income and up to the 5% gross annual cap. Thus each individual or family must purchase healthcare insurance and demonstrate as such for an amount equal to the current rates for auto insurance or house insurance. This will amount to approximately $1,500 per year for the typical plan per family.

Universal Coverage: The coverage of all individuals would be achieved by means of a negative tax plan whereby those individual under a certain level, such as $35,000 per family would have the cap reduced to 0% at $25,000 and have a negative tax provide for payment below that amount. These individuals would be funded from the general tax funds.

We summarize the position and savings of this policy in the following table.[19] This is a reflection of all of the elements that we have discussed and developed in this paper.

Factor	Position	Source or Use
Total Cost Per Family	***Current***	$7,500
Total Cost per Person	***Current***	$3,000
Deductible per Family	***Take 3% of Gross per Family***	$1,000
Catastrophic Relief	***FICA Source***	$1,000
Cost Control	***Take a 20% Reduction***	$1,500
Availability	***Each family buys insurance***	$1,500
Universal Coverage	***Tax top 20% pay for bottom 20%***	$2,500

[19]This proposal in many ways appears to reflect the current Clinton plan as discussed in the week of September 9, 1993.

7 CONCLUSIONS

This paper has developed several key issues in healthcare. First we have shown that moving one disorder from one column to another does not necessarily save healthcare costs. Second, we show that the introduction of technology in the healthcare transactions serves both quality and costs reduction. Third we show that there are basic philosophical beliefs that must be considered in the delivery of healthcare. Fourth we develop alternatives and present a plan that differs from those presented elsewhere. Our focus has been on quality, cost, demand control, and universality of coverage.

8 APPENDIX A: "THE PREFERRED PLAN"

8.1 Introduction

The development of a Health Plan for the coverage of all U.S. citizens is a challenging and essential act. It is at this time the most important element in national policy development. It represents a challenge that will not only be met by addressing the details of how best to serve all Americans but it a challenge in understanding what philosophical underpinnings are best suited for deploying a plan the is fair, equitable, and is sustainable in the century t come. The choice of such a plan will determine not only how health care is to be delivered to the citizens but how the economic infrastructure of the United States will be evolved in the twenty first century.

There are example of how health care systems have the economic structures of governments and their economies. England has had a national system for many years. The system provides adequate care but at a significant cost. The United States has had a combination of a free market system with that of a government controlled system. Simply put, the United States spent almost $800 billion on health care in 1992. Almost $300 billion of that was controlled directly by the Government, almost half. Thus, we Americans are already in a national system.

That $300 billion of Government controlled health care is marginal to acceptable. Medicare has been a success for the over 65 generation. Medicaid has not. It is argued that 34 million citizens are uninsured. This, by definition does not include the poor, since they are covered by Medicaid, nor does it include the elderly since they have Medicare. It includes those who chose not to be covered deliberately or who are in the lower economic strata and make the economic choice not to purchase health care and to lay the burden of its costs on the remaining sector of society, namely those working and paying for their coverage. Thus the current population of the United States that has health care and is employed is effectively paying for the portion in Medicare, the portion in Medicaid, and those not paying for it themselves.

This White Paper was prepared to contrast the proposed Clinton Plan with the "Preferred" Plan, a free market alternative that places the burden on the individual and not on the Government nor the employer. There are several philosophical schools of thought that are followed in the delivery of health care. We spend a few words describing each since the "Preferred" Plan can best be contrasted in terms of the underlying philosophical differences.

The four philosophical schools of thought are as follows:[20]

Utilitarianism

Utilitarianism assumes that there is some objective function that can be defined, measured and optimized. It assumes, for example, that the net worth of society can be measured and that the impact of a Health Care policy can be defined and measured in terms of that function. It suffers from dealing on global averages, from assuming some measurable quantity that singly is optimized, and by the definition of the objective function. This philosophy is one in which the decision is pushed back one step into the objective function. In effect, it is a philosophy whose objective function is, in effect, the philosophy. The utilitarian views the delivery of health care as a fully quantifiable process, that the individuals happiness can be measured and that the delivery systems structure modeled, measured and controlled to meet the goal of the mutually agreed to objective function. This may work for a chemical process control system but it never works for a human enterprise.

Egalatarianism

This is a direct extension of eighteenth century thought, clearly an extension of Rousseau and Jefferson. It inherently assumes equality, namely that we are all equal or more importantly, that we can all be made equal. It mandates equality. The inherent problem with this philosophy in it pure sense, is that in a capitalist society is mandates equality downward and further enhances equality upward. Egalatarianism works as a leveler of the middle class in a capitalist society, allowing those who are financially better off to prosper at the expense of the lower classes. Unless one eliminate capitalism, therefore, and reinstitutes communism in its purest sense, egalitarianism will not function. This philosophical approach, as proposed by the Clinton Plan, assumes that the Government becomes the mandate or equality and that the least common denominator rules. Unfortunately, especially in health care, our genes are all different. Some of us carry a gene for cystic fibrosis, some for near perfect health. Some of us refuse to follow health care guideline, and smoke and drink to excess. We cannot rule behavior, at best we can mediate outcomes.

Libertarianism

[20]We shall follow the more recent work of Dougherty in analyzing the four major positions on HealthCare philosophy in the context of a political environment. Dougherty has developed a framework that is essential in order to deal with the belief set of the differing policy areas and furthermore Dougherty has provided a basis for developing Policy Goals. 9. See Dougherty, C.J., American Health Care, Oxford Univ Press (New York), 1988.

The libertarian school builds on the responsibility of the individual and the uniqueness of the individual. The Bill of Rights are the essential framework for the libertarian. It empowers the individual to choose, not to be controlled by the Government, and to be responsible for their actions accordingly. It is clear that in this context libertarianism is a belief in the individual and is a strict interpretation of the Constitution of the United States. The Federalists in many ways were libertarians. The Jeffersonians were the egalitarians. Thus the cultural difference and that arguments ensuing are based in the founding of the United States. Clearly the Declaration of Independence, as written by Jefferson is an Egalitarian document. The Constitution, as promulgated by Madison, Hamilton and Jay in the Federalist Papers is libertarian. The United States is ruled by the Constitution and not the Declaration of Independence. Thus, for the libertarian, health care is ultimately the individual's responsibility, not the Governments.

Contractarianism

Contractarianism is a form of political philosophy that assumes the existence of a social contract between the governing and the governed. Contractarianism may be placed between two schools of thought as described by Sowell; unconstrained and constrained visions. Sowell defines the "Unconstrained" vision in the following terms:[21]

> *"... the unconstrained vision is the conviction that foolish and immoral choices explain the evils of the world and that wiser or more moral and humane the social policies are the solution ... such ideas found among numerous eighteen century thinkers- ..Rousseau, ...and in economists like Thorstein Veblen and John Kenneth Galbraith, and in the law with a whole school of advocates of judicial activism, epitomized by Ronald Dworkin in theory and Earl Warren in practice."*

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[21]Sowell, A Conflict of Visions, p. 37. (Sowell, T., A Conflict of Visions, Morrow (New York), 1987.)

It should be noted that Sowell's "Vision" is the same as Kuhn's "World View". (Kuhn, T.S., The Structure of Scientific Revolutions, Chicago Univ Press (Chicago), 1970.). The latter is preferred because Kuhn has thought through the process in detail for the scientific area and this has been applied by McGarty, Architectures, in the development of public policy in telecommunications. (McGarty, T.P., Alternative Networking Architectures, B. Kahin Editor, McGraw-Hill (New York), October, 1991.) It is the basis of the deconstructionist approach developed by McGarty in the area of policy analysis and development. The world view approach is based upon a set of paradigms, that is basic examples or experiments that are used as the basis and justification of all subsequent actions within the confines of that world view. Specifically, if we were to use the example of the computer and relate it to the human mind, then we may readily relate all further actions to humans from what we do with computers.

Sowell further defines the "Constrained" vision:[22]

> *"... the constrained vision sees the evils of the world as deriving from the limited and unhappy choices available, given the inherent moral and intellectual limitations of human beings. For amelioration of these evils and the promotion of progress, they rely upon the systemic characteristics of certain social processes, such as moral traditions, the marketplace, or families. They conceived of these processes as evolved rather than designed and rely on these general patterns of social interaction rather than the specific policy designed directly to produce particular results for particular individuals and groups. This constrained view...found in Adam Smith, the authors of the Federalist Papers,...Milton Freidman and Friedrich A. Hayek..."*

We can take these two world views and see how they apply to the Contractarianism school and in addition see how it directly applies to all schools. The schools are fundamentally built upon one of these two world views. The Contractarianism school is an unconstrained school. It assumes the existence of an absolute moral law, and a law that is known to all, or at least to the select few who make it. It further assumes that this moral law is one that demands and requires equality through distribution. Namely, it assumes that those with disproportionate shares of wealth must be redressed and reapportioned. Equality is the driving factor. As stated by Rousseau:[23]

> *"To find a form of associations which may defend and protect with the whole force of the community the person and property of every associate, and by means of which, each, coalescing with all, may nevertheless obey only himself, and remain as free as before. Such is the fundamental problem of which the social contract furnishes the solution....These clauses, rightly understood, are reducible to one only, the total alienation to the whole community of each associate with all of his rights; for, in the first place, since each gives himself up entirely, the conditions are equal for all; and, the conditions being equal for all, no one has any interest in making them burdensome to others...In short, each giving himself to all, gives himself to nobody...we gain the equivalent of all we lose, and more power to preserve what we have."*

The Social Contract has an overriding moral power of existence. It, in Rousseau's mind, has the equality that idealistically derived from the government in Geneva, as perceived from Annency.

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[22]Sowell, Visions, p. 38.

[23]Rousseau, Social Contract, pp. 17-18.

In contrast, the constrained view is a view of the evolutionist. The evolutionist theory states that there are fundamental differences that those differences lead to a strengthening of the species and that competition is the essence of survival. It is built around the paradigm of the DNA molecule, which makes for fundamental differences in each human. Differences of physical appearance, accomplishment, contribution, and the ability to effect terror.

The Contractarianism school fails to take into account several key factors as they relate to HealthCare:

- *Not all humans are created equal when it comes to their own health. There are genetic diseases, there are levels of immune response limitations, and there are levels of emotional and personal control that effect health.*

- *Health Care Providers differ in the quality of their care. A cardiologist at Massachusetts General Hospital is not the same as one at Staten Island Hospital. Similarly, the cardiologist in Sri Lanka may also differ. There are value judgments based on measurable differences in mortality and morbidity.*

- *Health care is not a Commodity. I cannot buy ten pounds of oats in Health Care at one locations and ten pounds at another, and merely use price as the comparison. In fact, it is the Darwinian imperative that makes for differences in location.*

- *People are not equal in incentive. Smoking is a clear example. Some individuals begin smoking and continue, knowing full well of the consequences. People drink alcohol, consume excessive fats, fail to exercise, and consume illegal drugs. The question is one of what responsibility does the individual have to himself and society. Is there a fundamental quid pro quo.*

It is for these reasons that Contractarianism is fundamentally flawed. It is an unconstrained world view, driven by a moral imperative not accepted by all, denying the fundamental Darwinian imperative, and commoditicizing the individual and the care.

Many American are deeply concerned about the directions being proposed with the Clinton Health Care Plan. This White Paper presents an alternative called the "Preferred Plan". The differences are significant. Americans want,

- ***Freedom of choice in a Health plan.*** The Clinton Plan makes choice criminal. If I or a family member had cancer, it would be a crime under the Clinton plan for me to use Memorial Sloan Kettering in New York. I would be forced into the alliance selected hospital, no matter what their expertise.

- ***A plan that uses the inherent economic factors of supply and demand to the benefit of the consumer.*** The "Preferred Plan" does that. The Clinton Plan establishes price caps, rations health care at the Federal level, and makes it a criminal offense to attempt to save your life.

- ***A plan that promotes quality and innovation.*** A plan that rewards the best performers and the most creative. The Clinton plan restricts which student may go into what specialty, thus eliminating, for generations, the brightest minds in medical R&D. The Clinton plan mandates mediocrity.

The fear is that the plan currently under investigation responds to the demands of the unions for more controlled jobs at lowered levels of productivity and competence and will result in the growth of government bureaucracies. It will result in a health care system comparable to the U.S. primary and secondary education system. Our education system is far below world standards resulting in our loss of world competitiveness, and institutionalizing mediocrity. The same approach applied to health care will result in loss of life! This Plan has the following key elements:

- *Individual not employer responsibility, no group buying of plans.*

- *A fixed set of health plans at a fixed price per person per provider, common carriage approach.*

- *Total freedom of choice, choose any doctor, pay any price, and pay whatever above the plan.*

- *A fixed percent of gross income as a deductible, thus creating a demand curve.*

- *No government controls over health education, allowing selection by excellence.*

- *No subsidies for any health provision element, thus creating a supply curve.*

- *A standard national electronic transaction network for all payment and claims filing.*

The ""Preferred" Plan is economically based, builds on individual choice and initiative and is a reflection of what America was founded on, the principles of liberty, equality, and justice.

The basic economic underpinnings of the "Preferred" Plan are as follows:

- There must exist a demand curve. The consumer of health care must make a rational economic choice personally. The consumer must choose to spend more or less money, and that money must reflect an individual choice on the consumer's part.

- There must be a supply curve. The inefficiencies must be driven out of the system There should be no subsidies and excellence in delivery in a productive fashion must be rewarded in the market.

- There must be universal coverage, not just access; but this must be balanced with the Constitutional right to chose not to be covered but to economically bear the risks of such a choice. A Christian Scientist must not be forced to participate unless they so choose. It violates their freedom of religion, and it may involve them in a health process that may actually be wrong and harmful.

- Costs must be driven out of the system. The inherent inefficiencies of today's system are frequently generated by Government overhead. If credit cards were managed directly by the government then the cost per transaction would be ten times its current cost. There is no process in an economic entity that has lower costs when that process is managed by the government rather than the free market process. Even monopolies generate monopoly rents and thus higher prices. All one has to do is look at how long distance telephone rates have plummeted with the introduction of competition.

These four principle must be at the heart of any plan. The "Preferred " Plan is built on these. It is a libertarian plan that has universal coverage but has individual choice and individual responsibility. It clears the market and establishes quality and excellence as the hallmarks.

Element	Clinton Plan	"Preferred" Plan
Coverage	Universal coverage of all persons in the United States. Mandated participation no matter what religious beliefs a person may have.	Universal coverage, if not objected to on religious or other grounds, of all citizens of the United States. Maintains ability of those practicing their rights under the First Amendment of the Constitution to refrain from mandated health coverage.
Responsibility	The employer of the individual is responsible for payment. The individual has no personal responsibility for any participation, payment, selection, or offerings.	The Individual is responsible directly. There will be no Group Plans and there will be no groups or collusive buying groups. Each individual will be responsible for procurement of an individual policy.
Children	Plans cover individuals or families as appropriate.	All dependent children will be covered individually by a plan paid for by their parent, legal guardian, or by the state, if there is no such guardian.
Over 65	Become members of state alliances.	All current Medicare eligible individuals will purchase a plan from a registered provider, and the Government will pay for the base price of the base plan, directly.

Element	Clinton Plan	"Preferred" Plan
Payment	Each participant is responsible for 20% of the plans payment.	Each individual will be responsible for selecting and paying for an insurance plan. Each family will be responsible for their children and payment for a children's plan. If there individual or family is not able to purchase the plan because of financial reasons, lack of employment or other accepted reason, the Government shall provide that individual with a subsidy per person equal to that of the fee for the minimal service provided by the lowest cost provider. The subsidy shall be paid directly to that provider on behalf of the subscriber. In the event that the patient does not purchase a plan and seeks services, and is not covered by a self selected waiver, then the patient will be personally responsible for payment of all fees, will have subsequent fees paid out of their taxes, and shall be fined for the failure. It will the IRS responsibility to collect said fees.

Element	Clinton Plan	"Preferred" Plan
Pricing	All prices shall be set by agents of the National Health Board.	There shall be a set of standard offerings, with the minimal offering of a basic medical plan. No provider shall offer other plans unless they offer the standard minimal common plans. There shall be no difference in such plans. All providers shall list publicly the price per person per plan. There shall be no difference between any person based upon age, sex, health history, or for any other reason. Each person shall pay the same insurer the same price for the same plan. Insurers may offer the basis plan in combination with other plans, but the subscriber must be able to buy the basis plan alone.

Element	Clinton Plan	"Preferred" Plan
Choice	There is choice of alliance approved managed care plans. Within a managed care plan no U.S. citizen, other than the President and Congress, shall have any choice in any health care delivery. Any U.S. citizen, other than the President and Congress, shall be held in violation of Federal law in seeking out any services not mandated by the managed care plan. Any physician participating or delivering such unauthorized and mandated services shall also be in violation of Federal law.	There is total and complete freedom of choice. The patient may choose any physician at any time for any purpose. The physician may charge any fee for any service as long as the physician's fees are posted with common knowledge of what those fees are to any interested party.
Catastrophic Coverage	No specific control for catastrophic coverage. It is combined with the total plan.	There will be a list of catastrophic diseases. Any and all expenses of services directly related to meeting the needs of such a disease shall be paid for from a Federal fund. No individual shall be charged a deductible for any disease that is deemed catastrophic.

Element	Clinton Plan	"Preferred" Plan
Quality Control	Quality control shall be mandated by the National Health Board. The Federal government shall mandate quality measures and physician service delivery standards for every possible health process. Violation of such a standard by a physician may be viewed as a violation of the law. The state and the state alliances also will have a role in the policing of these federally mandated standards.	There shall be a state, federal, and/or other regulatory oversight control on physician, hospital, or other providers of services monitoring the quality of health care provided. The patients shall have immediate and direct access to this. There shall be a minimal level or standard established and there shall be monitoring of such providers to assure that they meet the standard. In the event that said standard if not met, the provider will be immediately denied the right to continue to provide service.
Management Control	There will be a national database system that will use the HCFA 1500 form or equivalent. All information will be analyzed and preceded by the Health Board or its agents and the state alliances.	All patient records will be computerized. There will be a standard patient billing record and said record will be generated at the provider's premises at the time the services are rendered. There will be a copy of that record available to the insurer and the patient and a summary available to the appropriate governing bodies and state and federal agencies.

Element	Clinton Plan	"Preferred" Plan
Price Control	All provider prices shall be fixed and controlled at a maximum level. Violation of these will be viewed as a Federal crime.	Each provider of services shall have available to them at the time of referral, the list of prices on all drugs, diagnostic services, referral services, or other services not directly provided by them. They must provide those prices to the patient at the time of referral. These prices must be provided in writing and must be honored at the time at which they are provided to the patient.
Demand Control	Demand control is managed by the primary care physician disallowing patient requests via a managed care plan. There will be no patient recourse. Each alliance shall have a budget which shall not be exceeded. Each alliance shall increase its budget in a fashion consistent with inflation. The alliance budget shall in no way reflect changes in health patterns or population demographics.	Each individual will have a deductible of 5% of their gross income or equivalent, and families will have to pay a deductible of 2% of their gross family income for each child. All deductibles are on an annual basis and the deductible will be renewed each calendar year.

Element	Clinton Plan	"Preferred" Plan
Supply Control	Price controls and caps will be placed upon the provision of services. Criminal penalties will be placed on the provision of services in deviation from the federal plan.	The desire is to have a health care system that "clears the market" from an economic perspective. To achieve this, there will be no subsidies of any type to providers of any type for the provision of service other than the fees provided by purchasers of said services. There shall be no government subsidies and there shall be no control on prices.
Workforce Management	The current union based workforce will be maintained and expended where possible. Healthcare is viewed as a segment for employment growth and growth in a segment with increased union involvement.	Productivity is to be the measure of performance with quality being maintained by mandate. By means of the supply demand relationship and by means of the market clearing activities of no supports, inefficient providers shall be driven from the market. Providers shall be responsible for the manner in which they provide the most efficient service at the desired level of quality.
Oversight	Oversight is by a complex structure of federal, state, insurer, provider groups. The structure allows for multiple levels of appeals.	Oversight is by a mutually acceptable professional, state, and/or federal oversight Board. There shall be no compensation for participation on this Board.

Element	Clinton Plan	"Preferred" Plan
Payment	All employers will be responsible for paying for the plan and for collecting the employee's contribution.	Each Provider of Health Care must offer a set of minimal benefit packages, such packages being identical from one provider to another. Each Provider must offer the package at the same price per person and such a price must be a matter of public record. Each provider of service will have real time access to the amount paid by the individual at the time of service. If the amount is still within the deductible level, the provider is responsible for collecting the amount at the time of service. If the amount is now above the deductible, in total, the provider shall be reimbursed by the insurer of record within forty eight hours of the provision of service. There shall be no denial of payment. Post service audits may be performed, and in the event that fraud has been perpetrated, it shall be a federal crime.

Element	Clinton Plan	"Preferred" Plan
Coverage Management	All citizens of the United States are covered. Each individual is mandated to join a local state health alliance is forbidden by law from using services outside of that alliance. Criminal penalties shall apply to any patient seeking to obtain services from providers not in their assigned alliance.	All citizens of the United States must be covered. The responsibility is that of the individual to seek out an obtain insurance. Those individuals not desiring insurance because of their own ability to pay, because of religious reasons or because of other personal beliefs, may not be compelled to purchase insurance. However, in the event that such individuals seek medical care, they will be charged a full and complete fee and will be held personally liable for all charges render. These individuals will be informed as such at the time of service provision.
Medical Education	Federally mandated selection on specializations. Federally mandated selection of quotas for appropriate representation of racial, ethnic, sex, and lifestyle participants in order for the physician mix to reflect the mix in the population as a whole. Federally mandated control of curricula to focus on primary health care delivery and dramatic reduction on any form of specialization.	There shall be no controls of any type on the nature of, the operations of, the choice of, the content of, of any other element of medical training. The market forces of the supply and demand elements of the health care business shall be the only controls. The selection of individuals shall be based on academic performance and clinical performance only. The goal in physician selection is on capabilities and performance, and no other factors shall be considered.

Element	Clinton Plan	"Preferred" Plan
Medical Research	Federally mandated selection of specialization will result in a diminution of capable researchers. Research will focus on Prevention and Health Service respectively. There is s diminution of basic research. Prevention will focus on the establishment of new federal programs to education disenfranchised groups and those needing special education in health matters. Health services will focus on new and innovative ways to monitor physician health care delivery.	There shall be no control or influence over the nature of research. Current research policies shall be continued and improved upon. The goal is to continue to foster and improve medical delivery through innovation and productivity, while maintaining the highest quality.
Physician Peer Review	Physician and other provider review shall be the responsibility of the Federal Government. The National Health Board shall set either directly or otherwise standards of performance. The proposed federal information gathering system shall monitor the practice patterns of physicians and shall take the appropriate measures to mandate compliance with federally set mandates and performance levels.	Quality of delivery is the ultimate goal, in a free market competitive environment. Patient complaints, provider's malpractice, and other deviations from quality shall be dealt with immediately and severely to resolve them in a timely fashion. There shall be a Peer review process set in place with patient representatives having at least on third the deciding positions.

Element	Clinton Plan	"Preferred" Plan
Patient Responsibility and Patient Training	The patient or individual has no personal responsibility or choice. The plan dictates from the federal level any and all procedures, access to specialized care required, or other accesses to health care. There is no intent to inform the individual of risk factors other than through the process of taxation of at risk consumable. At risk behavior is still considered the individual choice and the individual will not be held responsible.	The individual is held ultimately responsible for their own individual health and well being. The individual will not in any way be disenfranchised or otherwise discriminated against for any and all genetically related disorders. However the individual will be responsible for their behavior that places them at risk. As such, there will be health information made readily available describing risky behavior and indicating that such behavior has penalties. Where possible, the government shall take the elements of such behavior such as with tobacco or alcohol.

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