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# An Experiment in Demand Management-

# Reduction in Resource Use using a Patient-based Behavior Modification Program for Chronic Hypertensive Patients.

By

John Vincent Mackel. 

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements of the degree of Master of Health Services Administration.

Department of Public Health Sciences.

Edmonton, Alberta.

Spring, 1998.

**University of Alberta.**

**Faculty of Graduate Studies and Research.**

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled An Experiment in Demand Management- Reduction in Resource Use using a Patient-based Behavior Modification Program for Chronic Hypertensive Patients submitted by John Vincent Mackel in partial fulfillment of the requirements for the degree of Master of Health Services Administration.

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Date of Approval: March 26, 1998

DEDICATION.

This thesis is dedicated to my wife,

Laura E. Holmes, MD., CCFP,

without whose love and constant support

my life, and this work, would be incomplete.

ABSTRACT.

Traditional supply-management approaches to primary care will be inadequate in the face of impending demographic and societal changes. A demand-management model is described, in which hypertensive patients underwent a behavior modification program which resulted in maintenance of standards of care with reduction in office visits. Characteristics of successful participants were measured, making it possible to predetermine those future patients likely to successfully undertake a greater degree of responsibility for their own hypertension care. The model could be used in other common primary care conditions, with consequent reductions in the need for traditional office care.

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Finally, although the contributions of others were many, the errors are my own.

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## PURPOSE OF THE THESIS.

This thesis investigates the extent to which an appropriately designed, patient-based, behavior modification intervention will reduce the numbers of office visits and attendant costs for a common primary health care problem, while simultaneously maintaining satisfactory quality of care standards.

The project tests a different model of caring for primary health problems which could be applied broadly to the field of health restoration in primary care. In this supported self-care model, patients assume a larger role in their own management as participants in a behavior modification program.

The program includes two initial education sessions which comprise cognitive, affective and psychomotor elements, and is followed by on-going patient support from an identified provider. In this new model, providers would additionally assess each patient's problem with a view to the potential for training the patient in future self-care, and not just simply solve the problem for the patient at that moment. The model also postulates that there are certain patient qualities which lead to more successful participation in such a program, and hence their perceived health, social support and learning styles were recorded and evaluated.

The model attempts to reduce provider visits ( and accompanying costs) while continuing to maintain adequate standards of care in a demand-management approach for selected patients. A number of patient's perceived health status, social support and learning style variables were evaluated in order to ascertain if there were correlations between any or all of these variables and successful participation in the program.

Explanation of the study.

This was a prospective cohort study which sought to determine if a specific behavioral modification program would result in a reduction in office visits for hypertension care, without adversely affecting patient's blood pressure control. It also sought to determine if any relationships existed between a difference in their numbers of office visits, both for hypertension and non-hypertension care, and several variables. These variables were those included in the SF-36 perceived health questionnaire, the Duke-UNC Social Support questionnaire, and a Learning Styles questionnaire.

Traditional patient management by health care providers has cast patients in a dependency role. Large numbers of office visits for minor health problems has been one consequence. In comparing this process with that followed by health care providers in the care of diabetics, it was reasoned that a process modeled on diabetes care could be adapted to the care of a large number of minor primary care problems, with no loss of quality of care and consequent savings to paying agencies and health systems.

This study was undertaken to see if a specific education program reduced the numbers of office visits by hypertensive patients and hence reduced costs of care. The second issue to be determined was whether the degree of hypertension control in the study group of patients was adversely affected as the number of office visits decreased.

There is variation in the degree of patient compliance with recommendations for hypertension control made to them. This study attempted to find out if there were differences in subjects perceptions or learning styles which might account for reduced effectiveness of their care, if such was present. Subject's perceptions of their health status, degree of social support and learning style were measured by means of three questionnaires to determine if any of these variables influenced either number of visits or level of hypertension control.

## INTRODUCTION

### Collaborative Care vs. Dependent Care.

1. To achieve optimal patient management, physicians will seek to identify the capabilities that patients will require in order to undertake their own care, rather than physicians simply assuming the responsibility for that care. The physicians task will be to assist patients in developing the appropriate capabilities and acceptance of responsibility for as much of their own care as is possible, rather than physicians carrying out that care themselves. This is what is meant by a "collaborative" model of care instead of a "dependent" model. The provider role becomes that of coach, rather than captain.

2. The physician and patient become a "care team."[1] As far as is possible, in such a team, the patient is the primary provider and the physician and associates are the backup source of advice and support, in the same way that consultant physicians currently advise and support their primary care colleagues.

Teams are composed of persons who have equal status and specific tasks are delegated to one or more individuals best suited to perform them. Other team members provide support. Thus we extend the membership of the care team to include the patient, in a collaborative rather than a dependent role, and delegate appropriate tasks to them.

### Societal Trends are toward Acceptance of Personal Responsibility, and away from Passive Acceptance of Authority.

Acceptance of personal responsibility for care is a major component of a self-care program. Societal trends toward acceptance are therefore a factor in the success of such programs. There is clearly a major trend in modern industrialized societies away from the unquestioned acceptance of authority. This trend is not limited to health care, but appears to be a general movement on a broad front. In Canada, it was readily seen in a

constitutional crisis, where the population in a referendum vote ignored the advice of a long list of " authorities," and instead chose to reject the Federal Government's recommended course of action regarding a separate and distinct status for one province.

Similar processes can be seen in most industrialized nations, and may be summarized as an attitude of increasing distrust of authority of any type.[2] This climate of distrust includes organized medicine which has traditionally functioned as an authority - i.e. " Doctor knows best."[3] Some nursing commentators have included organized nursing in the same group of paternalistic professions.[4]

An example of this distrust was the change in the Canadian legal definition of consent. Until 1980, the legal standard of care was " a standard of care which a reasonable physician would perform." It has since been changed to "a standard to which a reasonable patient in possession of the facts would agree."[5] This was a profound change in attitude and clearly shows a transfer of power from the physician to the patient.

This trend away from authority coupled with increased access to medical information makes the patient less likely to accept provider statements carte-blanche. This creates the opportunity to re-examine traditional roles and relationships between the participants in the health care process, to identify opportunities for quality improvement and cost reduction.

## The Medical Model of Care.

The existing care system is now examined from a perspective of its success in meeting the criteria for supported self-care.

Since the Flexner Report,[6] medical practice, particularly in North America, has been defined by the specialist system, which is basically a reductionist approach to care. Specialists function as the "Court of Last Resort" in terms of medical decision-making , so

it is easy to understand why this overall reductionist approach had a strong influence on our present health care system. It is based on the assumption:

The more knowledgeable the decision-maker, the better the resulting decision.

Therefore the specialist is the best decision-maker.

This approach has sometimes confused health status ( the desired outcome) with health care ( the process necessary to obtain the desired outcome).[7] It is alleged to be illness-oriented and in the past has been accused of neglecting promotion of health and prevention of illness.

Primary care specialties have broadened their focus beyond illness alone and have embraced the more global concept of care to include health promotion and illness prevention as well as the traditional restoration of health. A fourth system parameter of reasonable and sustainable cost is also receiving more attention. However, patients have continued to be relatively passive participants in the process.

Since 1978, the national College of Family Physicians of Canada [8] has emphasized the quality of " patient centeredness" which is defined as the degree to which the patient's agenda is met by the physician.[9] Although there has been some recognition of the physician responsibility to the community, there has not been a recognition of the physicians primary role in educating the patient to assume more of their own care. Conceptually, they continue the traditional model of care in that they do not primarily focus on enabling the patient to become more independent of the provider in any meaningful way. It is still the physician who meets the patient's agenda, and consequently defines and controls that agenda. The patient still has a relatively passive role. The fundamental qualities of this care system are still those of a dependency model.

The traditional approach to care and changes in societal acceptance of it.

The traditional approach to care has been grounded in the belief that the professional knows best, and that diagnosis and management are " black arts" which the patient cannot possibly understand.

While there is clearly some truth to the notion that health professionals possess knowledge and skills above the ordinary, our society and its legal system have moved away from the idea that this special knowledge confers on the professional the ability to demand blind obedience from the patient. Ethicists now maintain that the principle of autonomy must be considered in addition to that of beneficence. The traditional paternalism of the medical and nursing professions [10] is changing in response.

The traditional system was also founded on a relative lack of availability of health care knowledge by the public, i.e. asymmetry of information. This information deficit is being corrected by the various media, and it is a common occurrence to hear quotations from the latest medical journals and various television programs on the subject of health care. Thus, patients have available to them numerous sources of information independent of professionals, and often may obtain this information in advance of the professional.

There also appears to be increasing awareness by patients of their ability to obtain and successfully use a number of health management strategies previously reserved to professionals. There are a number of tests ( pregnancy, ovulation, glucose, lung function etc.) obtainable "over the counter" which formerly were only accessible via the professions. Many drug stores offer free blood pressure measurement, and these machines are also available for home use. There are now drugs available to patients that formerly required a prescription.[11] These and similar changes have considerably increased the potential scope of self-care in modern society, and they are continuing to increase in availability.

This explosion of the health information highway contributes to a reduction in asymmetry of information as well as direct promotion of self-help and interest group functions. However, patients still may need assistance in distinguishing between various sources of advice, as well as on-going support in management, after a course of action has been fixed.

Impending Demographic Changes.

Change in the composition of society brings with it a need to re-examine how health care systems will respond to such change. Our society is on the verge of a profound change in its composition. There has never before been a predominance of older people such as will occur in the next few decades.[12] This has profound implications for health care systems and their underlying economic supports. The old and the very old consume health resources much more than do the young. Demand for many services will therefore increase.[13] There will be a lack of sufficient younger providers to care for the large numbers of older people in a dependent care model, even if society could afford to do so. In addition, in almost all developed nations there will be a much smaller number of taxpayers to support this greatly increased burden of care.

A supported self-care model, with its goal of an absolute reduction in the requirement for health professionals and reduced need for " face-to-face" interactions, mediated through and enabled by improved technology, is a potential solution.

Primary Care- Who are the Providers ?

To place a supported self-care system in context, the current system is examined. There are large numbers of health providers outside the traditional physician system. These include traditional paramedical providers interested in an expanded role, such as

pharmacists, nurse practitioners and physician assistants in the United States and Canada, and also alternative health practitioners of a wide variety of types. The extent of alternative medicine has not been widely appreciated by traditional medical practitioners, but it has been estimated that expenditures on alternative medicine exceeds those of traditional hospital care in the United States.[14]

Most primary care is not delivered by medical and paramedical professionals, but by lay persons. One can estimate the extent of lay medicine by examining the large " over the counter" pharmaceutical market which is extensively advertised to the public. It is unlikely that pharmaceutical companies would continue to spend millions of dollars on television advertising if it were not profitable to do so. Kerr White [15] demonstrated that, in one typical month, a population of 1000 adults reported 750 episodes of illness with only 250 being seen by a physician and 100 being referred to hospitals. Thus, lay person care is more common than professional care by a factor of 2:1.

The Use of Mid-level Providers as an Alternative to Primary Care Physicians.

Is a substitute provider an adequate solution to the problem of providing large numbers of primary services? In the current atmosphere of cost containment, some provider groups allege that they hold the key to increased quality accompanied by decreased costs. This thesis argues that the substitution of other health professionals in the traditional model is not the answer in the long term. Such an approach creates further extension of the dependency model, with the substitution of another provider for the physician. Both cost per capita of patient visits as well as quality of care data has been disputed [16]. Even if the

cost per visit is initially lower, there is no reason to believe that mid-level providers would not adopt an " equal pay for equal work" negotiating position.

There is also reason to believe that Roemers Law [18] continues to apply. This is to say that utilization will continue to increase to the system's capacity. If the numbers of either providers are increased, the system capacity will increase. There will be an "add-on."[19] Overall system costs will likely increase, unless there is a parallel reduction in the physician stock.

Substitution of the pharmacist for the physician.

Pharmacists have additional training in pharmacology, but less in diagnosis. They presently have no opportunity to perform physical examination. Where the diagnosis has not been made, it is questionable if the quality of diagnosis can be as good, in the absence of physical examination data available for the diagnostic process. Pharmacists would have to accept the patient's diagnosis, or obtain one from elsewhere. Management strategies and clinical practice guidelines would then be applied. Electronic technologies are increasingly available which can display information about allergies, incompatibilities, etc.

In the supported self-care model, the diagnosis has already been established, or else it is incorporated into the patient's predetermined management plan, as in the case of the diagnosis of streptococcal sore throat. In this model, patients themselves could use the computer, or other information source directly to undertake their own care. Both non-pharmacological and pharmacological measures can be incorporated into management algorithms. These can be individualized by integrating the pharmacology data base with a number of sorting fields, such as allergies, interactions, etc., specific to the individual patient, and directly entered into the software by the patient. This software already exists.[20]

Substitution by an Advanced Qualification Nurse.

There is some dispute that this person is less costly than a trained physician.[21] While there are a number of literature discussions around cost decreases, there are few if any examples of the costs of nurse-run independent primary care in urban Canada. Suggested models of primary nurse care often do not include assessment of the cost impact of reduced volumes of patients cared for, as well as the salary, benefits, and costs of office space and equipment added to the overall expense, expenses which are paid by physicians from their fee income. Costs may be confused with expenditures. The cost per capita for each patient visit may be equal to or greater than the cost of the physician. Per capita costs for midwife deliveries in Ontario and in British Columbia are much higher than physician costs for normal delivery.

Also, for those more minor conditions which these practitioners wish to treat, it makes more economic sense to train the individual patient first, rather than any professional if any additional training is required. This exemplifies a modern management principle of the use of the least-cost provider for the given task. If both consumer and nursing diagnostic processes are to be algorithmically based and limited to minor conditions, it may be as feasible for the consumer to follow an algorithm as it is for the nurse. Particularly with the availability of individualized electronic assistance, as previously outlined, it is questionable whether the use of a professional would result in any savings or if this would result in an additional expense for the system.[22]

For the majority of less complex conditions, this thesis argues that a more cost-effective approach is for the patient to assume increased responsibility for management of common problems, with support from the provider. It then becomes more logical to try to improve the capacity of the patient to undertake more of their own care than to substitute other providers in a continued dependency model.

There is also the issue of the inefficiencies and accompanying costs of a further fragmentation of a dependency-based system. It has been shown [23] that costs of care by physicians for identical disease conditions is dependent on their level of training. In our present system, the patient is cared for by the primary physician until it becomes necessary to transfer the care to the specialist. This transfer brings the consumer into a more expensive level of care and is therefore to be undertaken when truly necessary.

Since most diagnosis reflects a process of probability assignment, uncertainty is common in patient care. Tolerance of uncertainty is therefore a necessary quality in providers. The level of this intolerance is a cost factor in health system performance. By this is meant that a practitioner less tolerant of uncertainty will likely refer earlier. If the originating provider has a lesser level of training, it is more likely that the transfer will occur sooner, rather than later. Thus if we compare the " Mid-level provider plus Specialist" team, and the " Primary physician plus Specialist" team, we have on one hand a smaller, cheaper primary component with a larger more expensive secondary one, and on the other hand a larger cheaper primary component with a smaller expensive secondary one.

In the absence of any quality issues, it would seem preferable to encourage less referral rather than more. This is not to say that quality issues do not exist in both models. But, even if the quality of management was identical in both groups, it is likely that their scope of practice is not identical. The usual patient interaction often may present more than one un-selected problem to the provider. The provider must be able to manage them. The ability to solve a broad range of problems without referral is of value both in terms of care and of cost. This increased ability will enhance the support function in the supported self-care model.

Patient-Provider Teams.

In supported self-care, the patient and provider function as a team. The concept of the patient and family physician functioning together as a team has been described earlier.[24] Ideally, the physician provides service in the usual sense, but also is the resource person for the patient over time. Supported self-care would enhance this team approach and bring it to an increased level of functioning.

Barriers to success include:

1. A significant number of patients either have no such provider resource available to them, or are unaware of the potential advantages accrued to them, or choose not to avail themselves of it.[25] In both Canadian and United States systems, there are about 20% of insured persons who could avail themselves of an identified primary provider and choose not to do so.

2. The high degree of provider choice which the system permits, in Canada and especially in the United States is also a contributing factor to lack of an identified single provider resource. Compulsory linkage with a single provider is not likely to occur at this time in the development of either the Canadian or the United States health systems, but an educational approach to the consumer, pointing out the potential quality and cost advantages might be successful. In the United States, it would be possible to offer financial inducements such as lower premiums to patients who commit to a supported self-care stream.

3. Governments, health plans, and organized medical organizations continue to view the health system from a " dependent care" perspective.

If the suggested self-care system were adopted with a goal of increased patient autonomy, self-diagnosis and management, it would be essential for each patient user to be linked with a professional as backup adviser. This has clear advantages for the

improvement of initial quality, where patients are at the beginning of the learning curve, and also for the ongoing maintenance of patient expertise and "system friendliness." The existence of a known adviser will also provide a feeling of confidence to the patient, especially in the early stages of system use.

This concept already exists in a rudimentary form in medical practice, especially in the primary care disciplines. But the present system does not have, as a major goal, the training of its patient base, which happens instead as an incidental byproduct of the doctor-patient relationship.

It is reasonable to suppose that a specific system whose major goal was to improve patient education would likely be more successful than one which addresses this issue en passant. Being a major goal it is also more likely to be both measurable and measured. Availability of an ongoing system for improving self-diagnosis and management, linked to a health professional capable of enhancing the quality of patient management abilities, is therefore more likely to successfully achieve this improvement than the current dependency model. The introduction of such a model also could create an opportunity to recruit patients into the type of rostered systems already existing in other jurisdictions.[26]

Role changes for patients and providers.

The supported self-care model involves a fundamental role change for primary providers. It requires a change in the patient role model from a dependent model to a collaborative, more independent model and a corresponding change in provider attitudes and behaviors. In this new model, providers would additionally assess each patient's problem with a view to the potential for training the patient in future self-care, and not just simply solve the problem for the patient at that moment. Providers will have a larger role as educators to help the self-care process, and act as consultants when patients are getting into

difficulties in performing their own care. This is how diabetes care is conducted. This also requires the recognition of a fourth portion of the care spectrum with the addition of self-care at one end of the primary care spectrum, just as emergency medicine has added pre-hospital care in their context. It is in this fourth portion, the largest portion of the spectrum, that we should focus our efforts to expand the lay role. By examining existing lay care and existing primary professional care, we will successfully identify additional areas for self-care, and attempt to transfer to the patient some of this care which until now has been traditionally provided by the physician or other care provider. This is a new perspective for primary care providers, as well as for patients.[27]

This new perspective posits that as much of their primary care as possible will be transferred to the patient, in so far as this meets their needs and desires. There will be a change in provider role in that the provider will train the patient in their new responsibilities, and will be available to act as " backup" and advisor where required. The proportion of self-care will increase and that of primary providers will decrease. Appropriate support systems will be required to assist the patient in their own care. This concept does not mean that patients do not need a physician at all, but rather that they will have a "doctor at a distance" who will be accessible when required.[28] This new approach will have a positive effect on two important issues.

The first is that of separation of care. Presently the provider does not have much to do with what happens outside the provider/patient interaction; the patient is merely supposed to comply. However the degree of compliance is quite variable in many cases.[29] By promoting a closer linkage between the patient and providers acting as a formal team, compliance should improve along with quality parameters. This linkage of the provider and recipient at the boundary in a service industry is quite consistent with modern management theory and practice.[30]

While there is little doubt that patients could undertake more of their own care, there is a further question. Do they want to? [31] There are some patients who presently do not want more responsibility for their care, however there has not been a support system specifically designed to help them. They have not been encouraged to do so, and may feel diffident in asking for help from physicians. Also, patients differ in the type of system support that they require.[32] This difference is grounded in how different individuals learn.[33] Even so, there is a significant number who already attempt to do more for themselves. Various self-help groups exist, with a range of contact with main-stream medicine. It is possible that these groups exist because of an unmet need for information and support which is not being adequately addressed by our current system.

The second issue is that of system costs. Costs of care decrease in a self-care model, since the provider cost is very small.[34] Since the overall number of primary care visits should decline, then it is also possible that fewer providers would be needed to provide the remaining more complex care portion of the upper end of the care spectrum. Patient indirect costs may also decrease since they will reduce time away from work, child-care expenses, etc.

Of concern are potential patient errors in the areas of diagnosis and of management. Quality issues apart, such errors could increase costs by delaying correct diagnosis or by application of incorrect management strategies, thus moving the patient into a more expensive disease category, with worse problems and increased costs of care. It is fundamental to the acceptance of the self-care system that it would not result in a decrease in quality of care.

This new system of care would enlist the patient as the first-line provider with a close link to the provider in a care dyad. By involving the provider directly, the potential

for error is minimized, while costs are reduced by enlisting the patient actively in the provision of their own care, thus decreasing visits, tests, etc. to the minimum.

In re-examining the Kerr White model,[35] we may consider the borders of each care category as barriers to care, and thus begin to define the specific issues which prevent the care being transferred to the patient. These may be potential risks in diagnosis or management, or may be simply a " we've always done it this way" attitude on the part of the physician, or a " I couldn't possibly do that myself " attitude on the part of the patient. There will also be some issues which have to do with patient restrictions in access to certain tests or drugs. Restrictions in public access to certain drugs appear to be decreasing, following Canadian Federal Government scrutiny.

Economic Impact of Self-Care.

Although it is true that the acuity of conditions treated by self-care is relatively minor, it is also the case that strained health care systems could not absorb such an increased workload if an increased "burden of care" were to be, for any reason, transferred to the professional sector. This is because the overall financial impact of these minor conditions is very large, owing to their high frequency of occurrence.

It is possible to evaluate the consequences of a partial transfer by examining the pre and post walk-in clinic situation. Consistent with the theory that increased access leads to increased utilization, it is alleged that there has been a significant increase in utilization and consequent costs with the introduction of the "walk-in" service. As predicted, the traditional clinic service has had to follow suit in order to compete. Since the late 1980's, the majority of traditional family practice groups have moved to retain market share by extending hours of operation into evenings and weekends. Thus, there is a further extension of access, and increased costs. The effect on access by reducing direct out-of-pocket patient

costs has been shown to increase utilization.[36] In the Canadian system where there are no direct patient costs, then one of the other access variables will become the controlling variable; in this instance, availability. The controlling access variable can impact access either positively or negatively.

Examination of the clinical profiles of high volume physicians matched by physician age, gender, and location confirms this outcome. There appears to be a very high proportion of minor illnesses, and increased prescribing costs compared to the average traditional practice volume. [37] In the "walk-in" environment, improved health status has not been demonstrated following increased access by patients. In return for these increased costs, there may be reduced health status associated with the increased iatrogenic disease associated with higher prescribing profiles.

The Spectrum of Primary Care

If supported self-care were to be adopted, are there sufficient diseases which could qualify for this model? There is a disease spectrum in all of health care in which management ranges from easy to difficult. This is true in primary, secondary and tertiary care, and for all providers. The boundaries between the different levels of care are not distinct, but rather they overlap to a variable degree. This overlap has three major components; those related to the patient, to the provider, and to the social / professional context in which the care occurs.

1. Provider variables relate to the abilities, skills, interests and limitations of those providing the care. Some variables are intrinsic, such as professional interests, while some are extrinsic such as legal and licensure limitations.

2. Social and professional contextual variables relate to the nature of the functional environment where the care occurs. Thus, a regional center may have general specialists who can act broadly within their specialty. The addition of a subspecialist will cause a contraction in the generalist's work, with referrals to the subspecialist of work that previously was performed by the generalist. This phenomenon is seen in metropolitan hospitals when additional subspecialist staff are added. The size of the community will also influence the scope of health care facilities available there, regardless of the type of provider available.

3. Patient variables have traditionally included such parameters as the age and sex distribution of the served population, socioeconomic status, and the nature and frequency of disease in the community as well as some promotion and prevention aspects, such as public health and immunizations. In general, these groups of variables continue to follow the established dependency model, with a passive role for the patient, and an active role for the provider. There has not been a generally-accepted perspective of the physician- patient team with each partner playing a major active role in decision-making. With the notable exception of diabetes care, there has not been to any significant extent a general perspective of the patient as the primary decisionmaker with the physician in the supporting role.

The Content of Primary Care.

The tasks of care must be considered as two distinct but related dimensions: diagnosis and management. There are clinical situations where the diagnosis is difficult and the management is straightforward, and also those where the diagnosis is straightforward and the management difficult. If patients are to assume greater responsibility for care, then it is reasonable for them to begin with those situations where the diagnosis and management

are both straightforward. It is therefore useful to examine the typical conditions currently treated by a primary medical care organization to see if there are conditions for which transfer to a self-care model is feasible.

The Misericordia Family Clinic is a group practice of four male physicians which has been in existence in West Edmonton, Alberta, since 1981. Complete patient diagnostic and procedure data have been collected throughout that time period.[38] Using this system it is possible to obtain reports of diagnostic clusters and their frequency for any or all physicians and for any portion of the clinic's existence. In the past two years , Kaiser Permanente North West (KPNW), a group-model HMO, has implemented a program-wide electronic medical record system, known as EPICARE. All encounters, for all providers, including telephone calls, are recorded by providers as they occur and are available for examination and review. This permits on-line record review for all of the conditions seen in the course of daily work by KPNW providers of all types. The system does not permit records to be closed without final diagnostic information being entered in the database. All diagnoses may be entered in text form, which is automatically converted to ICD-9 codes, or directly as the appropriate code. This database allows identification of similar potential self-care conditions, for approximately 450,000 registrants, and also the frequency of diagnoses. A portion of this database was used to select patients for this study.

Future trends in the content of primary care.

The trends in primary care content are related to the impending change in the demographics of society with an expected overall increase in the proportion of older adults along with a declining birth rate.[39]

Epidemiological changes will include a reduction in infectious disease, partly due to the successes of the health care industry and partly to other unknown factors,[40]

accompanied by a relative increase in degenerative diseases, cardiovascular diseases and cancers. This process, known as the epidemiological transition, has been occurring over the past several decades.

Those at the extremes of life consume a greater proportion of health care resources.[41] The impending change in population demographics will mean a higher prevalence of degenerative diseases and a reduction in diseases of infancy, further accelerating the present epidemiological transition, with a consequent large increase in utilization of health resources. In view of the very large volume of primary care visits, the traditional dependent model of care , whether it uses physicians or other providers, is not likely sustainable in this new situation which has never before occurred in any health system. There will be a huge increase in demand for care , and few providers to cope along with fewer taxpayers to fund the system.

Enabling Factors in Self-Care.

If patients are to undertake a greater proportion of their own care, then they will need to first become improved diagnosticians and be competent in appropriate therapy. Diagnosis is the basis of therapy ; if the diagnosis is inaccurate, then all the subsequent management is flawed. With accurate diagnosis, therapy decision algorithms can be used, including such materials as "drugs of choice" handbooks.

There are frequent situations where the diagnosis can be correctly made by the patient, if their decisions are properly supported. These include conditions where the diagnosis is already made, as in chronic unremitting diseases, or in recurrent diseases where the symptomatology is consistent among episodes. The rarity of the disease is not a factor, so long as it is consistent in its presentation.

Examples of these conditions include hypertension, where the condition is present in a stable unremitting fashion, and asthma where the intermittent disease presentation recurs in a stable presentation which is easily recognizable by the patient.

The fundamental requirement for a supported self-care system is that both patient and provider have sufficient confidence in their diagnosis to continue with a management plan. The above examples relate to chronic conditions, but the approach is not limited to chronic conditions alone.

The basic diagnostic and management template is composed of a knowledge component, a skill component, and a test/measurement component. Completion of this template permits a diagnostic decision, and is followed by an appropriate therapy process. Each of the components can be augmented with proper training.

As in diabetes, the previous exemplars possess the useful property that they can be quantified directly by the patient using easily operated instruments: that of home blood pressure cuffs, and respiratory peak flow devices. These technologies are widely available and are inexpensive. They lend themselves to statistical process control, which is the basis for the quality improvement movement. Being numerical data, they are easily transmissible in a number of formats, including electronic methods. In addition to these technologies, there are currently available Rapid Strep ™ throat tests, home cholesterol tests,[42,43] home prothrombin tests for monitoring anticoagulation, as well as the better known pregnancy and ovulation tests. More of these types of tests are on the immediate horizon.

The treatment protocol must be manageable by the patient, unaided in most instances by any health care professional. This is not to say that assistance should not be readily available, but rather that it should not often be necessary if the management protocols are well-designed and clear. It also does not mean that the present restrictions placed on patients in their access to various drugs, etc., should necessarily continue.

Patients manage insulin every day. They should do equally well with many currently restricted medications given adequate education, support and feedback to and from the designated provider.

It is quite possible to incorporate self-prescribing privileges for drugs into treatment algorithms, since there exists well-defined "drugs of choice" for many conditions. A smart card could permit access to a drug dispensing machine, in a similar fashion to the current banking machines. The technology would support patient safety and could easily monitor overuseage, incompatibilities, allergies etc., as well or perhaps better that human agents. The current pharmacy approach uses similar computer technology, but interposes an expensive professional in the process.

Other examples of patient-managed conditions.

There are several types of patient-managed diseases already existing in primary care. Diabetes mellitus, in which it is the currently accepted role of the health professional to be the educator and resource for the patient,[44] and not the manager of the actual condition, is a good example. The basic approach in this condition is to provide additional knowledge, by way of educational experiences, and skills ( e.g. training in the obtaining of the blood sugar), with the ability to operate a measuring device ( e.g. a laboratory test meter). This results in a decision by the patient regarding their condition, followed by a management maneuver such as injection of insulin, continued observation, visit to the provider, visit to the emergency department, etc.

Asthmatics are in a similar category.[45] Physicians presently encourage the use of measuring devices ( i.e. plastic spirometers ) to provide ongoing measurement of airway function followed by a similar type of algorithmic decision making process conducted entirely by the patient. The current trend in care for this condition is to further encourage

decision-making by the patient, with the physician playing a more advisory role, as in the diabetes model.

For many years, angina sufferers have been taught the rudiments of acute pain control so they can treat their symptoms at once, by taking nitroglycerin. They are also taught when to consult the health professional. Again, this situation lends itself to an algorithmic approach, although patient-centered formal algorithms are not widely available.

If it is possible for diabetics, asthmatics and those with angina, especially the more stable types, to provide most of their own care, then the concept could also be expanded to other conditions which we currently consider the province of the professional. Hypertension is a good example, especially in its more stable, milder forms.

We have examined the feasibility of enhanced self-diagnosis and management for chronic conditions. What of acute problems? A similar system could exist for the diagnosis and management of common acute primary conditions, the majority of which are already managed by non-professionals. It is possible to develop an algorithm-based system which would enhance user knowledge. Some already exist, and are the basis for many primary care practitioner manuals.[46] [47] These could be easily adapted to lay use.

User skills could be supported in part by electronic technologies ( for example the provision of on-screen diagrams and pictures appropriate to the condition could be organized as an algorithm in exactly the same fashion as is done with words, and selected by mouse-clicking etc.), and in part by actual training. This type of menu-driven selection process is widely used commercially on the World-wide Web. Health Maintenance organizations are beginning to develop their own web sites as a competitive strategy.

Examples of " hands-on" training programs already exist. One of the oldest is the Saint Johns Ambulance organization. This organization has trained the public in emergency techniques for decades. The techniques are usually in the domain of trauma, but there is no

particular reason why this could not be expanded to include other conditions. The training includes physical examination of injuries, and could be expanded to other areas, and to the use of simple examination tools such as the otoscope and stethoscope. It is perfectly feasible to include sound with the visuals in computer algorithms ( multimedia units) to provide real-time examples to patients of such things as rhonchi, tympanic membrane appearance, etc.

The objection that the average patient is rarely exposed to such situations is weakened by the fact that the majority of simple illness is treated by patients themselves. The successful Basic Cardiac Life Support program which trains lay-persons to respond appropriately to unusual and serious cardiac or pulmonary events has demonstrated that it is quite feasible for the lay person to obtain sufficient expertise to deal with acute serious conditions, even when these are a relatively uncommon event in the life of the average person.[48]

Examples of possible training programs include pediatric upper respiratory infections, adult upper respiratory infections, some dermatological conditions, adult urinary tract infections, etc. The underlying philosophy is a bias toward patient-centered management, in its true sense; i.e. each and every condition ought to be examined with a view to increasing the patients own ability to manage it themselves. The essential feature which does not presently exist is the system for enhancing their knowledge, skills, investigational competence and overall abilities to make informed judgments about their own condition, and organized accessible support for their consequent self-management efforts.

Health system paying agencies spend annually many millions of dollars on primary care conditions which have the potential to be managed directly by patients, given modest additional knowledge, skills, and investigational technologies, in the context of supported

care. The presence of competent backup, available when necessary, is an essential component. The likelihood of wide variation in individual ability for self-management requires that those individuals have access to help. This is merely an expansion of the activities of primary providers, who have acted in this capacity for many years.

This access to competent assistance not only improves the immediate situation, but also improves individuals skills; a form of "on the job" training. This assistance does not necessarily require the physical presence of the provider. We already experience this situation with new mothers. Early in this role, they have frequent questions, often of a very rudimentary nature. This changes over time, as they gain experience. Eventually, many become quite skilled at primary diagnosis and management. We advocate a system which would enhance such skill acquisition in an organized fashion, rather than the "ad-hoc" situation existing at present.

There is no reason, for example, that informed and adequately supported parents cannot weigh their child, measure its head circumference, and enter the results in a record. Simple feeding problems can be addressed in an algorithmic fashion. Simple physical examination techniques ( for example, the use of the otoscope) can be taught. The use and interpretation of the Strep test could be made available in the same way as is presently the case for pregnancy tests and ovulation tests. A videotape, CD-ROM or web-site can demonstrate a wide variety of examination techniques, as well as those rare but significant occurrences such as seizures. It would be feasible to include non-prescription access to antibiotics to be used in the appropriate algorithms, if the individual had demonstrated simple competencies in such an environment as the Basic Cardiac Life Support program exemplifies.

Pediatric problems are used as an example because of the generally high degree of motivation of parents. However, there is no reason why adult conditions could not be similarly organized.

The present provider-driven treatment system for adult minor illness is accompanied by significant other costs. Total costs include direct government/health plan spending, plus lost wages and other direct patient costs. At least some of these lost wages are due to attendance on health professionals. There is an additional component of over-the-counter drug therapy, much of which is of unproved benefit, and which may even be harmful in certain circumstances. Inappropriately prescribed antibiotic therapy is a further expense, and contributes to the problem of emerging resistant bacteria.[49 50]

The Role of Remuneration Mechanisms in promoting a Self-care Model.

In this context, it is necessary to distinguish between remuneration mechanisms and funding systems. We define the funding system as the system by which major block funding is allocated to regions and populations. It may also include the system by which global funding is assigned to certain provider groups.

The pool of funds is then disbursed through specified organizations and methods to the individual providers. Canadian physicians are paid through the provincial fee-for - service system, while virtually all other Canadian providers are salaried employees. In the United States, group-model HMO physicians are mostly salaried, although there are some moves to capitation.

Different remuneration mechanisms are known to have strong effects on attitudes and consequent behaviors in the workplace. Therefore, the successful introduction of the concept of supported self-care will be strongly influenced by the dominant payment

mechanism of the affected providers, and the degree to which the payment mechanism encourages or discourages the self-care model.

Types of Remuneration.

There are three major types of remuneration. These are salary, capitation and fee-for service. Each of these approaches has the ability to strongly influence the degree to which providers will adopt a supported self-care model.

In all these systems, there are two basic attributes of patient encounters which influence the success of supported self-care. These two qualities are volume of visits and complexity of diseases.

Fee for Service Factors.

This is the dominant method of physician compensation in Canada. As such, it is quite familiar to almost all Canadian physicians, their provincial paying agencies and government policy makers. It is not familiar to mid-level providers nor to their representative organizations. Most of these providers are remunerated by salary.

Canada is distinct among industrialized nations in that 95.5% of physician earnings come from public funding sources.[51] Until quite recently physician remuneration budgets were open-ended, thus protecting physicians from the risks of increased utilization.

The fee-for-service mechanism has some positive aspects. It is closely linked to provider effort and output. In its basic form, it allows for closer analysis of provider activities than other systems, although this is not perfect because of data collection defects arising from the original data goals and computing methodologies of the payment system and also a lack of provider incentive for accurate data entry. The system permits maximum clinical autonomy and patient choice. It is very flexible and can be designed to respond

rapidly to changing circumstances if those responsible for its administration are willing to employ it in this manner. Physicians in primary care pay for their own practice and administrative costs, rather than paying agencies, and have an incentive to control these costs. Rostering is not essential for successful operation, although this could be instituted if desired.

However, it has created an inflationary spiral in physician budgets, at least until these were capped. It also has been charged with the creation of excessive and unnecessary treatments and visits, and referral rate increases, although these charges are disputed by its proponents. The provision of services which are either unpaid or poorly paid by the fee schedule is discouraged, even if these services are strongly indicated and desired. Supported self-care is such a service. Prevention-oriented care is another. If the fee-for service system were to be extended to mid-level providers, the same disadvantages would likely apply. Also, there has been little demand from them for this type of remuneration mechanism.

The fee-for -service physician is fundamentally volume-driven. In most Canadian remuneration systems, there is little or no variation in reward for increased complexity Attempts to introduce complexity-based systems (such as the DRG program in the United States) have not been the answer to cost control.

The policy approach in fee-for-service systems has been that reward will even out in the long run. This is true, in the context of the fee for the service. Where it does not hold is in considering income for service. Here, it is in the providers best interest to have as many " low complexity" patients per day as is possible, since each of these patients generates the same fee as the more complex patient. High complexity patients are not cost-effective. This is the basic operating principle of walk-in medicine, i.e. to select those patients who are "lower- than- mean" complexity and to refer out those who are

" greater-than-mean" complexity. It permits more patients per unit time, and consequently greater reward for the same expenditure of time. Care of routine chronic diseases or acute minor self-limiting illnesses, is very rewarding indeed, because it requires little time and effort.

Also, there is no incentive to treat patients outside of an office visit since there is no fee for this service type. The creation of such a fee would open a Pandora's box of telephone contact recording for almost every specialty in the Canadian system. Canadian medical associations ( the " keepers of the fee schedules") are therefore very unlikely to do so. Paying agencies are similarly disenchanted. It might be possible to have a registration fee of some type, such as the Alberta Fee for Comprehensive Care proposal but again this raises the issue of capitation, which is not popular among Canadian medical associations, being equated with the problem-plagued British National Health Service.

The net result is that the fee-for-service system is biased towards office-based provider treatment of exactly those conditions which most lend themselves to supported self care.

Salaried Provider Systems.

Salaried systems are well-known to most people. The vast majority of health providers other than physicians are remunerated in this way. Because salaries are not intrinsically linked to productivity in either quality or volume, (although such linkages can be created), all such systems must include specific explanations of the required tasks ( job descriptions) and methods of determining the degree to which the employee has met the standards ( evaluation systems).

As in fee-for-service, salaried providers also have something to gain from low-complexity office care. In such systems, provider schedules are usually fixed by the

employer in terms of volume. They are generally not alterable by the providers, at least unilaterally. Therefore, if a provider is compelled to see one patient every 15-20 minutes, then low complexity problems are highly valued, since they mean much less work on the part of the individual provider. In salaried systems, it has been said that :

" the reward for good work is more good work."

The least work for the same income would mean a day filled with exactly those problems which are the purview of supported self care. Again, the provider is biased towards office-based treatment of minor illness.

A successful supported self-care model in a fee-for-service environment would require a reward system that increases provider return based on complexity of care provided. This type of system is not popular with salaried providers who are employed in HMO's, since it is the reason that many of them left the private practice environment in the first instance. It is also unpopular in the Canadian system, with medical associations having moved away from close definition of complexity for administrative reasons. Even if it could be introduced into Canada, there is no reason to suppose that the issues around volume and complexity would be different in the long run. Complexity of care is not easily measurable. Age and sex have traditionally been used as proxies, but these are simply insufficient.

Capitation Based Payment Systems.

There is considerable interest at present in these types of systems among paying agencies. This interest stems from the desire to develop a population-based health care system which is seen as having operational advantages. It is also likely that capitation is the only remaining choice that has any reasonable chance of acceptance by the medical profession in Canada.

The progenitor of capitation-based remuneration systems is the British National Health System, where primary care physicians are capitated. Almost all other UK physicians, including all specialists, are salary-based.

The most recent British primary care performance contract rewards providers in addition to the capitation fee for certain activities which are not considered "additional" in the Canadian context ( e.g. obtaining Pap smears), and there are performance standards or targets which practitioners must attain, with associated evaluation systems to measure their success rates.

Like salary, a capitation system is administratively simple to operate. Budgeting is similarly easy, and prospective in nature. For payment purposes, there is no need to break down physician tasks to the level of individual services although it may serve other management interests to do so. It provides an incentive to minimize costs of care, and allows for patient influence if the patient has the power to select their own physician.

But, a simple capitation system creates the incentive to underservice patients, and also to deselect patients who are higher-risk and therefore higher cost, i.e. adverse selection, if these factors are not addressed in the design of the rating process.

Other potential disadvantages include greater difficulty in analyzing the physician's practice, no disincentive to increased patient demand ( significant in the area of costs generated by visits) a more restricted choice of provider, and a requirement for rostering. Referral rates to other physicians may increase.

In the United States, charges are commonly leveled at HMO organizations and their physicians by patients who believe that they should have had certain tests or procedures, and there have been a number of high-profile legal settlements where HMO's have been found liable because of the court's perception that their objective was to save money at the expense of the patient's health. Issues of adverse selection are a major problem for

American society, where less fortunate patients cannot obtain medical insurance because of the existence of a " pre-existing condition."

There is no reason to suppose that Canadian practitioners would respond differently in a capitation-based system, unless it were not possible for providers, individually or collectively, to refuse enrollment in such circumstances. However, it is still easily possible for providers to discourage certain patients so that they will go elsewhere for their care even though there is no formal barrier. This can be accomplished by utilizing one or other of the classical access variables in a negative manner: i.e. to increase the barriers to care instead of reducing them.

Capitation could almost certainly facilitate the introduction of mid-level providers in a collaborative model with improved care outcomes by primary care physicians. Population-based funding would be easily introduced in conjunction with capitation payment, thus relieving payers and physician organizations of a major point of contention in their negotiations.

In capitation and in salary systems, it is simple to include distance interaction because there is no remuneration requirement for direct physical interaction between provider and client. In these two remuneration mechanisms, physicians are paid on the basis of acceptance of responsibility rather than for direct care. Thus, these two systems, increasingly common in United States practice, would lend themselves more easily to the supported self-care concept.

Of the two, capitation has the most potential to adopt supported self care models. Because the provider contracts to provide all necessary care to a defined population, higher-complexity cases still have to be seen if the design of the rating system is adequate. The difference is that, in a supported self-care environment, lower-complexity cases will not need to be seen as often and will still be remunerated. In this way the provider is rewarded

by reduced volume and a smaller workload for a given population with no monetary penalty.

Blended remuneration systems.

All suggested systems contain two or more components of the major three payment mechanisms. They have advantages and disadvantages in proportion to the degree of blend involved, i.e. the predominant system archetype will determine the various advantage/disadvantage mix.

A blended system has been advocated by organized family medicine [52] in Canada.

The Importance of Provider Attitudes.

If providers are not enthusiastic about a system of care ( e.g. supported self-care) and are unwilling to cooperate with its adoption, then it is most unlikely that the system will be successful. If a change in the primary providers duties results in lowered enthusiasm and morale, then it is less likely that an HMO will adopt it. This is because boundary-spanning employees play a critical role in customer satisfaction.[53] Unhappy employees transmit their feelings to customers, who perceive this dissatisfaction as a lack of quality, even when the quality is in fact adequate. This is an important issue for American HMO's who are now being measured against patient satisfaction standards. Such measurement standards must ultimately come also to Canadian practice.

Technologic Change and its role in Supported Self-care.

Supported self-care is most easily carried out by way of electronic data transfer and manipulation. Interactive computer software for the home is now a reality, and is the most rapidly growing portion of the North American market. The combination of interactive educational software ( from the parents perspective) and ability to play electronic games ( from the child's perspective) creates a huge demand for hardware and software that is capable of meeting these needs.

The same equipment is also capable of use in the Self-care model. Thus, individuals with chronic disease could monitor their condition and institute therapy without leaving their own homes, while transferring data to their physician and receiving advice via computer modem. Real-time interactive video is increasingly available at low cost. Parents could have interactive advice always available. Providers could have improved interactions with their patients.

The current interest in Clinical Practice Guidelines would have a new focus. Instead of providing guidelines for health professionals, they could be provided for patients, if suitably modified. Both patient and physician would be using the same data and software, which would make their interaction much easier. Also, the present hesitation which physicians feel about guidelines would likely not extend to use by their patients. The negative connotations of " cook book medicine" when applied by physicians become advantages when patients are using them. Physicians would be comfortable in the knowledge that their patients were following a prescribed management system.

It has also been shown that patient's compliance with their care plan is considerably improved when they have written materials ( care plans and guidelines) to which they can subsequently refer. It seems reasonable to suppose that an electronic real-time interactive system would be even better in this respect. Multi-media programs can

provide images,( both still and motion) and sound effects, on compact disc or by Internet web-site.

Using this electronic Multimedia technology, it is quite feasible to provide on-screen tutorials for skill enhancement, just as is presently done for physicians, medical students, and other health professionals. Much professional education material is increasingly available electronically, with several major textbooks already available on CD-ROM.

For example, it would be possible for the patient to have a fully integrated program including a tutorial for the use of the otoscope, accompanied by a series of full color eardrum pictures for comparison, and a management algorithm for otitis media available at all times. This would significantly affect the utilization for medical visits for otitis media, especially if the patient had the ability to directly obtain common first generation antibiotics.

Similarly, it would be possible to manage mild -to -moderate hypertension. The patient would measure their own blood pressure under the appropriate conditions, as outlined in the tutorial program, enter the result in the appropriate algorithm, and adjust the management plan accordingly. The adjustment could include drug therapy, or consultation where necessary. The quality of the consultation request would increase because of the ability of the algorithm to more precisely define the need for professional assistance.

Pharyngitis is a further example. In view of the fact that most of these conditions are viral in origin, and therefore not amenable to antibiotic therapy, it is likely that an algorithm would improve diagnosis quality, and that decreased costs would follow. This cost decrease includes direct system costs ( professional fees ) and indirect costs ( drug costs and patient's time ).

The computer program could provide images of different typical conditions, and instruction in the use of the Rapid Strep test which detects the presence of bacteria . Access to appropriate medications would further increase the scope of management for the consumer. Application of the self-care model, with it's goal of increased patient empowerment, will identify numerous additional examples. It was recently estimated by Maynard et al that 30-50% of primary care conditions do not need physician attention. This thesis proposes that much of this segment of health care can be adequately performed by patients themselves, with appropriate support.

Introduction to Educational Theories and Applications in Patient Education.

In order to develop a model for the educational initiative in the Supported self-care environment, generally accepted theories of education were reviewed. A complete review of leading education theory is to be found in the Appendix.

There are two basic schools of educational theory. These are the developmental school and the environmental school. The developmentalists, as exemplified by Rousseau,[54] believe that humans evolve according to an innate schedule. There are variations on this theme regarding the number and duration of these stages of development, and whether or not all humans complete all stages. Other prominent developmentalists include Bowlby,[55] who felt that the child becomes the man and then teaches his own child similarly, and Montessori,[56] who believed that the teacher responds to the learners stage and works within their capacities.

Perhaps the most influential modern developmentalist was Piaget.[57] He postulated four learning periods, these being as follows:

1. Sensorimotor ( infancy).

2. Preoperational thought ( very young child).

3. Concrete Operations ( Older child)

4. Formal Operations ( Adult).

The last two periods are important in adult education. Many adults do not reach Formal intellectual operational thought, remaining instead in the Concrete stage. This would mean that design of adult education experiences would require matching with the appropriate stage in the learner. Piaget also felt that achieving a higher stage automatically included the prior stages. Thus a learner capable of Formal Operations would also be capable of Concrete Operations.

The environmentalists, originating with Locke who postulated the " tabula rasa" concept[58] of the young child's mind, and continuing with Pavlov[59] and Skinner,[60] believed that it was the environment that was responsible for the learning process.

Pavlov's experiments with the conditioned reflex are well known. Skinner felt that the learner " operated on" the environment ( hence "operant conditioning" ) with behavior being determined by its consequences. These consequences were termed " reinforcers." Positive reinforcers included the idea that conditioning improved with immediate feedback; that incremental reinforcers were more successful in modifying behavior,[61] a process he termed " shaping"; and that fixed-ratio stimuli were more successful than fixed-interval ones.

Adult Learning.

No unified theory of adult learning exists. However, many of the current approaches emanate from the work of Dewey.[62] He believed education to be a lifelong process based on life experience and on the scientific method, with hypothesis generation

and collection of supporting evidence. Thus, the teacher is a participative guide and facilitator, choosing experiences for the learner; using the environment in support; and considering the learners needs and past experiences.

Freire[63] further clarified this work. In his view, the teacher becomes a learner by understanding the needs of the individual; learners participate actively in the learning process, and teacher and learner are jointly responsible for the process.

The strongest influence in recent years has been that of Knowles.[64]

His approach comprises four basic assumptions.

1. Adults move from dependency towards increasing self-directness, at individual rates and stages.

2. Adults acquire increasing experiences, which are more meaningful to them. Thus, experiential learning is the primary instructional approach to adults.

3. Adults are open to learning when they realize a " need to know." The teacher helps learners discover this need.

4. Adults desire increased competence in the " here and now." Thus, they are performance-centered.

Implications of the Knowles approach include:

The learning environment should make learners feel at ease; planning should include the learners viewpoints; learning needs should be diagnosed by the learner; both teacher and learner are mutually responsible for the success of the program. Self-evaluation should be the norm. Experiential techniques are primary, and are problem oriented.

There are detailed recommendations in Knowles work. These include the notion that the physical and psychological environments must be supportive of the learner; the adult self-directed approach means that needs are defined by the learner; the process of learning is a

joint planning exercise between teacher and learner, and they are consequently mutually responsible for it. The approach is problem-oriented. Self-evaluation is a major component. The adult's experiences are a useful resource to the teacher, and the practical application of the material should be emphasized.

Adult teaching and learning is a very complex subject. Not all agree that adult learning theory is valid. Brookfield points out the frequent differences between theory and practice and addresses the " theory-practice disjunction."[65]

Application of Learning Theories to the Study Design.

In this study, patients with hypertension were exposed to an educational program designed to improve their knowledge about their disease and to improve their skills in measuring their own blood pressures. The structure of the educational intervention therefore incorporated as many as possible of theoretical concepts identified in the education literature.

The Concrete and Formal operations ideas of Piaget[66] were incorporated by being very specific in the content of the basic information presented to participants. (A complete patient information package is included in the Appendix to this thesis). The concept of " attachment" by learners to instructors was fostered by instructors being personally open to discussion and interaction. The small-group format was chosen with this in mind.

Skinners principles of Programmed Instruction[67] were also incorporated, including " Shaping" i.e. progress in small steps; Active Learning i.e. interactive small group discussion and demonstrations, and Immediate Feedback during the sessions. Skinner also recommended reinforcers and fixed ratio rewards.[68] This process was attempted in the follow-up letters and telephone calls, which were not at fixed intervals.

Bandura's concept of social interaction was included in the small group sessions, both in discussion and in the psychomotor components where observation of other participants as well as instructor role modeling was included. His concepts of Attention, Retention, Motor Reproduction and Reinforcement [69] were included in the interactions.

Knowles' adult learning concepts[70] were also included where possible. These comprise:

1. Adults move from dependency to self-directness at different rates and stages.
2. Adults acquire increasing experiences which are more meaningful to them; thus experiential learning is the primary instructional approach.
3. Adults are open to learning when they have a "need to know." The instructor helps the learner to discover this need.
4. Adults desire increased competence in the "here and now." Thus they are performance-centered.

All of these issues were included in the small group discussions where possible.

Knowles also felt that:

1. The environment should put learners at ease.

Classes were conducted in the clinic normally attended by the patients, for that reason.

2. The planning system should include learners views.

This was not possible initially, however, in the discussions which followed, it was often possible to include patient's perspectives and questions. The interactive format was essential for this purpose.

3. Instructor and learners held mutual responsibility for the program.

This was addressed by the interactive nature of the discussions.

4. Problem-oriented experiential techniques were important and self-evaluation was the norm.

This was the case throughout the education modules and also in the home monitoring process.

The concepts of adult education theory for a supported self care model are important. It may be that different educational strategies will be required for different groups of learners. However, it does seem that the experientially based model is quite suitable for the supported self-care model, in that participants generally do have an immediately practical reason for participation. They certainly have recent experience of a health problem as well as a "need to know." They are more likely performance-centered, desiring increased competence, or they likely would not have participated in a program of this nature.

Is Education experienced differently by different patients?

Environmental factors have a major effect on patient learning, a fact well-known in medical practice where identical diagnoses can have profoundly different meanings to individual patients depending on their prior life experiences, both personally and among peers and family members. Developmental factors are also likely to have a major influence on the ability of patients to learn moderately complex instruction sets.

Adult learning theory, if one accepts its validity, may be based on observations of the individualized outcomes of a multiplicity of developmental and environmental factors along with the influence of inner growth potential. This may partially explain the wide variation in patient attitudes to acceptance of responsibility for care.[71]

Not all patients will achieve all the outlined stages and educational interventions will need to allow for this fact. Different individuals will possess differing aptitudes[72] for educational interventions and treatments.

Impact of Educational Theory on the Design of the Educational Intervention.

For this study, a small group model was chosen, with approximately 4 or 5 patients per group. This permitted a degree of individualization, as well as a feeling of cohesiveness and an environment of "learning from each other." It also reduced the feeling of distance between learners and instructors. This approach follows Skinner's " programmed instruction" concept,[73] which includes " Shaping" ( progress in small steps), " Active Learning" ( operant conditioning), and " Prompt Positive Reinforcement" ( immediate feedback). Elements of Bandura's Social Learning Theory also were incorporated in this experience, including Attention, Retention, Motor Reproduction, and Reinforcement.[74] Knowle's Adult Learning assumptions[75] were incorporated as much as was possible. A small group is also more manageable and is more likely to reflect that actual numbers in the usual primary care practice environment.

Discussions during the intervention process included:

1. The future possibility of participants being able to make minor modifications to their own drug therapy. A strong emphasis was also placed on their personal responsibility for the lifestyle modification portion of the treatment.
2. Increased experiences with self measurement were incorporated from the beginning.
3. Learners did seem to have a " need to know" and this was fostered by the instructors.
4. Expressed interest in increased performance ( blood pressure control and improved health) were frequent in the program.

5. Problem Orientation was designed into the experience. Many participants were willing to share their individual experiences in their prior diagnostic and therapeutic history, and this was well received by the others, so far as the two professional participant/observers could tell. In at least one case, an unrealized medication side-effect was diagnosed by way of another participant's story.

Cognitive, affective and psychomotor components were included in the intervention, with the last being a separate workshop. Following the two education sessions, there were additional follow-up letters, including a newsletter about hypertension, which was sent to all participants at irregular intervals. Telephone contact, again at irregular intervals, was maintained. This approach was patterned on the findings of Skinner; i.e. that intermittently-rewarded behavior was much less easily extinguished than continuously or predictably rewarded types.[76]

Not all patients are alike in their learning needs and capacities. Some patients prefer to know as much as possible about their condition whereas others do not. There are variations also when the disease condition is perceived as being more serious by the patient, where there appears to be a need for less information—a willingness to leave matters up to the professional.[77] This means that in the supported self-care milieu, which is oriented to more minor conditions, there will be a need for more information and dialogue with patients. Some may do better in small group learning and others not. In designing the educational intervention for this project, small groups were emphasized.

The overall model design has three major components in the initial educational intervention, being cognitive, affective and psychomotor elements. This occurs in a small group educational environment. It is followed by a behavior modification component, which attempts to keep patients involved, and uses regular intermittent irregular follow-up by letter and telephone as reinforcing strategies.

## PATIENTS AND METHODS.

### Explanation of the study background and purpose.

This was a prospective cohort study which sought to determine if a specific educational program consisting of two sessions would result in a reduction in office visits for hypertension care, without adversely affecting patient's blood pressure control. It also sought to determine if any relationships existed between a difference in their numbers of office visits, both for hypertension and non-hypertension care, and several variables. These variables were those included in the SF-36 perceived health questionnaire, the Duke-UNC Social Support questionnaire, and a Learning Styles questionnaire.

Traditional patient management by health care providers has cast patients in a dependency role. Large numbers of office visits for minor health problems has been one consequence of this policy. In comparing this process with that followed by health care providers in the care of diabetics, it was reasoned that a process modeled on diabetes care could be adapted to the care of a large number of minor primary care problems, with no loss of quality of care and consequent savings to paying agencies and health systems.

This study was undertaken to see if a specific education program reduced the numbers of office visits by hypertensive patients and hence reduced costs of care. The second issue to be determined was whether the degree of hypertension control in the study group of patients was adversely affected as the number of office visits decreased.

There is variation in the degree of patient compliance with hypertension control recommendations made to them. This study attempted to find out if there were differences in subjects health perceptions or learning styles which might account for reduced effectiveness of their care, if such was present. Subject's perceptions of their health status,

degree of social support and learning style were measured by means of three questionnaires to determine if any of these variables influenced the number of visits.

Summary of the Method.

In order to determine if hypertensive patients exposed to a specific educational intervention had fewer office visits for this condition compared to an age/sex matched control group, the number of their office visits for the period August 1, 1997 to January 31, 1998 was measured and compared to the number of visits for the period August 1, 1996 to January 31, 1997. These visits were categorized into three groups: those made for hypertension control, those not for hypertension control, and those which were indeterminate.

Quality of blood pressure control in the intervention group was assessed by examination of records made by patients in their own environment and for both groups by examination of records made by providers for all of their visits to any Kaiser facility in the relevant time periods. These records were then compared to the levels recommended by the Fifth report of the Joint National Committee on Hypertension[78] ( JNC 5) and to their prior control levels.

Patients in the intervention group completed three questionnaires to assess their perceptions of their health status, degree of social support and learning style. These parameters were compared with visit numbers by means of regression analysis in order to determine if any relationship existed between them.

Ethical Approval.

Ethical approval for the study was obtained from the Research-Ethics Committee, Faculty of Medicine, University of Alberta, Edmonton, Alberta, and the Human Subjects Committee, Center for Health Research, Kaiser Foundation Health Plan, Portland, Oregon. Following ethical approval, the Kaiser database provided a computer-generated listing of all patients of both sexes, aged between 35 and 60 years, without co-morbidities, attending Modules "A" and "C", Rockwood Medical Office, with a recorded diagnosis of essential hypertension.

Recruitment Process.

A letter requesting participation in the study was sent to all (approximately two hundred ) such patients. Twenty affirmative replies were received. These patients comprised the intervention group. From the remainder, health record numbers were selected at random, using a random number generation table, until an age / sex matched control group of forty additional subjects was assembled, twenty from module "A" and twenty from module "C".

Intervention Process.

The intervention group was invited to attend two educational sessions at the Rockwood Medical Office, the site where they normally receive their care.
All participants completed the approved consent form at that time. Copies of consents were maintained in the authors office and in the Center for Health Research. Each participant received their own copy also.

The first session comprised a cognitive and affective program, with a videotape about hypertension, and was followed by a question and answer period. A copy of the written material is included in the Appendices.

The second session was a lab designed to assist subjects in developing the skills required to take their own blood pressures. Patients brought their own electronic instruments with them, and these were individually calibrated against a mercury device. Some participants did not possess a device, and were recommended to obtain the instrument from the clinic pharmacy, which stocked supplies of the instrument recommended by Consumer Reports. This device is fully automated and is available in three different cuff sizes. Correct postures, and other factors impacting accuracy of blood pressure measurement were discussed, and demonstrated by the instructors and then by the patients. Cohorts two and three (control cohorts) continued with their usual care.

Blood Pressure Records.

As part of the written materials, patients were provided with blank records to enter their blood pressure measurements. The correct method of data entry was demonstrated and examples were performed in the class. A copy of the form is included in the appendix.

Following the sessions, a follow-up letter, with a fresh supply of blank forms was sent by mail to each participant, along with a prepaid mailer for the completed form. All patients returned useable records.

This process was repeated about every six weeks. Beginning with the second mail-out, a one-page newsletter about blood pressure issues was also included. Copies are included in the appendix.

Records were collected until January 31, 1998. The program was continued after that date as a service to patients.

Blood pressure measurements were entered directly from the patient forms into the SPSS database by an independent assistant.

Office Visits.

Office visit data for all patients were collected from the Kaiser electronic record database for the same time periods in each of two years, these being the current year ( August 1997-January 1998) and the immediate past year ( August 1996-January 1997). This selection was designed to minimize variations due to the season of the year, vacations and similar factors which could have affected office visit patterns.

Visits were categorized into three groups: those which were made for the purpose of managing hypertension, those which were unrelated to hypertension, and those which were uncertain.

Information was sought from several sources in each record. These included the " reason for visit," a record field completed independently by the medical assistant after questioning the patient, the body of the record as noted by the provider, and the final ICD-9 codes for that visit. The latter two record entries are made by the provider after the visit interaction is complete.

Two of these three record information sources had to be in agreement for the visit to be assigned a category. This reduced the possibility of providers recording a problem which was not addressed at the visit, even though it may have existed in the patient at the time.

The records were assessed by the author. Where there was doubt about a visit type, the final categorization was made on the basis of adding it to the non-hypertension visit group, a conservative approach biased towards reducing the difference between intervention

and control groups. Final visit categories were coded as one or other of three numerical codes and entered into the SPSS database.

The questionnaires.

The Medical Outcomes Study 36-item Short Form Health Survey (SF-36)[79] has been designed as a generic indicator of health status for use as an outcome measure in clinical research. It has been widely used and accepted by health researchers.[80] It is considered a valid and reliable instrument of high quality. It measures eight dimensions of functioning. These include Physical Functioning, Role Limitations due to Physical Health, Bodily Pain, Social Functioning, General Mental Health, Role Limitations due to Emotional problems, Vitality and Energy, and General Health Perceptions.

The Duke-UNC Functional Social Support Questionnaire measures an individual's satisfaction with the functional and affective aspects of their social support.[81] Each item is measured on a five-point Likert scale from " as much as I would like" to " much less than I would like." Items 1, 2 and 8 measure affective support, and the others measure confidant support. A summary score is additive. Sub-scores can also be formed. Its brevity is useful in a clinical setting. Reliability results are equivalent to a Cronbach alpha score of about 0.80. This is a measure of test-re-test reliability. Convergent validity is still the subject of measurement.[82] It measures the degree of agreement with other accepted scoring systems.

The Learning Styles Instrument[83] is a 46-item questionnaire which measures five distinct aspects of learning. These include: Information Involvement, Self-Care Orientation, Regimen Barriers, Information Avoidance, Risk Aversion, and Question-asking. Responses were made using a five point Likert scale, from strongly agree" to " strongly disagree." The first factor measures patient's interest in learning about their medications and their perceived interest. The second measures their interest in self-care and preferences for

consumer decision-making. The third concerns barriers such as difficulty in remembering to take medication. The fourth measures reasons for not wanting to know about treatment. The fifth factor measures interest in reducing the risks of hypertension. The sixth factor measures willingness to ask providers for information.

Statistical Analysis.

Data from the questionnaires were assembled as follows:

The SF-36 survey data was collapsed into its major subgroups and modified according to the standard instructions provided in the system manual. This resulted in eight standard numerical scores for each patient. The Duke Social Support data were added to provide a single numerical score. The Learning Style questionnaire data were added for each of the five subgroups using a numerical score from one to five.

Statistical Methods

This was a prospective cohort study comparing numerical discrete data for office visits between three groups. Office visits were compared by calculating descriptive statistics, with mean visits, median visits and standard deviations. Inferential statistics were calculated using a paired sample calculation of comparing means. Total visits for each group was compared for each of the two major categories of visits. Category two visits were too few to be included as a separate calculation. Systolic and diastolic blood pressure measurements taken in both office and home environments were recorded. Descriptive statistics were then calculated, for the cohort means. These were unweighted mean systolic and mean diastolic blood pressures for each cohort, with standard deviations. These were

compared to a national standard as outlined in the Fifth Report of the Joint National Committee (JNC 5).

In the intervention group, the SF 36, Duke score and Learning style variables were regressed against the differences in office visit categories between baseline time period and the post-intervention time period.

Study Parameters.

1. Patients were members of the Kaiser Foundation Health Plan during the course of the study.
2. Patients were under treatment for essential hypertension during the course of the study.
3. All patients received their regular care at one location ( Rockwood Medical Clinic).
4. The samples were identified by computer from the Kaiser Foundation Health Plan database, using the search criteria of age 35-65, either sex, no known co-morbidities, receiving care at Rockwood Clinic.
5. Visits and associated blood pressure measurements were included if they occurred within either of two time periods- the first being August 1st,1996 to January 31st,1997 and the second being August 1st 1997 to January 31st 1998.
6. Visits were counted if made to any medical care provider in the Rockwood facility in both of the two time periods. Visits to pharmacists, podiatrists and physical therapists providers were excluded since these providers do not measure patient blood pressures or initiate or modify therapy. Visits to the nurse treatment center were included in the visit counts, because they are frequently made for the purpose of measuring blood pressure.

7. There were two control cohorts. Cohort two was randomly selected from the other patients in the target clinic, who had been offered the opportunity to participate in the program but had not accepted. Cohort three was randomly selected from other hypertensive patients fulfilling the identical computer search criteria, but who had not been offered participation. This process was established to clarify if there was a selection bias in the " decliner" group.

Validity and Reliability.

1. Two major issues related to office visits concern the chance that a degree of variability might occur in categorizing the three visit types, and the possibility that all visits were not included in the sample.

While care was taken to include all office visits, it is possible that patients could have had visits or therapy outside of the Kaiser Permanente system, and hence would not be included in the results. Emergency room visits are not yet recorded on the KPNW electronic database system, with paper charts still being used. Any of these visits were not included, although it is unlikely that many of such visits took place since patients would have a significant co-payment in this circumstance. Also, both groups of patients would have such visits which tends to reduce the difference between groups. The distribution of such visits among the three categories is not known.

Accuracy of inter-rater variation was addressed by categorization of all office visits independently by two observers. The use of at least two of three items recorded at all visits was used to refine the categorization of visit types. One of these items ( reason for visit) was independently entered by the medical assistant prior to the patient being seen by the provider.

2. Accuracy of blood pressure measurements by patients. Issues include the accuracy of the devices used, and the ability of the patients to use the devices correctly. Recording the results is also a potential concern.

Device accuracy was addressed by calibration against a mercury manometer at the start of the study. The mercury manometer constitutes the gold standard of measurement. Participants were able to recalibrate their own device at will during the course of the study, although it is unknown how many did so. The tests carried out by Consumer Reports[84] included accuracy and stability for the recommended instrument, but not all patients used this brand.

Accurate monitoring of blood pressure by patients was addressed by devoting one of the education sessions purely to this issue. While re-testing during the study was not possible, the relatively short duration of the study, along with the relative familiarity of the patients with their measurement devices provides some assurance that a reasonable degree of accuracy was maintained. The likely reduction in the " white coat hypertension" phenomenon is also a factor in increasing the accuracy of the data. This is a condition in which blood pressure measurements are artificially raised due to patient's anxiety in seeing a physician. Data accuracy is also improved by the marked increase in the number of data points collected.

The patient recording instrument was specifically designed to be easy to use and patients did not express any reservations in using the data collection forms.

3. Questionnaire validity and reliability varied among the three instruments.

Most reliable and valid was the SF-36 survey instrument. This has been carefully constructed and its validity and reliability have been frequently confirmed in numerous studies.[85]

The Duke Social support instrument has been validated to an extent, however work remains to be done in this area. It is fair to say that there are not any instruments available to assess social support which carry the same weight as the SF-36. Reliability of the Duke instrument is rated as fair to good.[86] Convergent validity is not as highly rated, however the authors state that this is because it measures constructs that are similar but not identical to existing scales.

The Learning style instrument is the least validated instrument. There is very little information in the literature about learning style measurement. This instrument was chosen because of a prior study[87] which used it to measure information needs in medication use by older patients. Information need is a major factor in home monitoring.

## RESULTS.

### Changes in Office Visits in the Three Cohorts.

The three cohorts are designated as cohorts one, two and three. Cohort one is the intervention cohort recruited from module "A" patients. Cohort two is the control cohort selected from module "A" patients. Cohort three is another control cohort selected from patients attending module "C", which is another module located in the same clinic.

The first time period was a measurement of office visits and blood pressure determinations in the period August 1, 1996 to January 31,1997. This is the baseline period. The second time period was from August 1, 1997, to January 31, 1998. This is the post-intervention period.

There were significant reductions for both the first and second cohorts ( from module "A") between mean visits for the baseline and post-intervention time periods. There were no such reductions for the third cohort.

Table 1. Changes in Total Office Visits.

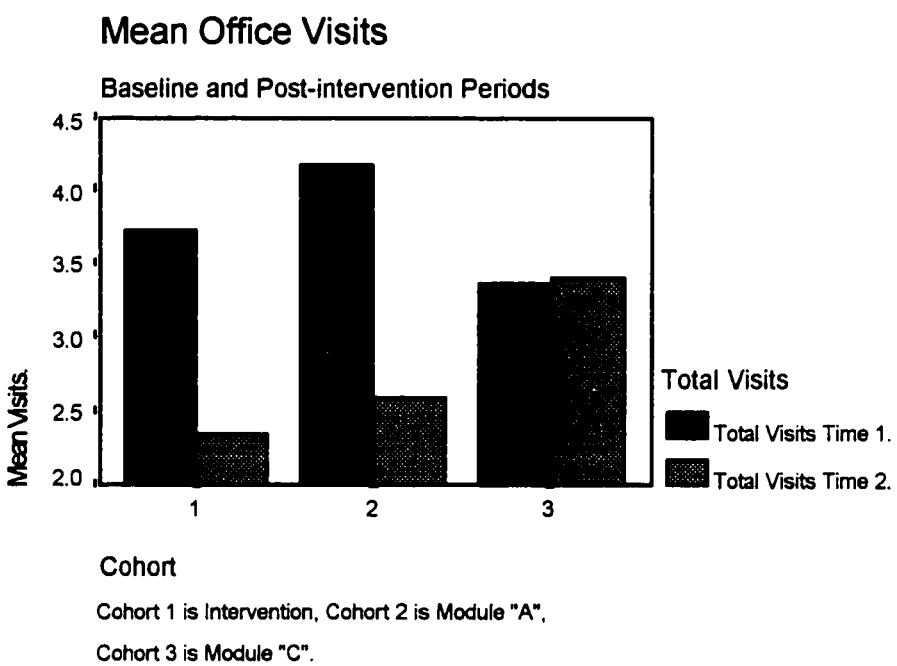
| | | Baseline. | | Post-intervention. | |
|---|---|---|---|---|---|
| | n | Mean | S.D. | Mean | S.D. |
| Cohort 1. | 21 | 3.71 | 4.03 | 2.33 | 2.43 |
| Cohort 2. | 29 | 4.17 | 3.11 | 2.59 | 1.82 |
| Cohort 3. | 25 | 3.36 | 3.30 | 3.40 | 3.84 |

Mean number of visits made by patients in the intervention cohort were lowest compared to those in either of the other cohorts in the second time period compared to the first time period, as seen in Figure 1 and Table 1.

The third, ( module "C") cohort did not change its pattern of visits throughout the two time periods, as expected. Cohort two did not behave as expected, with a reduction in office visits comparable to the intervention group. The overall visit difference was significant

This unexpected fall in visits in the second cohort, which had not had the intervention or follow-up program, raised the issue of the presence of one or more additional effects operating upon all of the Module "A" patients.

Figure 1. Changes in Total Office Visits.




Paired sample t-test Mean = 0.99, S.D. = 3.37, 95% C.I. = 0.21 - 1.76, t = 2.53, Sig. 0.013.

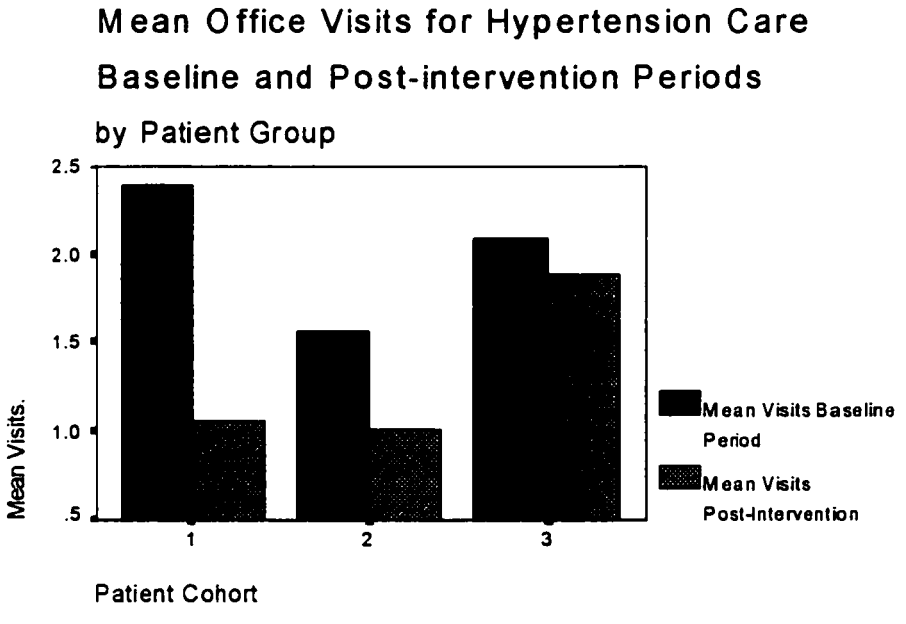
Changes in Office Visits for Hypertension Care.

Mean visits for hypertension care declined substantially among members of the first cohort, somewhat less so in the second cohort, and very little in the third cohort as shown in Figure 2 and Table 2.

Table 2. Changes in Office Visits for Hypertension Care.

| | | Baseline Visits. | | Post-intervention Visits. | |
|---|---|---|---|---|---|
| | n | Mean | S.D. | Mean | S.D. |
| Cohort 1. | 21 | 2.38 | 4.1 | 1.05 | 1.50 |
| Cohort 2. | 29 | 1.55 | 2.60 | 1.00 | 1.25 |
| Cohort 3. | 25 | 2.08 | 3.51 | 1.88 | 3.23 |

Figure 2. Changes in Office Visits for Hypertension Care.



This again demonstrated an unexpected fall in office visits among the members of cohort two. The other cohorts visit pattern was as expected, with a substantial fall in the visits by the intervention cohort, and little change among the members of the third cohort.

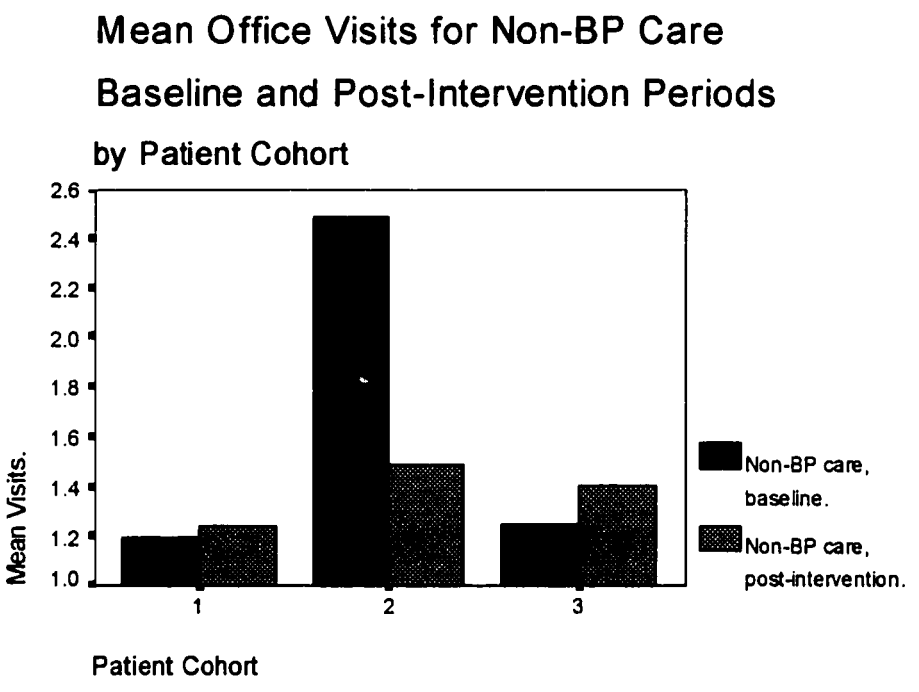
Changes in Office Visits for Non-hypertension Care.

There was little change in mean office visits for non-hypertension care in the first and third cohorts. Since there should have been little or no impact on visits for other purposes, this finding was as expected. Again there was a significant unexpected reduction in mean visits by members of the second cohort.( see Figure 3 and Table 3.) This reduction was significantly different at the 0.024 level. It again raised the question of additional factors operating within the two cohorts derived from the Module "A" population.

Table 3. Changes in Office Visits for Non-hypertension Care.

| | n | Baseline | | Post-intervention. | |
|---|---|---|---|---|---|
| | | Mean | S.D. | Mean | S.D. |
| Cohort 1. | 21 | 1.19 | 1.47 | 1.24 | 1.41 |
| Cohort 2. | 29 | 2.48 | 2.45 | 1.48 | 1.72 |
| Cohort 3. | 25 | 1.24 | 1.42 | 1.40 | 2.32 |

Figure 3. Changes in Office Visits for Non-hypertension Care.




Hypertension-associated Visits.

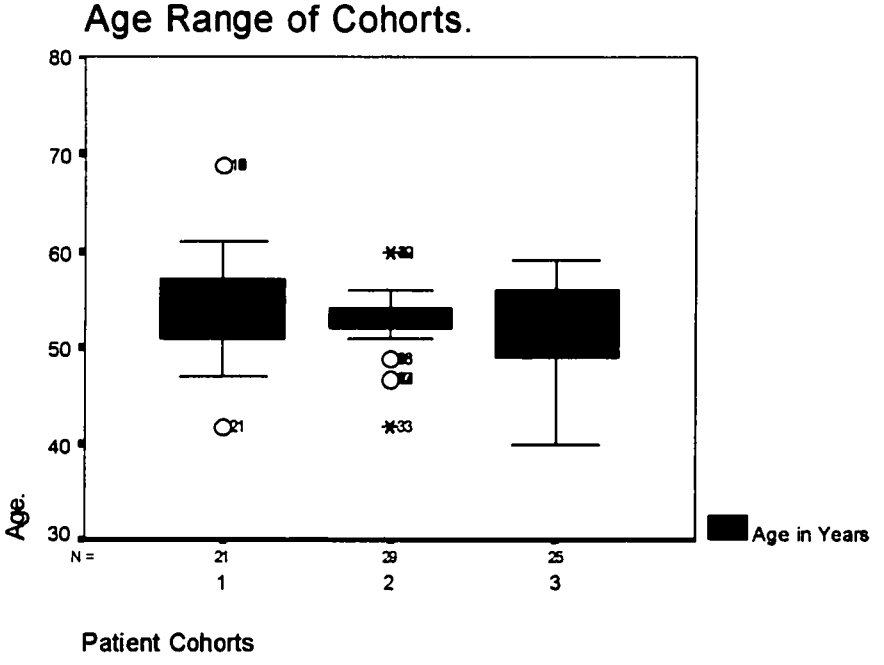
This category of visit was defined as one where the record did not clearly define the visit as one of the two main categories, leaving some doubt as to which of the two categories the visit should be assigned. It was designed into the experiment at the outset, since it's potential size was unknown at the time to the investigator. In practice, it was very unlikely to be unable to classify the purpose of the visits correctly. There were very few ambiguous visits, with 3 in each of cohorts one and two, and two in cohort three.

Age of Participants.

Age of patients in each cohort was comparable between the first and third cohorts, with a narrower range in the second cohort. There was no significant difference in mean or median ages for any cohort. The range of the third cohort was somewhat more broad with lower ages being represented more than in the other two cohorts. Age is not an explanation for the differences in visit pattern in cohort two.

( See Fig 4.).

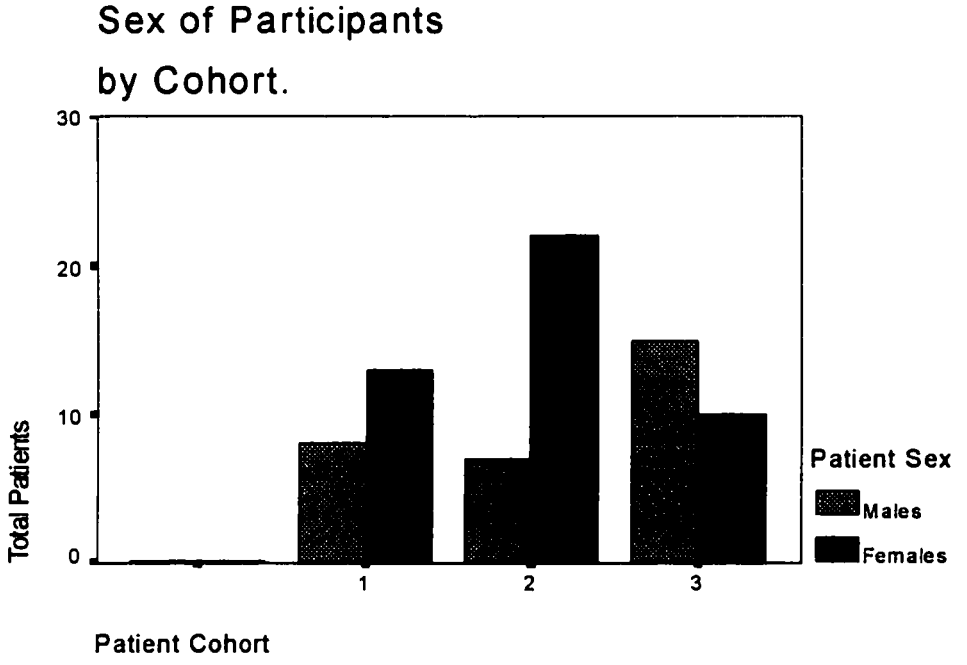
Figure 4. Age Distribution of Patients.



Gender Differences.

There was a significant difference in the number of females in the second cohort compared to the other two groups. ( See Fig 5.). Minor ( non-significant) differences were noted between the first and third cohorts. This difference could have arisen from a true difference in composition of the Module "A' population, or a problem with the selection process, or from statistical artifact due to the small numbers of patients in the sample. This difference in composition may partially explain the unusual pattern of visits by patients in this cohort.

Figure 5. Sex Distribution of Study Population.

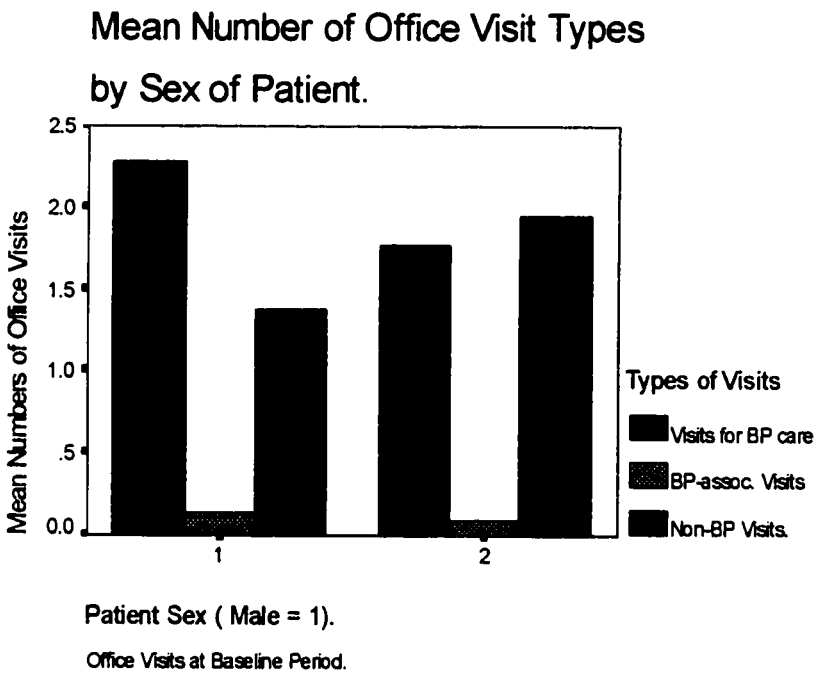


Mean Office Visits differences between Sexes.

In the baseline period, there were more visits made by males for hypertension care and fewer visits made for non-hypertension care, (see Figure 6). Comparison of the visit types reveals no significant gender differences in the pattern of visits.

Figure 6.

Difference in visit Types analyzed by Sex of Patients.



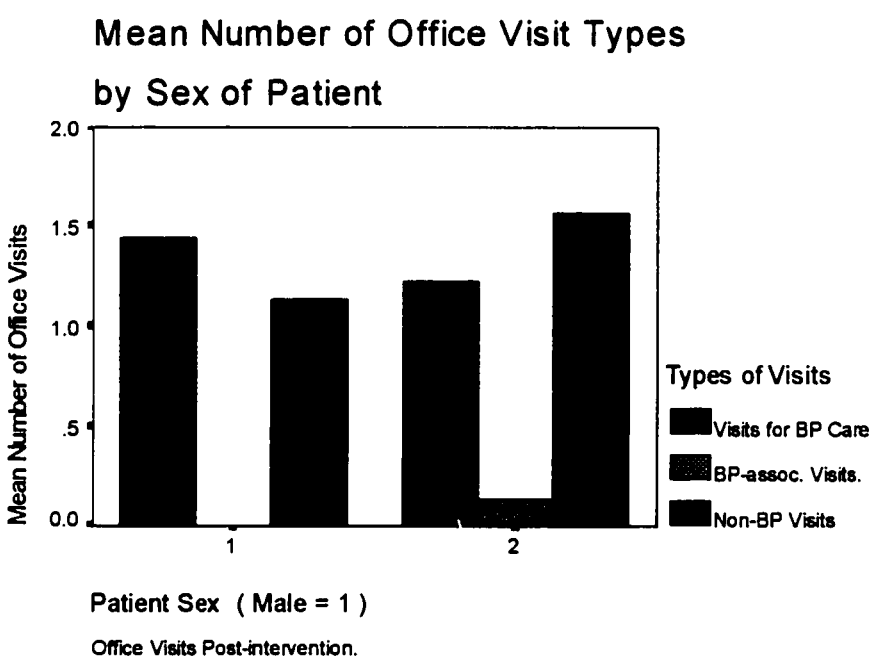
Mean Office Visits differences between Sexes.

In the post-intervention period , there were again no significant differences between the sexes in their use of office visits compared to the baseline period, as seen in Figure 7. There appeared to be a small non-significant decrease in the difference for hypertension care by males. Overall, there was little difference in the visit pattern in both sexes either in the baseline period or in the post-intervention period. The slight preponderance of visits for hypertension care by males was again seen, as was the opposite pattern for females, as had occurred in the baseline time period.

There was a significant reduction in visits for hypertension care by males in the post-intervention period compared to baseline.

Figure 7.

Number of Visits analyzed by Sex of Patients.



Changes in Mean Office Visits by Module.

Mean visit data were examined by module for both baseline and post-intervention time periods ( See Figure 8 a and b).

Figure 8 (a). Office Visits by Clinical Module, Baseline.

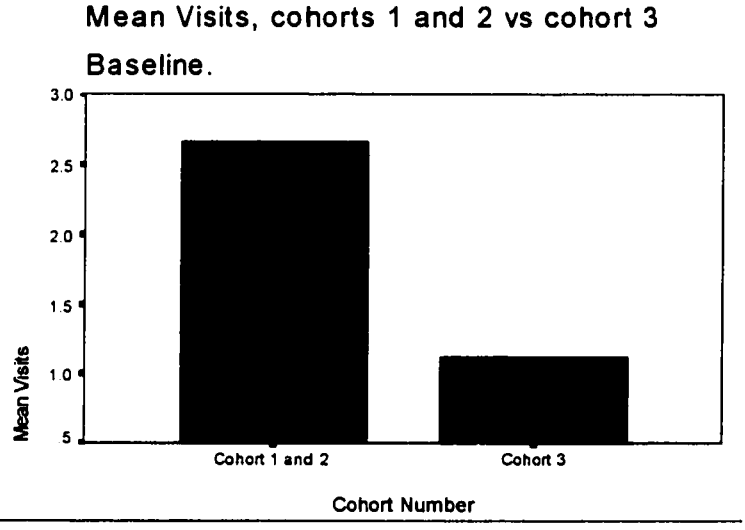
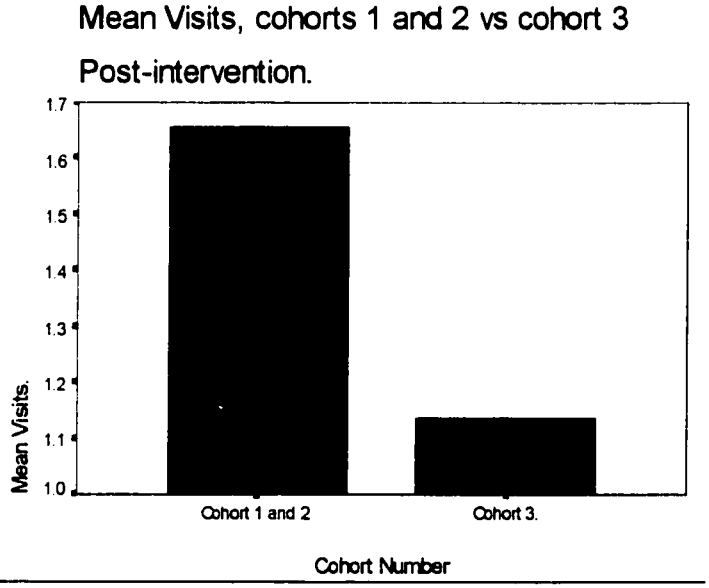



Figure 8 (b). Office Visits by Clinical Module, Post-intervention.



In both time periods, there were significant differences in mean office visits between patients attending module "A", ( cohorts 1 and 2) and module "C" ( cohort 3). There was also a significant difference between mean visits for the module "A" cohorts at baseline compared with the post-intervention period. There was no significant difference between mean visits for module "C" patients at baseline compared to the post-intervention period. Again, there appeared to be one or more additional factors operating on the Module "A" population which resulted in visit reductions regardless of the intervention.

Table 4. Office Visits by clinical Module.

| | Baseline Visits. | | Post-intervention Visits. | |
|---|---|---|---|---|
| | Mean | Std. Dev. | Mean | Std. Dev. |
| Mod. A | 2.65 | 3.41 | 1.65 | 2.06 |
| Mod.C. | 1.12 | 2.47 | 1.13 | 2.72 |

Office visits demonstrated a significant fall when analyzed by cohort, but not by gender or age. Cohort two had more females than would have been expected, and the largest portion of the fall in visits was for non-hypertension care in this cohort.

Control of Blood Pressure.

Office determinations of blood pressure did not alter significantly during the two periods of observation. Mean systolic pressures, as seen in Figure 9, decreased slightly with the largest, although not significant, decrease being observed in cohort one. Cohort two had more females and exhibited its largest reduction in visits for problems not related to hypertension. It again exhibits its difference in that systolic pressures, both baseline and post-intervention, are lower than in the other two cohorts.

Figure 9. Blood Pressure Control ( Systolic).

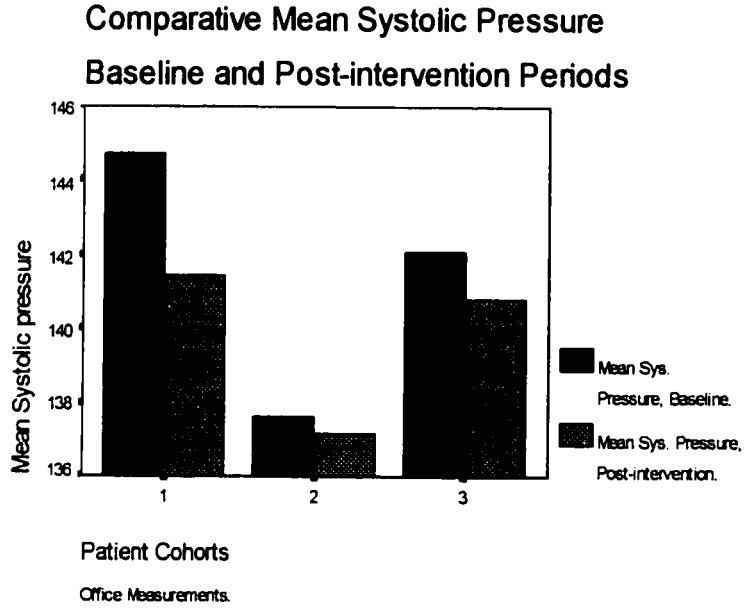
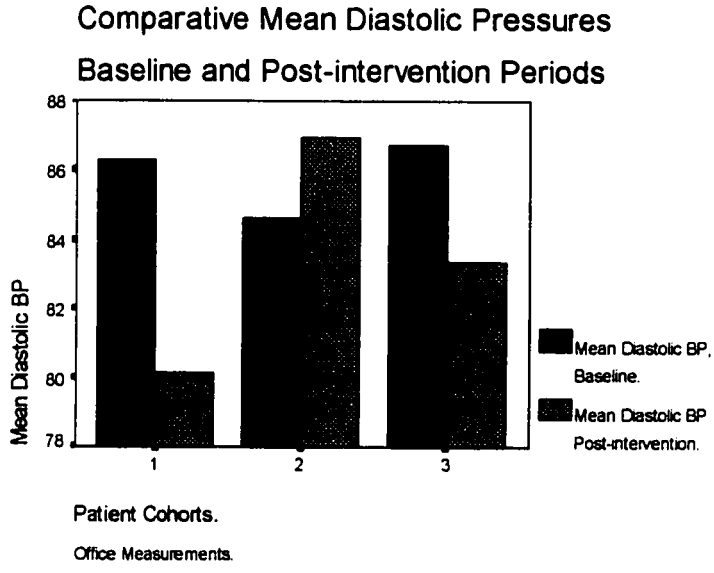


Figure 10. Blood Pressure Control ( Diastolic).




Mean diastolic pressures also did not change, except for a significant decrease in mean diastolic pressures in the intervention group in the second ( post-intervention) time period (see Figure 10), and slight non-significant increased diastolic pressures among patients in cohort two.

All of these mean systolic and diastolic pressure measurements conform to the national guidelines outlined in the fifth report of the Joint National Commission ( JNC 5). All cohorts had adequate control of their blood pressure prior to, and during, the intervention phases of the study, although there were moderately large standard deviations seen in all phases and for both systolic and diastolic pressures (see Table 5).

No deleterious effect due to participation in a home blood pressure monitoring program was found.

As expected, home blood pressure measurements were lower in the intervention cohort as compared to their office measurements (see Table 5). This " white coat effect"

has previously been described extensively and needs no further elaboration. There was no evidence that the home monitoring program caused any deterioration in blood pressure control for cohort one. Thus the reduction in office visits did not result in a greater degree of adverse control of blood pressure.

Table 5. Descriptive Statistics of Blood Pressure Control.

| Post-intervention Pressure. | Mean | Std. Dev. | Min. | Max. |
|---|---|---|---|---|
| Home Systolic Pressure. | 134.8 | 8.8 | 119.4 | 158.9 |
| Home Diastolic Pressure. | 81.6 | 8.6 | 62.8 | 100.8 |
| Office Systolic Pressure | 139.7 | 19.5 | 51.3 | 188.0 |
| Office Diastolic Pressure. | 64.2 | 14.0 | 50.0 | 110.0 |
| Baseline Pressures: | | | | |
| Office Systolic Pressure. | 140.4 | 13.0 | 110.0 | 170.0 |
| Office Diastolic Pressure. | 86.4 | 16.4 | 50.0 | 110.0 |

Questionnaire Variables and their Effects on Visits

Possible effects on visit differences between baseline and post-intervention time periods by each of the series of variables included in the three questionnaires, were carried out by means of multiple regression analyses. The dependent variable was Baseline minus Post-intervention Visits.

The regression function had the general form:

$y = a + bx$ which equates to

(Baseline - Post-intervention Visits) = a + b ( Questionnaire Variable).

The regression analysis was carried out using the differences between baseline and post-intervention visits, total and by types 1 ( for hypertension care), and type 3 ( for non-hypertension care), as the dependent variable. There were too few type 2 visits for meaningful analysis ( 3 visits in cohorts 1and 2, and 2 visits in cohort 3). All participants in cohort 1 scored highly on the Duke Social Support scale, without exception.

Analysis of effect of SF-36 and Learning Style variables on Differences in Total Office Visits ( Baseline minus post-intervention).

In order to determine if there were patient qualities associated with reductions in office visits, the difference in visits between baseline and post-intervention time periods was regressed against both SF-36 and Learning Style variables.

Table 6.

Regression Results, Difference in total Visits, SF-36 variables.

| Variable | B | Part.Corr. | T | Sig. t. |
|---|---|---|---|---|
| Physical Function. | -0.98 | -0.65 | -3.51 | 0.004 |
| Role and Physical Function. | -2.20 | -0.48 | -1.88 | 0.08 |
| Role and Emotional Health | 4.75 | 0.55 | 2.30 | 0.04 |
| Bodily Pain | 1.33 | 0.53 | 2.12 | 0.05 |
| Vitality | -0.34 | -0.36 | -1.35 | 0.20 |
| Mental Health | -0.02 | -0.03 | -0.11 | 0.91 |
| Social Functioning | 0.007 | 0.001 | 2.02 | 0.07 |
| General Health | 0.85 | 0.50 | 2.02 | 0.67 |

The regression constant was -5.88

Multiple R = 0.77. $R^2$ = 0.59. F = 2.21. Sig. F = 0.10.

Patients perception of their physical functioning appeared to have a negative correlation with a difference in total visits to the office. Moderate positive correlations were noted for bodily pain and for emotional effects on daily role on office visit differences.

A smaller positive correlation with perceived general health was seen, which was not significant ( Table 6).

Table 7.

Regression Results, difference in Total Visits, Learning Style variables.

| Variable | B | Part.Corr. | t | Sig. t. |
|---|---|---|---|---|
| Information Involvement | 0.14 | 0.11 | 0.40 | 0.69 |
| Self-care Orientation | -0.10 | -0.20 | -0.77 | 0.45 |
| Barriers to care. | -0.50 | -0.32 | -1.27 | 0.22 |
| Information Avoidance | 1.09 | 0.52 | 2.30 | 0.04 |
| Risk Aversion | 0.92 | 0.55 | 2.50 | 0.02 |
| Questioning Behavior | -0.15 | -0.14 | -0.55 | 0.59 |

The regression constant was - 12.53.

In regressing the Learning Styles variables, there were moderately strong positive correlations with Information Avoidance and Risk Aversion variables. Information avoidance is the tendency to accept the statements of professionals without questioning, and risk aversion is the desire to reduce the risk of adverse health consequences from an existing condition. This result indicates that participants desire to reduce their risk of further health problems and their tendency to accept the statements of health professionals without questioning was correlated with a greater difference in visits. Participation in an education program does not mean that there is disbelief in the instructors. Persons desiring more information about their condition may well seek out perceived authorities, in this case their

instructors. The intervention cohort was a self-selected group, who may well differ from those who declined to participate. This difference could result in acceptance of professional opinions and also with desire to reduce health risks.

Analysis of Effects of SF-36 and Learning Style Components on differences in Office Visits for Hypertension Care (Baseline minus Post-Intervention).

To investigate possible relationships between difference in visits for hypertension care and both the SF-36 and Learning Style variables, this difference was regressed against both sets of variables.

Table 8.

Regression results, Difference in Visits for Hypertension Care,SF-36 Variables.

| Variable | B | Part.Corr. | T. | Sig. t. |
|---|---|---|---|---|
| Physical Function. | -0.66 | -0.54 | -2.25 | 0.04 |
| Role and Physical Function. | -2.70 | -0.54 | -2.22 | 0.04 |
| Role and Emotional Health. | 4.76 | 0.54 | 2.20 | 0.05 |
| Bodily Pain | 1.08 | 0.43 | 1.66 | 0.12 |
| Vitality | -0.16 | -0.17 | -0.60 | 0.56 |
| Mental Health | -0.09 | -0.16 | -0.05 | 0.96 |
| Social Functioning | -0 | 0.11 | 0.38 | 0.71 |
| General health | 0.17 | 0.11 | 0.38 | 0.71 |

The regression constant was 6.46.

Multiple R = 0.76. $R^2$ = 0.58. F = 2.07 Sig. F = 0.12

Patients perceptions of their physical functioning again had a moderately strong negative correlation with differences in visits. Their perceived ability to carry out their daily role was also negatively correlated. Their perception of the effects of their emotional health on their ability to carry out their normal daily routine was moderately positive.

Table 9.

Regression results, difference in Visits for Hypertension Care, Learning Style variables.

| Variable | B | Part.Corr. | t | Sig. t. |
|---|---|---|---|---|
| Information Involvement | 0.21 | 0.16 | 0.63 | 0.54 |
| Self-care Orientation | -0.18 | -0.36 | -1.45 | 0.17 |
| Barriers to care. | 0.03 | 0.02 | 0.08 | 0.93 |
| Information Avoidance | 0.69 | 0.37 | 1.49 | 0.16 |
| Risk Aversion | 0.91 | 0.56 | 2.51 | 0.02 |
| Questioning Behavior | -0.27 | -0.26 | -1.01 | -0.33 |

The regression constant was - 12.14.

Multiple R = 0.75. $R^2$ = 0.57 F = 3.08. Sig. F = 0.04.

In regressing the Learning Styles variables, Risk Aversion was the only variable achieving significance. This means that participants interested in reducing potential risks to their health had a greater difference in visits. Increased knowledge and skills may result in a reduced need for a visit.

Analysis of Effects of SF-36 Variables on Office Visits for Non-hypertension Care.

Possible relationships between difference in visits for care unrelated to hypertension was investigated by regressing these differences against both the SF-36 and Learning Style variables.

Table 10.

Regression results, Visit Difference for non-hypertension Care, SF-36 variables.

| Variable | B. | Part. Corr. | T | Sig. t. |
|---|---|---|---|---|
| Physical Function. | -0.33 | -0.56 | -2.32 | 0.04 |
| Role and Physical Function. | 0.63 | 0.29 | 1.07 | 0.30 |
| Role and Emotional Health. | -0.31 | -0.08 | -0.30 | 0.77 |
| Bodily Pain | 0.28 | 0.25 | 0.90 | 0.38 |
| Vitality | -0.13 | -0.28 | -1.02 | 0.33 |
| Mental Health | -0.12 | -0.44 | -0.15 | 0.88 |
| Social Functioning | 0.61 | 0.21 | 0.75 | 0.47 |
| General Health | 0.65 | 0.66 | 3.08 | 0.009 |

The regression constant was -10.34.

Multiple R = 0.78 $R^2 = 0.61$. F = 2.39. Sig. F = 0.08.

Perceived physical functioning had a significant negative correlation with a difference in office visits for this type of care. This appeared to be a correlation which applied regardless of the presenting health problem, since it was also present in the hypertension and total visit categories. There was a positive correlation between greater visit difference and perceived general health. This is as expected.

Table 11.

Regression results, Visit Difference for non-hypertension Care, Learning Style variables.

| Variable | B | Part.Corr. | t | Sig. t. |
|---|---|---|---|---|
| Information Involvement | -0.06 | -0.08 | -0.29 | 0.78 |
| Self-care Orientation | 0.09 | 0.32 | 1.25 | 0.23 |
| Barriers to care. | -0.51 | -0.51 | -2.22 | 0.04 |
| Information Avoidance | 0.33 | 0.30 | 1.20 | 0.25 |
| Risk Aversion | 0.03 | 0.03 | 0.12 | 0.90 |
| Questioning Behavior | 0.18 | 0.28 | 1.11 | 0.28 |

The regression constant was -2.19.

Multiple R = 0.63. $R^2 = 0.40$. F = 1.58 sig. F = 0.22.

Among the Learning Styles variables, Barriers to Care was the sole significant negative correlation. Participant behaviors such as forgetting to take medication or to follow instructions was more likely to result in a smaller difference between baseline and post-intervention visits. Forgetting medication may be associated with forgetting appointments. Since this quality is likely to have persisted over time, this could result in a smaller visit difference.

## DISCUSSION

### Health Education.

There is a long history of patient education in medical practice. Patients and doctors have interacted in this way for many years. There are several different categories of this interaction. One is provider-patient, occurs on an individual basis, and relates more to the relationship than to the disease. By this is meant the provider uses the long-term relationship with the individual or family to provide additional knowledge or skills. Because this relationship occurs over time, the provider may often provide education about a number of conditions, which may or may not be related to each other. This is the family practice paradigm. An exemplar is office counseling about smoking.

A second type is disease-centered. In this category, the provider delivers the same educational intervention to a number of individuals, either jointly or separately. This may occur in a class or small group environment, as in diabetes education. There are many others. This tends to be delivered by specialists in the particular disease, and is often service-based in that it is associated with a clinical service. An exemplar of this type is the education program delivered in ICU units regarding myocardial infarction.

Other educational interventions are delivered in schools and in the community, frequently by non-physician providers, such as health nurses. Pharmacists also provide information to patients as the occasion presents itself.

However, all of these interventions tend to follow a similar structure, in that they are single-content programs which generally do not take into account individual differences in how patients learn. It is a " one size fits all" approach to learning. In this they resemble the research method from which they spring-the traditional randomized controlled trial. The design of this type of research attempts, by randomization, to create as uniform a patient

body as possible, and then introduces an intervention, whose effects are measured and compared to a control group. The results are then generalized. Thus the method hopes to use a single intervention on a broader base, also a " one size fits all" approach. Many attempts have been made to find "a" method which will result in improved patient understanding, but a single method is unlikely to suit the huge variety of patients who require increased knowledge and/or skills. We do not expect this approach to be successful in most other areas in medical care.

There is little literature surrounding the concept of individualizing educational interventions in patient care.[88] The education of health professionals has been investigated [89] but this is a very different task. It is directed at people who are of above-average intelligence, highly motivated to learn, and who are not ill. In contrast, patient education must be effective for those of average intelligence, who may have less motivation, and who may be ill. Many have had little formal education, often long ago.

There is also the issue of compliance.[90] This problem continues to increase the burden of suffering and its attendant costs. Traditional patient education continues to have difficulty in closing the gap.

Untreated hypertension is responsible for long-term health risks of considerable magnitude.[91] Hypertension can be thought of as an example of a "pre-disease." In such conditions, in the primary care environment, many patients do not experience any disability or indeed any symptoms.

Patient education for this common primary care circumstance may well need to be different to that which is provided in hospitals and specialty clinics where patients have already sustained a major illness.

This study used a behavior modification approach which included a three element education program with cognition, affect, and psychomotor elements. It also incorporated a

long-term follow-up approach, with regular feedback. Others have demonstrated reductions in office visits when patient education programs have been utilized. In particular, asthma, diabetes, lipid diseases and hypertension have been the focus.[92] [93] Some have achieved good long-term results in this condition. Hypertension has been well controlled by one group for approximately five years.[94] One characteristic of this program has been the level of follow-up intervention. However, there has not been a patient " pre-filter" to determine which patients will do well in such an environment.

In designing patient management programs, patient learning characteristics may play a significant role. It is suggested that the application of such pre-filters may lead to improved matching of patients to the specific educational initiative, with improved compliance and eventual outcomes.

This study set out to demonstrate reduced office visits accompanied by an absence of adverse effects on blood pressure control, and this was achieved. In this, it confirms the work of others that such reductions are possible.[95] Further, several patient characteristics were identified which were associated with participation in such a program.

Visits for Office Care.

Visits for hypertension care were significantly reduced in the intervention cohort and in the Module "A" control cohort, and not in the Module "C" cohort. The mean visits by the "A" control cohort, although decreased, did not reach the level of reduction achieved by the patients in the intervention cohort. The differences in visits for non-hypertension care showed much smaller variations between the intervention and second control groups. However, there was again seen a substantial difference in the first control cohort's use of resources with a large decrease between the two time periods. This suggests that there may

be additional differences in the way that patients of the two Module "A" cohorts behave, one being due to the intervention, and others being independent of it.

This may be a reflection of an intervention effect operating within module "A". This is possible for two reasons. One is that all two hundred eligible subjects attending this module received a letter of invitation to join the project. This letter had some explanatory detail about the method and may have prompted some questions of their provider, thus creating behavior change by the providers. The second is that the staff of the module, who were informed in detail about the project prior to its inception, may have been affected by their knowledge of the intervention and may have altered their usual approach to the care of hypertensive patients. This would account for the observed reduction in visits for hypertension care in the module "A" population, and the absence of such a reduction in the module "C" cohort. The existence of an intervention effect is also reinforced by the smaller blood pressure reduction in the module "A" control cohort.

Since the inequality between the baseline and post-intervention visits was the variable under consideration, a possible explanation was not that there was a reduction in the post-intervention visits but rather that there was an unusually high baseline visit rate in module "A". However, this was not seen in visits for module "C" patients. It could be explained by the fact that module "A" had an " urgent care" culture, similar to the walk-in approach.

Visit availability might explain the difference in visits, since the other four access factors have remained unaltered during the study period. There were some difficulties with appointment availability around that time. However, it is of interest that this reduction in appointment numbers did not alter the visits of similar patients attending module "C", located in the same clinic, which was also equally affected by the appointment reductions.

Number and types of appointments are not under the control of the professional staff. These factors are decided at a level of management outside the module. The schedules are then built on an electronic template and patients are assigned spaces in the appointment stream as they call in. This process had been altered about 2 years previously, when, in order to improve access to providers, the appointment process was fundamentally altered. Waiting lists were shortened and a system of " Customer Directed Access" was instituted. As part of this process, the computerized appointment system was made to identify the " First Free" time slot available. This meant that many appointments were made on a first-come, first-served basis, without continuity of care.

The effect was that patient were to a large extent randomly allocated to providers throughout the system, as in a walk-in clinic. In spite of this increased random access, the module "C" cohort did not exhibit the same pattern of visit behavior as did the others. This fact again leads to the conclusion that one or more specific factors was at work within module "A", its providers or patients, which was different to that seen outside.

The gender distribution of the professional staff did not alter in the study period, and there were female staff members available in both modules to patients throughout the study. Although this acceptability variable is known to influence patient behavior, it did not change in the period under discussion and is therefore unlikely to be the explanation for the observed differences in visit behaviors.

Module "A" did change its task assignment prior to the study, in that it moved from being an urgent care clinic to a family practice-based one. This potentially could have influenced access, however it was completed more than two years previously and should not be a factor now.

These differences in patient behavior prompted further examination of the module "A" patients to investigate the possibility that a selection bias had occurred in this group.

Patient age did not differ significantly between any of the groups. Therefore age distribution did not create the differences in numbers and types of visits.

There was a difference in the distribution of the sexes, with more females in the control cohort in Module "A" compared to either the intervention cohort or to the module "C" cohort. There were also some differences in the distribution between the intervention and second cohorts, but these were not significant.

It is well-known that females use medical services to a greater extent [96] than do males, although this difference reduces with age. However, if this were the cause of the visit difference, then little or no decrease in visits by the patients in the module "A" control cohort would be expected, which was not the case. There was also no evidence of increased visits in the module "C" control cohort. Males were found to have a moderately higher mean number of visits for hypertension, while females had slightly higher use for non-hypertension diagnoses, an expected finding. This pattern did not alter substantially from one time period to the other. Therefore gender did not play a role in the difference in visits.

The patients in the first control cohort were randomly selected from hypertensive patients who had already received a letter of invitation to participate in the education program. There is the possibility that this foreknowledge affected their behavior since they all were aware that the study was about to begin. It is also possible that these " decliners" may have differed in other significant ways from those agreeing to participate. This is supported by the differences in visit utilization between the two control cohorts, where none should exist, as well as the gender difference, again where none should exist.

Because of the impossibility of the author caring for all the patients in the study, it was necessary to inform the providers in module "A" prospectively about the nature of the study, and that the study was in process. This also may have influenced provider behavior in reducing the frequency of visits for hypertension for all patients in module "A".

Another possible explanation is that the selection process, which should have resulted in three age/sex matched cohorts, somehow failed to do so for the second cohort. However, an identical process was followed for each group. A selection bias could certainly be one explanation for the observed differences between the module "A" control cohort and the module "C" control cohort. An intervention effect could also be the explanation.

Given the differences in structure and behavior between the control cohorts from module "A" compared to module "C", it is reasonable to make the primary comparison between the intervention and module "C" control cohorts for the reasons discussed above.

Costs of Care.

It is generally a difficult task to accurately measure true costs of care.[97] For the purpose of this study of hypertensive patients, it is office visit numbers which varied during the course of this study and which therefore are the major factor in reduced resource use. Medication costs remained constant, or at least the same or less than they would have been in a pure office care population. Reductions in costs may occur due to reduced iatrogenic factors, as well as the avoidance of " white-coat" hypertension and its attendant investigation and prescription costs. There are also fewer actual facility costs since patients did not need to be seen at the same frequency as before. The improved degree of blood pressure control results in a potentially lower requirement for medications and attendant downstream iatrogenic problems. Others have confirmed this cost reduction[98] for payers, although patient costs have not been measured to see if this was cost shifting as opposed to cost savings.

All these beneficial cost impacts are predicated on the avoidance of reductions in quality of care. They would likely be negated by a single avoidable episode of major complication due to poor hypertension control in the intervention cohort. This can only be

ascertained in a longer and larger follow-up study. It is well-known that good control of blood pressure results in reduced complications, but it remains to be seen if greater use of a supported self-care model can also achieve this in the long term.

A cost formula is heavily dependent on its fiscal milieu. Usual Canadian practice is different to that of the KPNW system, however, from the perspective of the paying agency, it is still true to say that reduced office visits will reduce costs, particularly for very common conditions in primary care practice, due to their very large numbers. Again, cost savings as opposed to cost shifting is a key element.

The Intervention did not adversely affect the degree of hypertension control for the Intervention Cohort.

The purpose of this study was to determine if the educational intervention would result in a reduction in visits and associated costs, and to explore the relationships between the questionnaire variables and visit reductions. It was also important to ascertain if the intervention adversely affected patient care, with resulting increased blood pressure levels.

It is relatively simple to reduce health care resource consumption. Reductions can be achieved by simply decreasing access by using the classic access variables in a negative way. This supply-side management approach has been the traditional approach to expenditure control, and has been widely used by paying agencies in a number of ways, both to save costs and to shift them. However, there is always a risk with this approach that quality of care will decrease along with access reduction. An important finding of the RAND Health Insurance Study, and a fundamental problem in supply-side management, is that a reduction in access affects the deserving as much as the undeserving[99] ( if such exist in health care). In contrast, this study relates to demand-side management. As such, there is

no direct comparison with studies such as the RAND insurance study. However, the same concerns apply to issues of quality of care regardless of the management approach taken.

There was a reduction in mean systolic blood pressures measured in the office environment, in all three patient cohorts, although the reduction was significant in the intervention cohort only. There was reduction in mean diastolic pressures, also measured in the office, among members of the intervention and third cohorts, with a slight increase among the members of the second cohort. However, in no case was there any evidence of significant adverse effect on blood pressures, and in most cases there was improvement. No participant sustained any known complication of the disease, or its treatment, although the time frame of the study was short.

Home blood pressure measurements were significantly lower than office measurements for the same patient cohort, and were also lower in comparison to both of the other control cohorts. This was expected, and agrees with the extensive literature surrounding the " white-coat hypertension" phenomenon.

A clear majority of patients were controlled at or below the levels suggested by the Joint National Committee (JNC 5), being a systolic pressure of 140 mm, and a diastolic pressure of 90 mm. Mean pressures were similarly adequate.

In sum, appropriately organized home blood pressure monitoring , with adequate support and follow-up, did not increase risk to the patient, and has considerable potential to reduce over-treatment and other iatrogenic factors impacting quality of care.

Effects of the Questionnaire Variables on Visit Reductions.

Duke Social Support

No significant effect on visits was identified by this variable. This is because most participants did not perceive problems with their degree of social support. This degree of homogeneity is likely related to the small number of participants and their group characteristics. A high degree of social support, as evidenced here, has been shown to improve ability to cope with illness.[100] It may be that patients who do well in a supported self-care program can be selected on this basis.

Correlation of Variables with Difference in Office Visits.

Short Form-36.

The SF-36 variables were regressed against greater inequality of office visits ( i.e. baseline visits minus post-intervention visits) for total visits and also for hypertension-related and non-hypertension related visits. These variables demonstrated several significant correlations. The SF-36 instrument was re-coded so that higher scores in each variable reflect increased health. Some values of visit difference were negative ( more visits after the intervention than before).

The variables that correlated with a greater visit inequality were Emotional Role, Bodily Pain, and Perceived General health. Thus, a larger difference between baseline and post-intervention visits ( i.e. fewer post-intervention visits or more baseline visits ) occurred in those patients who felt that their emotional health was better able to sustain their daily duties and activities, and whose general health was good. A greater difference also related to decreased bodily pain. These results are as expected. Patients with higher emotional and general health scores are likely to participate in their own health care to a larger extent.

Perceived Physical Function was negatively correlated across all visit types. The ability to carry out one's daily activities is dependent on one's physical functions. Yet these patients who had no other co-morbidities and who had good general health, had a greater difference between baseline and post-intervention visits as their sense of good physical functioning declined. This variable was derived from a series of questions which attempted to ascertain the degree to which patients had any limitation in their physical activities such as running, golfing, climbing stairs. As in all the other variables, the score was higher with better perceived health.

Persons who believed that their health was better may have had a smaller inequality of visits because they may not have had many visits in either time periods (i.e. low baseline). Those perceiving their health as being poor had a greater inequality of visits between the two time periods. Since patients in these cohorts were selected as having no co-morbidities, and hypertension is not associated with feeling unwell or with limitation on activities, it may be possible that they do not perceive themselves as being ill. In a disease state where patients are encouraged to exercise and to lead a normal healthy life as much as possible, patients may have decreased their need for office visits if they felt that their hypertension was controlled better than before, i.e. that their overall health was in fact better than had been the case before the disease was treated. It is also possible that their increased knowledge of their disease improved their comfort level generally, resulting in reduced need for office visits.

Patients have problems, not diagnoses. Thus, when a patient has a symptom, e.g. headache, it is of concern to them whether this headache is a serious blood pressure problem, or merely a routine headache problem. By teaching them correct blood pressure measurement techniques, the intervention may have permitted patients to better decide that they did not have a serious blood pressure problem. Therefore they may have reduced their

visits because the intervention made it possible for them to know that their symptoms were not due to hypertension or its complications. Given that these patients were chosen because they had no co-morbidities, there is no other reason for them to believe that they suffered from any additional serious health problem. Thus, they may have decided to avoid a visit, which would be reflected in the data.

Another possible explanation for this result may be that patients may decrease their visits when they feel unwell if they believe that they are not in any immediate health risk situation. This is consistent with compliance observations in the primary care of chronic disease, where it has been shown that patient perceptions of the immediate health risk is a major motivator in compliance.[101] Patients must learn to cope with chronic disease and may respond to it by attempting to reduce its effect on their daily lives. One potential result is that they attempt to reduce their dependency on the health system in an effort to prove to themselves that they are still in control. Participants in the intervention cohort may have been more likely to exhibit this tendency, as demonstrated by their willingness to undertake more of their own care. This is an example of attempted reduction in cognitive dissonance.

Patients may also exhibit avoidance behavior, in that they may prefer to remain in ignorance of their health status rather than know its true state. This avoids a negative feeling of poor health, especially when no adverse symptoms exist, as in the case of hypertension. This avoidance behavior may relate to the fact that most health care is a noxious experience for patients, who have to force themselves to participate in it. Intervention participants are unlikely to exhibit this attitude, since they have undertaken to increase their blood pressure measurements.

There is also the possibility that reductions in office visits may make sense when viewed from the patients perspective,[102] in a utility-maximizing approach. For example, some patients may use chronic illness to achieve social outcomes which would not

otherwise be possible. This is an example of the use of the legitimizing power of the medical system in their social lives. In this cohort of patients, however, it is less likely that a reduction in visits would be related to such an attitude. Their desire to participate in more of their own care is inconsistent with a desire to maintain a persisting illness role.

A physician mediation effect[103] might also explain the finding. This effect postulates that poor health in patients has a negative effect on providers, and that this effect is somehow transmitted to the patients, either consciously or unconsciously by providers, resulting in an improved work experience for providers. Health plans are not the only health care entities which use the principles of adverse selection to improve their own professional lot.

There was a global reduction in visits of all types in module "A". With the small number of salaried providers in one module where morale was known to be problematic, it is conceivable that a physician mediation factor was in operation.

Statistically, since the correlation equation is bi-directional, the negative value for the correlation relates to the direction of the effect, and not to its strength. Additionally, the correlation coefficient measures the degree of linear association, and non-linear associations will not appear to be strongly correlated. The measure is one of association, and not causation. The small size of the sample may have had an affect. The correlation between an increase in the visit difference between baseline and post-intervention periods and physical functioning could be an artefactual one, related to the small sample size. A larger study population would clarify this issue.

Learning Styles.

There were six variables in this questionnaire, and moderately strong correlations with Risk Aversion, and Information Avoidance variables were identified in the regression analysis as being correlated with an increase in the inequality of visits between baseline and post-intervention periods.

Risk Aversion is defined as the patient's desire to reduce the chance of adverse health consequences of a disease. The risk-averse person might want to have greater reassurance about their medical condition or disease and consequently demand more office visits, not fewer. It was emphasized during the intervention that patients could obtain a more accurate and complete picture of their hypertension status by frequent home measurements than could professionals using infrequent and stressful office visits. Therefore in this instance it may be that patients obtained the needed reassurance by increased knowledge and skills derived from the intervention, which outweighed the need for additional reassurance provided by the office visit. Thus, these patients may not have felt unsupported and may have felt that they were reducing potential adverse health outcomes of their disease by participating in the project. Information Avoidance is centered on the notion that " Doctor knows best" and that patients scoring high on this variable do not want additional information about their disease.

One would normally expect a group of patients who are assuming more responsibility for their own care, and who specifically chose to participate in an educational program with the avowed aim of increasing their knowledge, to correlate in a strongly negative manner on this variable. However, it is possible that patients may have interpreted this portion of the questionnaire as pertaining to the need for information after the intervention was completed. If so, it is reasonable for patients to feel that they have complete information already, and that no further improvement in their level of information

is required. It should be noted that the questionnaires were completed at the end of the classes in order to improve the rate of return. The two classes were the beginning events in the intervention process. The timing may have caused this effect.

A further explanation lies in the concept that these patients may have participated because they felt that they would obtain additional direct professional contact, which met their needs for additional information.

It is also possible that patients have other information sources available to them which makes it unnecessary to obtain further information from professionals. Today many patients access electronic information sources, and this information may be perceived to be of higher quality than that received from their usual primary provider.

It is also possible that the small number of participants influenced the accuracy of the statistical analysis.

Correlation with Difference in Visits made for Hypertension Care.

SF-36.

Moderately strong correlations in visit differences for hypertension care were found for the variables Physical Functioning, Role related to Physical Function, and Emotional Role. The two former variables correlated in an moderately negative manner, while Emotional Role correlated positively. Fewer visits occurred if the individual had lower physical function and if they perceived that their physical functioning reduced their ability to carry out their daily activities.

This result is similar to that found in the regression analysis of total visits. The same postulated mechanisms related to reductions in total visits may well apply in the case of hypertension visit reductions. It may be possible that improved self-care and the ability

to measure one's own blood pressure relieves one of the need for hypertension-related office visits when one is feeling unwell.

One of the objectives of the educational program was to convey to the participants that hypertension, although classified as a disease, was not something that necessarily required a professional's attention for routine care. In one sense, the message was that hypertension per se, when adequately controlled, could be considered as a disease precursor, not requiring additional concern or initiation of additional office visits by the patient.

Emotional satisfaction was positively correlated as in the total visit category.This is an expected finding. It is reasonable to suppose that persons who feel emotionally healthy and in control can assume greater responsibility for their own blood pressure control and monitoring.

Learning Styles.

Again, Risk Aversion and Information Avoidance variables correlated moderately strongly with a greater difference in visits between the baseline and post-intervention visits. The same comments apply as are outlined in the section regarding total office visits.

Correlation with Visits made for Non-hypertension Care.

SF-36.

Moderately strong correlations were found between a greater visit difference and the variables Physical Functioning, and General Health. Once again, the Physical Functioning variable correlated negatively while the General Health variable correlated positively.

It is reasonable to expect that persons who perceive their health to be good might well require fewer office visits for unrelated conditions. Good health is not specific to a single condition, but rather is a more global function. Patient who perceive themselves as having decreased physical functioning may exhibit avoidance behavior, decreased compliance, and be subjected to the other influences previously discussed in the relationships with total visits. Many of those influences are more, rather than less, likely to be global in nature and to affect overall attitudes and beliefs, rather than any disease-specific behavior.

Learning Styles.

The sole variable which correlated with greater difference in non-hypertension office care was that of Barriers to Care. This variable is related to such items as failure to remember to take medication, having difficulty in keeping to the medication schedule and similar matters.

There is no reason that this is especially important in care of other medical conditions and not in the care of hypertension, and yet there was no similar correlation for the hypertension-related office visits. It may illustrate the difference between the medication consumption pattern in a chronic disease as opposed to an acute disease. A need for long-term medication consumption may create a very different behavior pattern than does acute illness.

Willingness to admit to compliance errors may also mean that the individuals had increased confidence that this was a recoverable error, unlikely to do prolonged harm. It is also possible that increased self-confidence after the program was an additional factor. This finding may also be due to the small numbers of subjects in the intervention group.

Selection of Patients for Supported Self-Care.

In the design of this study, it was not thought that this system of supported self-care would result in a panacea that would suit all patients. However it is quite possible to ask patients with index conditions such as hypertension to complete the questionnaires outlined in this study, or others which may in future prove to be superior, with a view to identifying those individuals who would do well in such a treatment milieu. This would then be followed by the appropriate educational interventions and entry into a supported care system.

There were several associations with a greater reduction in office visits in this study. These associations included:

1. A general sense of good emotional health.
2. High levels of social support.
3. A sense of reduced physical function which impacted on daily role.
4. A willingness to accept professional advice at face value.
5. A desire to reduce the likelihood of health problems arising from the disease.
6. Self-imposed barriers to care.

Weaknesses of the Study.

Unquestionably, the most significant weakness is related to the sample size. The inability to recruit more subjects within the time available made it impossible to conduct the original randomized design rather than the prospective cohort design which was used. Even with this design, the small numbers may influence some of the correlations which have been previously discussed.

Final Comments.

In spite of the small sample size, the results suggest that the concept of demand management in primary care is one that deserves greater attention. Studies such as this, but with larger numbers and greater design rigor, will make it possible to identify those individuals and groups who can successfully assume a much greater degree of their own disease management than has been previously the case.

The patients who participated in this study did achieve a significant reduction in office visits and associated costs with no decrease in the quality of their care. Certain variables were identified as being associated with the educational intervention.

It is possible to design care systems for common primary care conditions which can incorporate these principles.

In an increasingly constrained health care system, such qualities are no small matter.

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Appendix 1.

Review of Learning Theory.

Review of Learning Theory.

Review of Classical Education Theories and Potential Applications in Patient Education.

In order to develop the educational initiatives in the Supported Self-Care environment, the general theories of development which underlie education are reviewed. Then, their potential application to the field of adult learning is considered. Finally adult learning theory as it is currently applied to patients and patient education strategies is reviewed, with potential application to its use in Supported Self-care.

Early Educational Theory.

Early societal attitudes to learning were based on the prevailing belief that the young functioned as miniature adults. A gradual change in this view began in the late sixteenth century when social attitudes slowly began to believe that children become the adults that they do because of their upbringing and education.

The environmentalist position, that the young child's mind is a "blank slate," was first enunciated by Locke,[104] who is considered the father of environmentalism . He believed that all men are born equal and if some become better than others, this is due to circumstances. Thus, the environment formed the mind. Acting through "associations", " repetition" and "imitation," and especially through "reward and punishment," the mind would be ideally formed. He believed that this process should be begun very early in life, and should be carried out firmly. Only good behavior should be rewarded. Praise and disapproval were his major recommendations for interventions. He felt that the slavish following of rules was not useful; rather exposure to desired models as well as repeated practice was more likely to succeed. He also suggested that humans, and especially children have their own cognitive capacities which are not likely to be alterable.

Locke's principles of association, repetition, modeling and inducements ( positive and negative) are still widely used by modern educators, many of whom view education as a socialization process.[105]

The other major position is that of the developmentalists as exemplified by Rousseau. This position holds that humans develop according to Nature's plan at different stages and capacities. Nature carries out the development of individuals if given the chance to do so. Further, most adults are over-influenced by their environment which for the most part seems to have a stultifying influence on their individuality and creativity.[106]

Rousseau felt that it was important to consider what the person was capable of learning at various stages in life, and not simply what ought to be taught. In childhood, he postulated four main stages. These are infancy, childhood, late childhood, and adolescence. In each stage, the nature of learning is different and learning therefore must conform to the underlying capacities of the stage in which the learning is occurring. As a general principle, Nature would do all that was necessary for the appropriate education of individuals if left alone to do so. Adult interference would only create difficulties and frustrations.

The principles espoused by Rousseau were that development unfolds according to an inner timetable which is independent of outside influences. It has identifiable stages in a series, and education must fit correctly with these stages.

Gessell believed that educational development was a product of both genes and environment, and that the development process was genetically directed in a process he called maturation.[107] He postulated a fixed sequence of development but recognized that different individuals progressed at different rates. Gessell felt that the entire personality was governed by the intrinsically regulated maturation process. The term "Reciprocal Interweaving" describes the integration of introverted and extroverted tendencies. This balancing process is incomplete, causing a "functional asymmetry" in the adult personality.

This asymmetry is not necessarily a bad thing. Being genetically controlled, the degree of human uniqueness and the accompanying individual maturation and development process was also recognized by Gessell. He used Rousseau's principles as the background for extensive research.

Modern theorists feel that he did not recognize the degree to which the environment structures learning and behavior.[108]

The influence of the environment also extends to the human interactions which surround us. Ethnological theories of development emphasize the adverse effects on young children who are separated from their parents. Bowlby felt that humans have attachment behaviors which serve to promote attachment to caregivers and which consequently provide a base of security from which the individual can explore.[109] Deprivation in this stage is postulated to result in later learning problems, as well as other possible psychological difficulties. The concept that we cannot change children's behavior in any way we wish bolsters the developmental approach.

Bowlby's beliefs were further developed by Ainsworth who postulated that the experiences of parents as small children was fundamental to the way in which these same parents interacted with their own offspring.[110] He also believed that their avoidance behaviors became self-perpetuating by being learned by their own children. Some have argued that Ainsworth has ignored the issue of innate temperament, while the proponents of the theory feel that parental responsiveness is the major factor. Perhaps both are correct. There is an effect on adults in any event.

Ainsworth has also speculated on the existence of an ongoing need for attachment figures for adults. These are defined as others on whom one can count for help and support as needed. Social support and professional support in disease states impacts on the supported self-care model.

Rousseau's views were used as a basis for a practical approach to education by Montessori, an Italian physician who first was interested in mental retardation. She believed that human learning was different at distinct times in life. A central idea in her theory is that of the Sensitive Period ( similar to the Critical Period). In her theory,[111] the role of the teacher was to identify the period in which the pupil was learning, and then to provide the appropriate support for that period. The teacher is therefore a follower, not a leader. She believed that the usual reward/punishment approach of traditional education merely created submission. As a developmentalist she emphasized the need for appropriate environmental support, and demonstrated how developmental theories could be successfully translated into practice.

One of the most important psychological theorists was Piaget whose theory of learning consists of four periods, each with several stages. He postulated that learning occurred at individual rates, but in an invariant sequence. He did not believe that this was genetically determined; i.e. was not a "maturationist." In his view, learning has three components; Assimilation ( taking in), Accommodation ( changing our structures to fit new facts), and Organization ( theory-building and creation of coherent systems.).

Piaget also felt that children built these new structures themselves, without adult teaching or influences; i.e. he was not a maturationist or a learning theorist. Thus there was an active construction process by the individual child.

Piaget's four periods of development are Sensorimotor, Preoperational thought, Concrete operations, and Formal operations. These correspond approximately to the age groups of 0-2 years, 2-7 years, 7-11 years and 11+ years. There is also a correspondence between scientific and social reasoning, which requires the ability to simultaneously consider and coordinate two perspectives.[112] Autonomy is defined as the ability to change the rules of the game, and may also be an important factor connected with compliance with

therapy. Some believe that compliance is an artificial construct and that deviations from the ideal as defined by professionals are rational from the patients perspective.[113]

The Stage Concept in Piaget's view is invariant, with some children progressing at different rates and also some failing to reach the highest stage. Therefore adult learning methods may need to be modified for those in lower stages, and be more concretely based. The qualitatively distinct thought processes within the different stages has implications for the design of learning experiences for adults. Ideally, identification of the stage for each learner should result in optimal learning.

Alternatively, learning could be designed for the lower stage, with the idea that those in the higher stages would be included automatically. The concept of stage integration also touches on this. By this is meant that earlier stages are not replaced, but rather integrated into learning.[114] The ability to use "Concrete Operation" is therefore retained by a learner who is also capable of "Formal Operations."

Piaget's belief that his stages were universal also would mean that general learning strategies are applicable across cultures, without much modification. He felt that the environment was important, but only in part. The environment creates situations which contradict experience, and thus generates conflict. This is an example of the philosophical idea of a Dialectical Theory. This holds that change occurs when our existing ideas meet with counter-evidence which motivates us to develop new concepts. The social environment can also stimulate this process. This has significant implications for the design of learning experiences for adults. Learning modules must provide interesting and meaningful experiences to be successful.

Recent attempts to validate Piaget's work have been successful to some extent, especially for the later stages. Also, the generally observed " five to seven" transition in childhood[115] may fit with the onset of the Concrete Operation stage ( III). Of greater

significance to this thesis is the finding that many adults do not regularly demonstrate the highest stages of formal operations. Adults only employ formal operations some of the time.[116]

Piaget felt that the use of formal operations might be in distinct categories; for example in areas of special interest or ability. Some authors suggest that formal operations are employed by adults in areas of vital interest to them. This has implications for supported self care.[117]

Environmental theories of Development.

These theories follow in the tradition of Locke with his ideas of "associations." The father of modern environmental learning theory is Pavlov,[118] who happened to notice that his dogs would salivate, not just when food touched their mouths, but also on hearing approaching footsteps of the person who usually brought the food. He noted that the reflex had become conditioned to a new stimulus. His classical experiment where the presentation of food was accompanied by the shining of a light found that, after a time, salivation would occur just with the light alone.

The presentation of food is an unconditioned stimulus, and the light a conditioned stimulus. Salivation to food is an unconditioned reflex, and to light a conditioned reflex. The order of occurrence is important; the conditioned stimulus must occur before the unconditioned one. The conditioned stimulus does not work indefinitely, and will eventually stop. Pavlov found that some spontaneous recovery could occur, but still there would be eventual disappearance of the reflex. The stimulus can generalize ( bells of different tones produce the same result) but eventually the subject only responds to the tone most closely resembling the original stimulus. Second-order conditioning occurs where a second stimulus

is paired with the first, and then the first is gradually removed, leaving the response to the second stimulus.

J.B. Watson applied Pavlovian theory to problems of development in the young. He strongly believed[119] in behaviorism, as well as environmentalism. One of his practical applications was a form of behavior modification known as systematic desensitization. However, it is not clear that behavior modification can explain the acquisition of the broad range of complex activities in humans.

These concepts were further developed by B.F. Skinner, who was also a strict behaviorist and environmentalist in the Watson mode. However his model was not based on Pavlov's respondents, but rather on a class of behavior which he termed "operant."[120] In this type, the subject moves freely in the environment, and "operates" on it. Some of the subject's behaviors have favorable consequences, and it is the rate change that is significant. In Pavlov's work, prior stimuli always elicit responses. For Skinner, they make responses more likely.

Skinner postulates that it is these subsequent positive factors that control the antecedent behavior. Thus, behavior is determined by its consequences . These consequences are called " reinforcers," and may be primary or conditioned types. Immediacy of reinforcement is important. Behaviors are subject to extinction and may also show spontaneous recovery. They may be generalized to other related situations. Skinner also postulates that operant behavior is not acquired in an " all or nothing" fashion, but rather in an incremental way as in a method of approximations. This is known as shaping. Individual behaviors can then develop into long, complex behavior chains.[121]

Skinner also examined temporal factors in behavior modification. In general, he found fixed-ratio reward schedules are more successful than fixed-interval ones. Similarly, variable-ratio schedules are better than variable-interval types. The ratio refers to the

number of times the behavior occurs before the reward, while the interval refers to the elapsed time.

One of Skinners important findings was that intermittently rewarded behavior was much more difficult to extinguish than the continuously rewarded type. He also found that negative reinforcement was effective, although this is to be distinguished from punishment which he did not favor.[122] Instead, extinction of undesired behaviors combined with reinforcement of those desired is recommended.

Thoughts, feelings and drives were not important in Skinnerian theory. Although they existed, they were not thought to produce any external behaviors, but rather these were completely controlled by the external environment. He extended his theory to include the influence of evolution on living creatures as a fundamental example of the power of the environment to effect change.

Programmed instruction is a practical approach to behavior modification[123] using operant techniques. It is widely used, both in the print and electronic media. Several of Skinner's discoveries are embodied in this technique. These include:

Progress in small steps ( shaping).

Active learning ( operant).

Immediate feedback ( prompt positive reinforcement).

These are suited to adult learning situations as well.

Bandura has further commented on the ability of the environment to influence learning. His Social Learning Theory argues that much more rapid learning occurs by observing the behavior of others. His theory of Observational Learning has four components. These include Attentional processes, Retention processes, Motor Reproduction processes, and Reinforcement and Motivation processes.[124]

The first component states that we cannot observe a model if we do not pay attention to it. Secondly, we need some way to remember the model, since we frequently do not imitate it immediately. Thirdly, appropriate motor skills may be required to perform a task. Finally, there are a number of reinforcements, some of which are vicarious ( i.e. rewards of others are motivators).

Self-regulation in Bandura's view is initially achieved by observation of high-performing models, and by peers. Association with high-achieving peers and observation of models who are rewarded for high performance may also influence adult learning.

He defines "Self-efficacy" as a more general assessment of ability in a particular field, and it is felt to be a powerful motivator, if the perception is accurate. Sources of information in this respect may be "Actual Performance" (we have previously succeeded in the task), "Vicarious Experience" (others successes are felt to be within our scope ), "Verbal Persuasion" (such as pep talks), and "Physiological Cues" (such as fatigue or tension). As many as possible of these factors were incorporated at various points into the educational intervention in this study.

Erik H. Erikson has contributed substantially to the psychoanalytic theories of development by defining eight stages of life.[125] His theory has evolved from the Freudian developmental concept, and has expanded it by the addition of three new stages.

We will not delineate the stages here, except to say that early difficulties may result in lack of confidence, which could impact on the willingness of the adult to accept responsibility for their own care, as well as on their ability to accomplish it. The failure to correctly progress through the various stages in time with the societal demands placed on individuals, may mean that some experience a lag or delay in attaining the appropriate ability required for self care, and may not ever achieve this. This agrees with earlier work

where it was noted that some adults rarely, if ever, achieve the stage of "Formal Operations."[126]

Like Erikson, Carl Jung also was interested in the development of the adult. His particular interest was the exploration of the unconscious and its symbols, and especially dreams. He developed a theory of personality[127] that encompassed various systems of personality functioning.

Personality structure includes the ego which is equivalent to one's consciousness; the persona which is the image of ego as presented to others; the shadow which is those feelings and traits that we cannot admit to ourselves; the anima/animus which is the opposite gender side of our personalities; the personal unconscious which contains all the thoughts and feelings that we have repressed in our lives; the collective unconscious which is inherited and shared by all humans, and contains archetypes; and the self which is the most important archetype and which constantly searches for inner wholeness and meaning, and a balance among the different aspects of our personality.

Jung's theory of development postulates that the personality develops differently in the first and the second halves of life, with a " mid-life crisis" between. At first the personality is outwardly directed with the task of establishing careers, families, etc. Extroverts do better here. Around the age of forty, the external goals may lose their meaning and the individual turns inward and examines the meaning of their life. Men and women express their opposite sexual sides in that men become more concerned with relationships, while women become more independent. The second half of life is increasingly concerned with the reality of death and the search for integrity. The impending change in population demographics will mean that more patients will be in the second half of life. The increasing independence of women will have marked implications for an

supported self-care model, not only because women are still the major care providers, but also that there will be more of them.

The final exemplar is that of Maslow, whose hierarchy of needs[128] is well known. The hierarchy progresses from basic physiological needs, through safety, belonging, affection, self-esteem and self-actualization needs.

His humanistic approach to developmental theory is an overall concept of progression towards an internal state of conviction and peace. The ultimate expression of this theory is that adults achieve a condition of mind that is inherently independent, and capable of learning of itself. This " highest order need" of self-actualization was the focus of Maslow's work.

While agreeing that the environment is important, he believed that the individual's guiding force was our inner nature. Thus, social practices should be evaluated in terms of how well they encourage inner growth and maturation. This would include an independence model, which has as its purpose exactly that. The increased acceptance of responsibility for personal care fits with this approach.

Overall, there seems to be a consensus that adults are the creations of their inner growth potential and their environmental influences. The extent to which a single individual progresses through the various stages described by most theorists, as well as the extent to which environmental influences change behavior, is quite variable. Not all adults are fully mature, capable individuals. It will be important to be able to classify individuals potential for successful independent care according to their state of development.

Adult Learning.

No unified theory of adult learning exists. However, many of the current approaches emanate from Dewey.[129] He considered education to be a lifelong process based

on life experience. In his view, adults based their learning on the scientific method with hypothesis generation, and collection of supporting evidence. Thus, the teacher is a participative guide and facilitator, choosing experiences for the learner; using the environment in support; and considering the learners needs and past experiences. The teacher becomes a learner by understanding the needs of the individual; learners participate actively in the learning process, and teacher and learner are jointly responsible for the process.

The strongest influence in recent years has been that of Knowles.[130]

His approach comprises four basic assumptions:

1. Adults move from dependency towards increasing self-directness, at individual rates and stages.

2. Adults acquire increasing experiences, which are more meaningful to them. Thus, experiential learning is the primary instructional approach to adults.

3. Adults are open to learning when they realize a " need to know." The teacher helps learners discover this need.

4. Adults desire increased competence in the " here and now." Thus, they are performance-centered.

Implications of Knowle's approach include the following:

A learning environment which should make learners feel at ease.

A planning system which includes the learners viewpoints.

A learning needs diagnosis made by the learner.

A mutual responsibility by both teacher and learner for the success of the program.

Self-evaluation should be the norm. Experiential techniques are primary, and are problem oriented.

There are more detailed recommendations in Knowle's work. These include the notion that the physical and psychological environments must be supportive of the learner; the adult self-directed approach means that needs are defined by the learner; the process of learning is a joint planning exercise between teacher and learner, and they are consequently mutually responsible for it. The approach is problem-oriented. Self-evaluation is a major component. The adult's experiences are a useful resource to the teacher, and the practical application of the material should be emphasized.

Not all agree with this approach. Cross [131] feels that the differences between adult and child learning are artificial and difficult to maintain. Brookfield questions many underlying assumptions of adult learning.[132] In particular, he does not agree that self-directness in adults is sufficiently common as to be capable of sustaining the general theory. He also does not feel that the " problem orientation" quality of adults is valid. He feels that many adults do not simply respond to immediately practical educational issues, but rather will often inquire into new knowledge and skills that are not immediately relevant to their circumstances. For example, there is a wide variety of courses and other educational endeavors which adults pursue, and which they enjoy for their own sake.

Thus, he believes that there is not, and likely will not be, a general theory of adult learning because the differences among individuals and their preferred learning styles is larger than any generalizable principles yet developed.

Rogers emphasized the self-actualization of the learner[133] as the goal of education. His learning characteristics include perceived relevance of the subject, a change in self-perception, non-threatening of the learners, facilitation by doing, active participation of the learners, and involvement of the whole person. These lend themselves to the educational intervention for this study.

Adult teaching and learning is a very complex subject. An appreciation of the complexity is best demonstrated by an examination of the work of Brundage and McKerracher,[134] who integrated much of the existing research into a summary set of 36 principles. Brookfield also points out the frequent differences between theory and practice and addresses the theory-practice disjunction.[135]

Implications for the supported self-care model.

The implications and uncertainties of adult education theory for a supported self care model are important. It may be that different educational strategies will be required for different groups who may have different learning styles and needs. However, it does seem that the experientially based model is quite suitable for the supported self-care model, in that participants generally do have a practical reason for participation. They certainly have recent experience of a health problem as well as a need to know. They are more likely performance-centered, desiring increased competence.

They may experience in some disease conditions the disharmony referred to by Mezirow.[136] In others, the disease is a more abstract entity. Hypertension is a good example of the latter. Here, the patient generally has no way to distinguish that they are at risk; they feel quite normal. This apparent normality in some disease states is a fundamental problem in health promotion and illness prevention, and is common in primary care.

Does Learning Theory Apply to Ill People?

There is concern that learning theory, and especially adult learning theory, may not apply in the case of illness. There is a substantial body of research, mostly in the field of nursing, which examines patient education issues. However, the majority of this work arose from hospital-based programs dealing with patients who had serious illnesses, such as

various cancers, myocardial infarction, renal dialysis programs and the like. The main exception has been in diabetes care, but even here the main impetus was to improve the knowledge of the insulin user, where mistakes have serious potential consequences. There is a difference in the attitude to personal responsibility of the patient in the case of serious illness versus minor illness. There is a greater passivity in the former, and less demand for participative decision-making and information. It may be that in the types of health conditions which are the purview of a supported self-care approach, the attitudes of patients are more closely aligned to the attitudes of the healthy, rather than the diseased.
This would support the inclusion of more information and participation in the design of educational interventions, and this is the approach which was used in this study.

Appendix 2.

1. Initial Patient Recruitment Letter.
2. Telephone Script for Follow-up Call.
3. Final Patient Recruitment Letter.
4. Class Schedule Letter.
5. Memo to Providers re Project Start.
6. Patient Consent Form.

Patient Education Project—Essential Hypertension.

Dear Member,

I am one of the family physicians in Module "A" at the Rockwood Medical Office, and I am writing to invite you to join in an education program about high blood pressure. We are looking for new ways to improve how we care for our patients.
We hope this project will help to do that.

This program is an attempt to improve the ways that we providers can help our patients to better understand diseases that they may have, and to improve ways that providers and patients can work together. As a person who has high blood pressure, you could be of great assistance with this project.

If you agree, you would attend two short meetings lasting 1 or 1 ½ hours, either in the early evening or in the morning, where you and other people with high blood pressure would receive information about this disease. The educational sessions and the course materials are free. The times and dates are on the enclosed card.

You would also be taught the correct way to measure your own blood pressure. You could use your own measuring device or those in a drug or grocery store at very low cost. You would write down your own blood pressure measurements on a form at different times during the coming 10 months and mail the form to the office. A copy of the measurements would be given to you, and the original would become part of your medical record. You would be notified about your providers conclusions and any required changes to your treatment. Both blood pressure control and required office visits will be scientifically evaluated to see if the program works.

These measurements should improve your provider's knowledge of your blood pressure. You would NOT have additional tests or examinations, or take experimental medications or other special treatments outside of your normal routine. You would remain under the care of your regular provider at all times, without restriction.

Even if you decide not to join the program, your decision will have no other effect on your care. You can also decided to leave the program at any time, and again this will not affect your care in any way.

If you would like to participate, please return the enclosed card, indicating which two sessions you prefer. If you would like further information, please call me, Dr John Mackel, at 503-669-3900, extension 3326; Nurse Kathy Partlow at 503-669-3900, or you may call your personal provider in the module if you prefer.

Thank you for reading this letter. We hope that you will join the program.

Yours sincerely,

John V. Mackel, MD, FCFP.
Program Coordinator.

Kathy Partlow RN.
Program Coordinator.

Patient Education Project—Essential Hypertension.

Telephone script for follow-up call after initial patient recruitment letter.

" Hello, my name is XXXXX from Kaiser Permanente and I am calling to follow up on a recent letter that we sent to you about an education project for people with high blood pressure".

"Can I answer any questions that you may have about the project?"

" You can certainly discuss the project with your regular provider if you are uncertain".

" Would you like to receive further information about this project ?"

" Thank you for your time. You will receive further information shortly".

OR

"Thank you for your time, sorry to have bothered you".

OR

" Thank you for thinking it over. Please let us know if you decide to participate".

This call will, where appropriate, be followed by a final letter outlining the project and requesting consent for participation.

Patient education project—essential hypertension.

Dear Member,

Thank you for your continued interest in our education project for patients with high blood pressure.

We will be offering this program on the following dates and times:

( Schedule follows).

In order for us to know if this program benefits you, we will be using regular research methods that are designed to help us know if the program really makes a difference, or not to people's health.

We do this by a process called randomization, where some patients will continue their usual care plan, and other will receive the new program, with the allocation being at random, i.e. by chance. It is important to remember that neither of the two care methods are known to be superior, and either should be equally acceptable to you before you finally agree to participate in the project.

Blood pressure readings and number of required office visits will be examined, to see if the program makes any difference to your health.

We are not aware of any negative effects that participating in the program might cause. However, if you have any questions about this study, your rights and responsibilities as a study participant, or about potential or actual negative effects on you, you may contact

Mary Durham, Ph.D., Vice-President for Research, Kaiser Foundation Hospitals, at 503-335-2400.

Yours truly,

J.V. Mackel, MD, FCFP.

Program Coordinator.

Patient education project—essential hypertension.

July 27, 1997.

Dear Member,

Thank you for your continued interest in our education project for patients with high blood pressure.

To start, we will be offering this program on the following dates and times:

First program.

Session one. Monday, August 11th, at 6:30pm.

Session two Monday, August 18th, at 6:30pm.

Second program.

Session one. Wednesday August 13th, at 10:00 am.

Session two. Wednesday August 20th, at 10:00 am.

In order for us to know if this program benefits you, we will be using regular research methods that are designed to help us know if the program really makes a difference to people's health.

Again, we emphasize that there are no experimental drugs or tests in the program.

Blood pressure readings and number of required office visits will be examined to see if the program makes any difference to your health. We will also ask you to complete a short questionnaire to help us assess your state of health, and one to tell us the way that you best learn things. These are, of course, completely confidential.

We have enclosed a state of health questionnaire and a standard consent form in this mailing. Please bring them with you to the first session. You may bring a friend with you if you wish.

We are not aware of any negative effects that participating in the program might cause. However, if you have any questions about this study, your rights and responsibilities as a participant, or about potential or actual negative effects on you, you may contact us, Dr. John Mackel and Kathy Partlow RN, at 669-3900, or Mary Durham, Ph.D., Vice-President for Research, Kaiser Foundation Hospitals, at 503-335-2400.

Yours truly,

J.V. Mackel, MD, FCFP.
Program Coordinator.

K. Partlow, RN.
Program Coordinator.

Memo

To: Health Care Team Members,

Module "A".

From: J.V. Mackel, MD.

Date: April 7, 1998

Re: Patient education program for hypertension..

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Dear Colleagues,

You may recall that I had mentioned the idea of a patient education program for our patients with high blood pressure.

This is now about to happen.

We have just sent out letters to members identified as being hypertensive without co-morbidities, , inviting them to participate in this new program.

The idea is to help educate them about their disease, and to support them in measuring their own blood pressure. They will enter these measurements on a card and return it to you. You will then be able to decide if any further changes to their therapy are required, and to take appropriate action.

You will remain in full control of their therapy at all times.

In this way we hope to reduce the need for office visits while enhancing the number and quality of the pressure measurements. This allows us to reduce costs, thus enhancing our competitiveness, while also improving the quality of our work.

Patients have been invited to call you if they wish to know more about the program, and so this memo is to give you some detail, before any calls come in.

There will be two evening education sessions, one being a presentation about hypertension, and the other a lab to practice measuring blood pressure. Patients will be given various written materials and a record card as well.

I would be pleased to field the calls if you would prefer.

Thank you for your support in this project.

PATIENT CONSENT FORM.

PATIENT EDUCATION PROJECT—HIGH BLOOD PRESSURE.

This project is to see if we can improve control of high blood pressure in a cost-effective way by using regular educational methods similar to those used in treating diabetics.

In diabetes programs, the patient is educated about the disease and carries out treatment, with " back-up" from the professional as needed. This project is to see if this method works for high blood pressure, resulting in improved control of blood pressure and reduced need for office visits. Both these factors will be scientifically evaluated to see if the program works.

If I agree to participate, I will attend two teaching sessions designed to improve my knowledge of my condition, and increase my skills in measuring my own blood pressure. The sessions will last about one to one and one half hours. The two educational sessions and materials are free.

I will measure my blood pressure from time to time, write down the result, and mail these measurements to my regular provider, who will decide if my treatment is working well. I can either buy my own blood pressure monitor or go to a local drug or grocery store where this service is offered at very low cost. I will be notified promptly about my providers conclusions, and also about required changes in my treatment ( if any). The measurements that I make will be placed in my medical record.

I understand that this should improve my provider's knowledge of my blood pressure and how it varies, which will help decisions about my treatment. Also, I know that my own provider will continue to manage my therapy, and that there are no unusual or experimental treatments or drugs or tests associated with the educational program.

I will continue to have the ability to see my chosen provider at any time, without restriction in any way.

I have read this form carefully and I understand the purpose, procedures, benefits, risks, discomforts, and precautions of the project, and my rights during my participation.

I voluntarily consent to participate in this project. I have been offered the opportunity to ask questions and understand that future questions that I may have about the project or about my rights as a participant will be answered. I understand that I may decide to discontinue the program at any time, and that this will have no other effect on my care.

I have received a copy of this consent form.

| | |
|---|---|
| --- | --- |
| Date. | Signature of Participant. |
| --- | --- |
| Participant health record # | Printed Participant's Name |

If you have any questions about this research, your rights and responsibility as a research subject, or about research-related injuries, you may contact Mary Durham, Ph.D., Director of the Kaiser Permanente Center for Health Research, Kaiser Foundation Hospitals, 503-335-2400.

Appendix 3.

1. Class Outline for Instructors.
2. Patient Education Handout.
3. Sample Blood Pressure Record Sheet.

PATIENT EDUCATION PROGRAM - HYPERTENSION.

CLASS OUTLINE

SESSION 1.

Cognitive Portion:

1. The purpose of blood pressure. Why there are two numbers.

2. General concept of biologic " normality". Pressures " out of range" ( high or low).

3. What happens to us when the pressure is too high, i.e. why should it be treated, and the benefits of treatment.

4. Effects of other diseases and habits , i.e. diabetes, lipid disorders and smoking.

5. How do we treat high blood pressure?

   Non-drug therapy.

   Drug Therapy.

6. How do we know that the treatment works as it should? The expanded role of the patient in measuring pressures.

Affective Portion:

1. How does the disease affect us emotionally? Modified grief reactions. Impact of family and friends.

2. Impact on family and friends. Facilitating/denying/ etc.

3. Past experiences with the effects of high blood pressure.

4. Long term drug use—how do we feel about it?

Question and answer period/ Discussion.

SESSION 2.

Psychomotor portion:

1. Demonstration of correct pressure measuring, with various devices. Some things that can reduce the accuracy of measurement, pitfalls and problems.

2. Discussion of various devices and their relative utility.

3. Hands-on lab with instructors. Using the form to enter your data.

Question and answer period/ Discussion.

Patient education project.

High blood pressure.

Course materials.



Rev 07 22 97.

TABLE OF CONTENTS.

Has this condition had an effect on my family or friends?

What is my past experience with high blood pressure and its effects?

How do I feel about long-term medical treatment?

Question and answer period.

SESSION 2.

Demonstration of correct pressure measurement. Types of devices.

Things that can reduce accuracy, pitfalls and problems.

Discussion of the various types of measurement devices.

Hands-on lab with instructors—how to do it.

Recording your results and communicating them to your provider.

Question and answer period.

## WHY DO WE NEED TO HAVE OUR BLOOD UNDER PRESSURE?

Blood is a complex mixture of water, chemicals and cells. Its basic function is to serve as the transportation system for the body, carrying nutrients of various kinds to every single cell in our body, and carrying away the waste products of our metabolism.
This is just like roads and freeways serve as the transportation system in our cities, where cars and trucks transport people and goods around.

Energy is needed to make the system work. There has to be a way of making the blood move around so that it gets to the places that need it. The energy source for the blood system is the heart, which acts to pump the blood around the body.

The heart is just a bag of muscle with some one-way valves. When the heart muscle contracts, it squeezes a jet of blood one-way under pressure along the arteries, just like cars moving in a one-way street. The force of the contraction creates pressure in the arteries and there is a peak ( contraction) pressure, followed by a lower
( relaxation) pressure

With each heart contraction, another jet of blood pushes on the one before, and so the blood moves along the one-way system of arteries, which get smaller and smaller as they progress, until they become very tiny tubes, called capillaries. The walls of capillaries are so thin that the nutrients in the blood can soak through the wall and reach the cells, and the cell wastes can also soak through in the opposite direction into the blood stream. Finally, the blood with the wastes is collected in tiny veins, which are also one-way, and are carried to the organs that clean and refresh it. It is re-circulated again by the muscular

contractions of the heart. This process is never-ending during our lives, and our lives depend on it.

## HOW IS THE PRESSURE CONTROLLED?

The walls of arteries are made of muscle tissue which can relax and open wider, or contract and become more narrow. If they narrow, then the pressure inside the artery has to rise, ( just like putting your thumb on the end of a garden hose).

The width of the arteries is controlled by a complicated system of nerves and chemical messengers which act constantly to hold the blood pressure in the normal range for all our activities, both physical and emotional.

## WHAT IS " NORMAL" BLOOD PESSURE ?

Because people are not exact copies of each other ( except for identical twins), our bodies and their component parts vary from person to person. This variation can be measured and the results fall in a range, from low to high, small to large.

Healthy people have a range of normal values for the various parts and functions of their bodies. Some examples of this are height, weight, body temperature, and blood pressure. Various blood tests are also like this. Doctors decide on what is normal by measuring thousands of healthy people and recording the results.

When the measurements fall outside the normal range, this is usually considered as a disease.

Blood pressure is also measured in this way and there is a normal range of blood pressure which doctors use to decide if a person needs to be treated or not.

Some families and races seem to be at risk for high blood pressure, and some do not, depending on their genetic makeup. We know very little about this. Our environment also has a considerable effect on us and can contribute to our chances of developing high blood pressure.

Environment factors include mental stress, too much salt intake, excess food, too much alcohol, high cholesterol, and smoking.

It seems likely that both genetic and environment factors are needed to make the disease process begin.

## WHY DOES BLOOD PRESSURE HAVE TWO NUMBERS?

Recall that the heart muscle contracts and sends a jet of blood into the arteries, and then relaxes and rests for a short time until the next muscle contraction. This means that the jet of blood has a peak pressure followed by a lower pressure while the heart rests. The peak (or contraction) pressure is called " systolic pressure" by doctors, and the lower (relaxation) pressure is called "diastolic pressure".

Both of these pressures have normal ranges and both are important for good health. Doctors used to believe that the lower pressure was the important one, but we now know that both should be normal for optimal health.

## WHAT HAPPENS IF THE BLOOD PRESSURE IS TOO HIGH?

Recall that the pressure in the arteries depends on the amount of contraction by the muscles in the artery walls. If the system which controls the artery wall contraction gets out of order, then the resulting blood pressure will be too high.

Several things result from this higher pressure.

1. The heart has to increase the force that pumps out each jet of blood, so it has to increase the strength of the muscles in its wall. Each beat requires more effort by the muscle. When we consider that the average heart beats about 80 times per minute, 60 minutes per hour, 24 hours per day, this is an average of 115,200 times per day. Extra work of even 10% adds up to a large increase.

2. The increased pressure pushes against the artery walls, and the muscles in the walls have to do more work to hold the pressure back. This causes them to wear out faster than normal, and they harden. Some arteries seem to be less able than others to stand the increased pressure, especially the arteries that feed the heart muscle, the brain, the kidneys, the retinal tissues in the eye, and the legs.

It is critical to understand that high blood pressure damages arteries slowly .

Unless you measure the pressure, you cannot tell that it is happening to you until a complication occurs.

## WHAT ARE THE COMPLICATIONS OF HIGH BLOOD PRESSURE?

If the arteries wear out too much, the artery wall thickens and ultimately can be completely blocked. When this happens, the tissues which depend on that artery for nutrients will be injured, or even die.

In the heart muscle, this blockage results in a " heart attack" , which can be immediately fatal, or which can be non-fatal with damaged areas of heart muscle.

In the brain, the result is either a fully completed stroke where brain cells die, or a temporary stroke where the cells are injured, but recover. This temporary stroke is called a " TIA".

In the kidney, the result is eventual kidney failure, requiring transplantation.

In the eye, blindness of varying degrees is the result.

In the legs, gangrene can occur and amputation can be required.

## ARE THERE OTHER FACTORS WHICH CAN MAKE THINGS WORSE?

There are other factors which can make the situation worse. These are things that are known to speed up the damage process in the artery walls.

One of these cannot be helped; this is our family history. This is our genetics at work.

All the others can be helped. These are the non-genetic things that we can modify by ourselves, or with the help of others. They include the following:

Smoking.

Overweight and other poor eating habits. ( includes salt and fats).

High Cholesterol.

Low exercise habits.

Emotional stress.

Diabetes, both insulin and non-insulin types.

Thickened heart muscle due to the increased blood pressure.

All of these factors have been proven to increase the risk of artery damage, and all have been proven to reduce the risk of blood pressure complications if they are improved or

eliminated. Some of these can be improved by the patient alone, others require professional guidance along with the patients' cooperation.

The bottom line is that the patient is the one who carries out the treatment.

Even when drugs are used, it is still the patient who has to take them correctly.

HOW IS HIGH BLOOD PRESSURE TREATED?

Before any disease can be treated, first you must know that it is there!

All the participants in this program already know that they have high blood pressure. But what about relatives? Recall that there is a genetic component to the problem. It would be useful for your relatives, especially close ones like parents and older children, to be tested for blood pressure problems. You will be able to do this for them if you have your own machine to measure blood pressure. We recommend that you have your own machine.

There are two ways to treat high blood pressure.

1. Lifestyle modifications.
2. Medications.

Lifestyle modifications. You are the only one who can do these!

Known effective methods are:

Stop smoking.

Reduce weight.

Reduced sodium intake.

Reduced alcohol consumption to 2-3 measured drinks per day.

Avoid certain drugs and health foods.

Reduce stress.

Increase calcium and potassium intake in the diet.

Possible other methods not yet proven:

Acupuncture.

High fiber diet ( known to help other diseases).

Fish oils.

Drug therapy.

Drugs are known to improve the outcomes of treatment. They work best when combined with the lifestyle modifications outlined above.

The major types of drugs used are:

1. Diuretics ( Water pills).
2. Beta-blockers.

3. ACE inhibitors.

4. Calcium Channel blockers.

5. Other less-used drugs.

It is desirable to have good blood pressure control using as few drugs as possible. This is why lifestyle modification is so important, because it helps to decrease the use of drugs.

The best treatment is a combination of lifestyle and medications.

DRUGS IN THE TREATMENT OF HIGH BLOOD PRESSURE.

General remarks about medications.

1. You will notice that every drug has two names. These are its chemical name and its trade name. This can be confusing because the doctor may call it by its trade name ( for example Zestril) and the label will say lisinopril. These are the same drug. The reason for this is that the drug makers like to have a short, easily used name so that it is easy to prescribe. Pharmacists like the longer name because they can use any brand in stock. Also, the longer name is more exact.

If you think you have the wrong drug, ASK BEFORE USE !! You can call the pharmacy at any time, or you can call your prescriber.

2. All drugs have side-effects. Some of these are common, while others only occur in a few people. The pharmacy will provide you with information about the known side-effects. If you think you are experiencing a side-effect, call the pharmacy or your provider.

Diuretics.

Also known as water pills, these act on the kidney to make it pass more urine. This reduces the amount of liquid in the blood stream and therefore reduces the pressure.

People sometimes don't realize that these drugs act by removing sodium from the blood stream. If you eat a lot of sodium, then the drug is much less effective, because you are replacing the sodium that is removed with just as much fresh sodium.
There is a list of hi-sodium foods in this information package. Learn them and Avoid them!
The commonly used drugs called NSAIDS ( Advil, Motrin etc.) also retain sodium.

Diuretics also remove potassium from the body. Recall that potassium helps to keep the blood pressure normal, so we don't want it too low. We need to replace the lost potassium by eating hi- potassium foods or taking potassium pills. These foods are also listed later. You can really help you doctor control your blood pressure by reducing your sodium and increasing your potassium if you use these drugs.

Two common drugs are Hydrodiuril ( also called HCTZ), and Lasix ( also called furosemide). There are some others, and most have the same actions and side-effects.

Beta-blockers.

These drugs act by reducing the effects of the cardiac stimulant called adrenaline, which increases heart rate and blood pressure. They also seem to protect us from getting repeat heart attacks, and may even help prevent first heart attacks, especially if we need to have major surgery. They are often used in combination with diuretics.

The really important thing to know is that they can make people who have asthma much worse, and should never be taken by asthmatics, even those people who have not had any asthma problems recently.

People with heart failure can also have problems with this type of drug.

Two common examples are atenolol, and propanolol. You will notice that these drug names often end in the letters " ol".

ACE inhibitors.

This type of drug acts in a very different way to those mentioned earlier.

Recall that the muscle contraction in the walls of arteries is increased in people with high blood pressure. One of the chemicals that produces this effect is called "ACE".

So the medication counteracts or " inhibits" it. Hence the name ACE inhibitor.

The original drug was called captopril, and all of the names of this type of medication usually end in the letters " pril". There are a lot of these drugs. Lisinopril seems to work well and is commonly used. It is also called Zestril. These medications also help people with heart failure. They seem to work especially well in combination with diuretics.

There are some side-effects with this medication. It can increase the potassium level in the blood, and for this reason the level needs to be monitored. It also can reduce the blood flow through the kidneys, and there is a blood test to detect this.

It can produce an irritating dry cough.

Calcium Channel Blockers.

There are three different chemical types of this drug. They all act by blocking the fine pores in the cell wall through which calcium flows. Although they are called blockers, they have nothing to do with the beta-blockers, which are entirely different drugs.

The types of most use in treating high blood pressure are amlodipine and nifedipine. There are several different ones, all ending in the letters " dipine".

Other types are diltiazem and verapamil. These are used in patients which high blood pressure and rapid heart rates. Verapamil in combination with beta-blockers does not work as well. They have a tendency to make the legs swell with fluid.

Also, there has been some recent concern that some of these drugs can increase the risk of heart attack.

Other drug types.

Although these are the bulk of modern drug types for the treatment of high blood pressure, there are others which have also been used. Your provider will give you details about your treatment, and possible side-effects, if required.

You can also call the pharmacy for advice.

High Blood Pressure and our minds.

So far we have discussed the effects of high blood pressure on our bodies.
But the disease also affects our feelings and the feelings of those around us.
Many people, when they find out that they have the disease " high blood pressure", react emotionally to the idea of having a long-term chronic medical condition. This is to be expected. We are facing a new and different future, one where the possibility of health problems has suddenly become much more real. We are asked to take medication every day, sometimes with the possibility of unpleasant side effects. We are asked to make big changes in the way we eat and drink, in our exercise habits, and sometimes in our work. There are implications for our health insurance and finances.
We will need to purchase medications, and have tests done at intervals.
It is a very different world!

Grief Reactions.

When people lose something important to them, the subconscious goes through a grief process. Usually we think of this when someone dies, but it actually happens with <u>any</u> important loss, including loss of good health. This grief reaction often happens when people are newly diagnosed with diseases, such as high blood pressure.

There are stages in grief reactions.

Often, the first stage is indifference; " it isn't really happening to me".
This may be followed by anger; " why me?".

After this comes depression; " it doesn't matter what I do, the result will be bad".

The final stage is acceptance " I know that I have this condition, and I will do my best to achieve good health as much as I can".

It can happen that people get stuck in one of the in-between stages.
This is important because they can fail to carry out the necessary treatment because of their abnormal state of mind.

For example, a person in the " indifferent" stage may not bother to take medications. Someone in the "depression" stage may say that medication won't make any difference anyway. A person in the " anger" stage will be constantly exposed to higher adrenaline levels due to the anger, and this makes the pressure higher.

If you think that you are in one of the " in-between" stages, discuss this with your provider. There is help for this.

Effects ON family and friends.

When we develop high blood pressure, there are a number of changes that we may need to make. Many of these changes affect those around us, at home and at work. Other people may have to modify their own lifestyles in order to help us. The family diet may have to change radically. Smokers may have to quit, or at least smoke elsewhere. Weight reduction will have an impact on eating habits for the family, as will cholesterol problems. Getting used to a low salt diet can be a problem for other family members.

It is really true that the whole family has to treat the blood pressure. If it does not, then needed lifestyle modifications may not happen. This decreases the effectiveness of treatment.

Effects OF Family and Friends.

Other important people in our lives can be either a great help, or a great hindrance. Our family can help with dietary changes, or they can say that they will not change their diet to suit a single individual; " it's YOUR problem!". The other extreme is when family members treat the person as if they were seriously ill, doing everything for them and not allowing them any participation in family events " in case it might over-excite them". This makes the person an invalid.

Co-workers can refuse to co-operate in efforts to quit smoking, and can even try to make the person fail in their quit program.

Many jobs are very stressful, and there are people in our work environment that can make the stress worse.

It is important to discuss these things with the people around you, so that the best possible outcome can be reached.

Our Past Experiences.

Our past experiences with illness, especially with high blood pressure and its complications, have a major impact on us.

We may know someone who has had the disease, and has had major problems with it. Or, we may have seen cases of complications of blood pressure, such as strokes or heart attacks. Some families have very high rates of these events, and sometimes people feel hopeless and doomed to have the same experience in the future.

Summary.

Our ideas about our condition, our feelings about it, and our fears, are very important. We need to think about them, and about how these things will help or hinder our blood pressure control. The effect of treatment on our functions is important. Some of these effects are unpleasant. Also, our expectations of the treatment, and of our providers, is important. We need to be clear and realistic about our expectations and communicate them to our care-givers.

## IS IT WORTH IT TO TREAT HIGH BLOOD PRESSURE?

After reading all of the previous material, some people might say that it doesn't seem worth it to undergo all this complicated life change.

NOTHING COULD BE FURTHER FROM THE TRUTH.

Years of medical research have shown conclusively that reducing the blood pressure to the normal range really helps. The complication rate is greatly reduced, and people lead longer and healthier lives.

Recall that your doctor can only help with part of the program.

You and your family do the rest.

This program is really about putting YOU in charge of your health, and really, that is where the control should be.

With you, your family and your doctor working together, the best possible outcomes can be reached.

## HOW CAN I HELP MYSELF AND MY DOCTOR TO DO THIS?

There are two main ways to do this.

The first one is to work on the lifestyle changes that are so important in the treatment program. We have already listed these earlier in this booklet.

The second one is to measure your own blood pressure and send the results to your doctor.

In the past, patients would go to the doctor perhaps every three months, and have their pressure measured. Treatment would be given, depending on that measurement. We now know that many people have higher-than-normal blood pressure especially at the doctor's office. This means that their treatment is based on a measurement that is artificially high. So the result can be overtreatment. When we consider that treatment has a major impact both in terms of side-effects and in dollars, any overtreatment is important.

What we doctors really need to know is the person's USUAL blood pressure. The only practical way to get this information is if the person themselves does the measurement and lets the doctor know the result.

There are many advantages to this method.

First, we don't have the artificially high measurement in the doctors office, so our readings are closer to our usual pressure.

Also, we can take many more readings than could be done at the office. The more readings we take, the better we know what is our usual pressure.

We can also tell when our pressure is better or worse, and get ideas about why this is so. This helps in preventing worse pressure.

Also, we can send the readings to the doctor instead of going there, which saves us time and money, and is also more accurate.

Are there any disadvantages? If our measurements are accurate, there are no disadvantages, except for people who prefer to see their provider in person instead of talking to them on the phone.

The accuracy of our measurements is very important.

Taking accurate blood pressure readings is the subject of the second part of this program.

TAKING YOUR OWN BLOOD PRESSURE.

Using an electronic device.

1. It is very important to choose the correct size of cuff. The correct sizes are in Table 2. Sometimes, electronic devices don't have any choice in size. You need to check this before you buy one.

2. The cuff should be correctly applied as shown in the demonstration. The patient should be sitting comfortably with the arm bare and well-supported. The upper arm should be at heart level as demonstrated in the classroom.

3. Talking, chewing gum or sitting with the legs crossed can increase the reading slightly.

4. Be sure to pump up the cuff to about 200mm or higher in order to fully close off the artery. You can test this by feeling your pulse disappear when the cuff is fully pumped up.

5. Activate the release valve so that the cuff pressure reduces slowly.

6. To avoid veins becoming congested, do not leave the cuff partly full of air. Be sure to completely empty it each time you take a measurement.

7. Measure the blood pressure in both arms. They may be different. Use the arm that reads higher for all your measurements.

8. We do not recommend devices that go on your fingertip.

Non-electronic devices.

You can purchase other measuring devices which work by using a stethoscope, either incorporated into the cuff or free-standing. These are much cheaper, and, once you know how to use them, are just as accurate. Doctors and nurses use this type of device in the office.

To use this type, you have to know how to listen to the sounds that the arteries make. This is not difficult to learn. It will be demonstrated in the class. The peak ( systolic) pressure is when the sounds first start to be heard, and the relaxation ( diastolic) pressure is when they disappear.
A diagram of the sounds ( called Korotkoff sounds after the man who first described them) is included in this information package.

Freddy's Pharmacies.

Many people use their local grocery store or pharmacy to check their pressure. The machines are accurate, and are checked several times per week. The advantage is that you do not have to purchase anything, or learn how to use the devices. The

disadvantage is that you have to go there, so you don't have the same opportunity to take many readings.

Recording your results.

Now that you know how to use the devices for measuring blood pressure, you need to write down the results and send them to your regular provider, or other professional who is responsible for advising you and ordering your medications.

You need to decide how often to record results, and also how to enter them on a chart. We have provided some blank charts for you, and we will demonstrate this part of the program in the class.

Basically, you need to enter two readings for each time you measure the pressure. These are the peak ( systolic) pressure, and the relaxation ( diastolic) pressure. It is more meaningful to your provider if you choose two different days and take several readings throughout the day, rather than one reading every day. This is because your pressure changes from wakening until sleep.

If your pressure is stable ( doesn't change much from day to day), you need fewer readings to keep track of your health.

Mail the record to:

High Blood pressure project.

Module "A".

Rockwood Medical Office,

19500 SE Stark Street,

Portland, OR 97233.

You will get a copy to keep, and the original will become part of your medical record.

DO YOU HAVE QUESTIONS ?—CAN'T REMEMBER WHAT TO DO?--

PROBLEMS?

Call us at 503-669-3900, Mon.-Fri. 8am to 5pm.

TELL THE OPERATOR THAT YOU ARE PART OF THE HIGH BLOOD PRESSURE EDUCATION PROJECT.

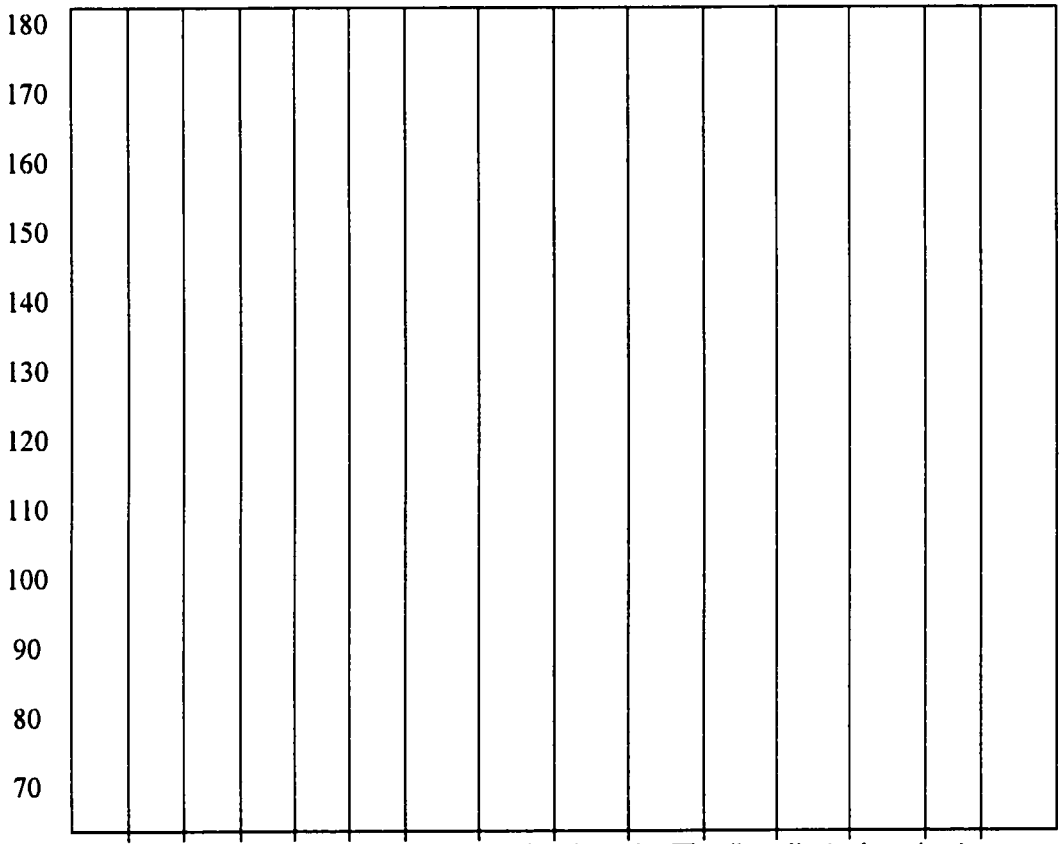
BLOOD PRESSURE RECORD.

NAME:..... RECORD #

.....

PCP NAME: ..... TIME PERIOD: .../...../..... TO

...../...../.....




Please record the systolic ( peak) pressure with a Λ mark. The diastolic ( relaxation ) pressure is recorded using a V mark in the same column.

Each column is used for one complete measurement only. There are 15 columns. If you need more, then use a second sheet.

Appendix 4.

1. First Patient Follow-up Letter.
2. Second Patient Follow-up Letter.
3. Feedback: Good Hypertension Control.
4. Feedback: Moderate Hypertension control.
5. Feedback: Poor Hypertension Control.
6. Sample Patient Newsletter.

HIGH BLOOD PRESSURE

EDUCATION PROJECT.

Oct. 06, 1997.

Hi everyone!

This is just short note in follow-up of the blood pressure class.

We hope everyone is well, and that the pressure recording is going as planned.

We haven't heard from anyone to the contrary!

Enclosed are some additional forms and a stamped envelope to return your present records.

As we mentioned, a copy of these records will be given to your regular provider, and another will be placed in your permanent record. Also, as promised, there is a copy of your original consent form for your own records.

Your provider will contact you if there is any sign that your control is in need of adjustment.

Please feel free to call either myself or Kathy if you have any questions or concerns, or if we can help in any way. Once again, my number is 503-669-5052.

Thank you again for helping us in this important project,

HIGH BLOOD PRESSURE

EDUCATION PROJECT.

Dec. 07, 1997.

Hi everyone!

This is just another short note in follow-up of the blood pressure class.

We hope everyone is well, and that the pressure recording is still going as planned.

We haven't heard from anyone to the contrary!

Enclosed are some additional forms and a stamped envelope to return your present records.

As we mentioned, a copy of these records was given to your regular provider, and another will be placed in your permanent record.

Your provider will have already contacted you regarding your pressure levels, either by letter or in person.

With this letter we have included a new feature—a newsletter with some recent information about cardiovascular disease—we hope you find it interesting and informative. We have also included answers to some of the questions that other group members have asked.

Please feel free to call either myself or Kathy if you have any questions or concerns, or if we can help in any way. Once again, my number is 503-669-5052.

Thank you again for helping us in this important project,

Have a wonderful holiday season !!

Yours sincerely,

J.V. Mackel, M.D.

K. Partlow, R.N.

HIGH BLOOD PRESSURE EDUCATION PROGRAM

Family Practice Module "A"

Rockwood Medical Office.

Dear Participant,

We have now had the opportunity to examine the blood pressure measurements that you sent to us recently.

Your blood pressure is doing very well. Keep practicing the lifestyle improvements that we discussed in the class.

Continue with your present treatment, and continue to measure and record your pressures twice weekly as before.

We will be in touch with you again, just like last time, with new record forms. We will also include any additional information about high blood pressure that we discover and which seems to be useful ( not just another add-on drug!!).
Be sure to send in the records just as you did last time. This is how we can tell if you are doing well.

Please be sure to call us at 503-669-5052 if you have any questions or concerns.

Yours in good health,

JV Mackel MD. K Partlow, RN.

HIGH BLOOD PRESSURE EDUCATION PROGRAM

Family Practice Module "A"

Rockwood Medical Office.

Dear Participant,

We have now had the opportunity to examine the blood pressure measurements that you sent to us recently.

Your blood pressure is doing reasonably well. The majority of the readings seem to be in the correct range. A few high readings do not mean that you need to change anything. Keep practicing the lifestyle improvements that we discussed in the class.

Continue with your present treatment, and continue to measure and record your pressures twice weekly as before.

We will be in touch with you again, just like last time, with new record forms. We will also include any additional information about high blood pressure that we discover which might be of interest to you.

Be sure to send in the records just as you did last time. This is how we can tell if you are doing well.

Please be sure to call us if your readings are continuing to increase, or if you are getting more of them in the higher range

Please be sure to call us at 503-669-5052 if you have any questions or concerns, or if you are not sure about your situation.

Yours in good health,

JV Mackel MD. K Partlow, RN.

HIGH BLOOD PRESSURE EDUCATION PROGRAM

Family Practice Module "A"

Rockwood Medical Office.

Dear Participant,

We have now had the opportunity to examine the blood pressure measurements that you sent to us recently.

Your blood pressure needs to be improved. Many of your readings are increased.

Your primary provider will be calling you to work out a new treatment plan for you. This might be medication changes, either increases or additions, or a period of further observation.

Keep practicing the lifestyle improvements that we discussed in the class.

Until you hear from your provider, continue with your present treatment, and continue to measure and record your pressures twice weekly as before.

This will be especially important after any alteration in your treatment, if this is what is decided between you and your provider.

We will be in touch with you again in a few weeks, just like last time, with new record forms. We will also include any additional information about high blood pressure that we discover and which might be of interest to you.

Be sure to send in the records just as you did last time. This is how we can tell if you are doing well.

Please be sure to call us at 503-669-5052 if you have any questions or concerns.

Yours in good health,

JV Mackel MD. K Partlow, RN.

# Blood Pressure Facts

December 7, 1997 Volume 1, Issue 1

**Lifestyle changes.**

**I have tried really hard to control my pressure by following the lifestyle recommended in the discussion group. But my readings are still higher than I would like.**

**At what point should I be concerned and start medication??**

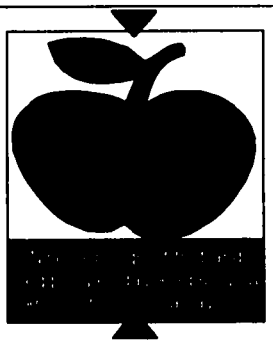
With moderately elevated readings, up to 160/100, you have some time to arrive at the decision. Remember that blood pressure control takes time. Call us if you are still concerned.

503-669-5052.

## Fats change artery linings!!

In a recent article in the Journal of the American Medical Association, a study reported on volunteers who ate a high-fat meal, with changes in their artery linings being measured using a special imaging technology.

Two important findings were that fats caused changes in the artery lining, and also that taking two common antioxidants immediately prior to the meal seemed to prevent this change from occurring. These antioxidants were Vitamin C ( 1000mg) and Vitamin E ( 800 units).



While this one study is not conclusive proof, it is an important piece of work because of the already known links of high-fat diets and artery disease, as well as the links between antioxidants and health.

It's probably best to avoid the need for additional antioxidants, and instead move towards more fruit and vegetables and lower the amount of fat in our diet.

Or maybe both!!

## Questions and Answers

**How often should I take my readings?**

If your blood pressure is stable ( i.e. not changing much), then twice weekly is ample.

Some people can even reduce this to once weekly after they have a good "track record".

It is really a question of knowing yourself and how your own unique vascular system behaves.

**Why bother with the lifestyle changes when I can just take the pills!!**

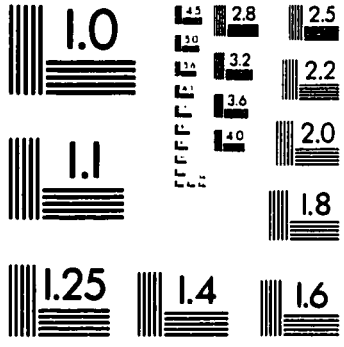
Recall that there are two treatments for high blood pressure—medication is one of them and diet/exercise is the other.

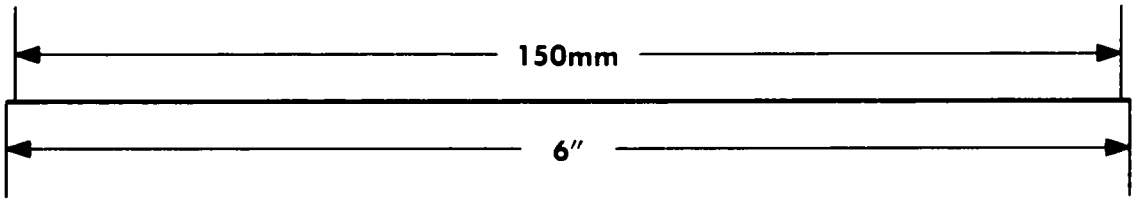
Think of your diet as chemicals ( from the food digestion) which help or hinder your blood pressure control. By using the right dietary chemicals, we are working with the medication chemical, and by using the wrong diet chemicals, we are working against our medication.

Also, the right diet ( i.e. high in fruits and vegetables) has a lot of other health benefits, for example, in helping to avoid cancer.

Remember to reduce as much salt as is possible.

TEST TARGET (QA-3)

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