Approaches to Prevention in an HMO Setting

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Group Health Cooperative of Puget Sound is consumer-run and was founded in 1945. At the present time this organization has approximately 250,000 members, 250 physicians, two hospitals, and nine out-patient facilities. A large bulk of the primary care is delivered by family physicians who constitute approximately 120 of the total physician group.

Our organization, since its inception late in 1945, has been struggling with the prevention issue. It is written into the preamble to the bylaws: "This Cooperative shall endeavor to develop some of the most outstanding hospitals and medical centers to be found anywhere, with special attention to preventive medicine."

One of the major organizational problems with prevention at the present time, and one which all family physicians can appreciate, is the massive and inappropriate overexpectation on the part of the general public as to what physicians at the level of office practice can deliver, on the one hand, and the massive and inappropriate "overkill" on the part of our physicians on the other. To meet this problem we at Group Health are attempting to take a rigorous, analytical, epidemiological, population based approach and gradually apply it to matters of prevention for all ages. This general approach is applicable to matters of primary or secondary prevention and has been written about widely.[1-3] These groups have emphasized the need, and indeed the necessity, for following specific criteria in selecting diseases to be screened for and screening tests to be applied. These criteria have been very succinctly condensed by Ann Browder.[4] They are:

1. The disease condition is important.
2. It has a recognizable presymptomatic stage.
3. There are reliable tests for this stage which are acceptable in terms of risk, cost, and degree of discomfort to the patient.
4. Treatment in the presymptomatic stage reduces morbidity and mortality more than treatment after symptoms appear.
5. Facilities are available for diagnosis and treatment of those persons positive on the screening tests.
6. The screening program has been chosen after consideration of other needs competing for the same resource.

Keeping the above criteria in mind, then, this paper presents an overview of our struggles with prevention here at Group Health, both in the pediatric and the adult realm, as it is occurring. In selected instances where possible, the rigorous specific approach alluded to above will be referenced. It will become obvious in other areas that the data do not permit scrutiny with this degree of rigor.

Pediatric Well Child Care

Since there has long been a structural framework for prevention for children, we have moved on from this base and are now attempting analyses

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of the component parts which make up well child care. For totality of overview, our overall Well Child Schedule, which appears in the back of each patient record as a flow chart, is included in Figure 1. Some specific component parts of the schedule which illustrate the approach taken are summarized below.

10-to-14 Day Visit

1.This is a stressful time for new parents.[5,6]* ** Our own telephone monitoring shows calls from parents of newborns peaking at this time.*

2. Hypothyroidism incidence is 1:6,000 live births. One wishes to start treatment by 30 days of age. Better separation of "low normal" T_4s from some true hypothyroid children occurs when screened at 10 to 14 days.[7,8] Treatment prior to three months leads to better outcome. A question remains as to whether treatment at one month is better still.[8]

3. Phenylketonuria (PKU) incidence is 1:14,000 live births. The ideal time to screen is at seven to ten days of age. An analysis of the British experience by Starfield and Holtzman shows essentially no false negatives if screening is done then. Screening as presently done here in the United States on Day 3 will miss 10 to 20 percent.[9]

These background data led to our policy of a 10-to-14 day visit to a nurse. Exact implementation varies from medical center to medical center. In some it is performed as a cluster visit of four to eight newborns to a family practice and a pediatric nurse together. In others the visits are handled on an individual basis by the nurse. However performed, the visit provides a weight check on the baby, monitoring for maternal stress on a clinical basis, a time for question answering, and a repeat PKU and T_4. Ultimately, if our system proves totally effective in "capturing" all newborns at Day 10 to Day 14, we may discontinue the initial PKU and T_4 done in the nursery. Such deletion would require a change in Washington State law as presently written.

Spacing of Physical Examinations

One consideration in the spacing of physical examinations (Figure 1) was the yield when these are looked at purely as a screening instrument for finding disease. The summary data presented below are taken from the work of Yankauer,[10,11] MacIntosh,[12] Anderson,[13] Grant,[14] Rogers and Reese,[15] and have been written up in more detail by our Pediatric Well Child Committee.

1. The prevalence of defects in children examined in the nursery is about 20 percent overall. Approximately four percent overall have a "significant" defect, roughly one percent each have congenital heart disease, central nervous system, genitourinary, or gastrointestinal anomalies. Fifty percent are found by the time the babies leave the nursery.

2. On examination at six weeks, 11 percent will have some defect, and about 1.4 percent of these will be significant. Eighty percent of the total found in the first year are discovered by then.

3. Overall in the first year of life, 11.4 percent will have some defect, 2 percent are significant, and 97 percent of the total are detected by one year. The parents are aware of approximately 50 percent of the defects, so these could generate an office visit.

4. After one year, the prevalence of adverse conditions is approximately 20 percent. The incidence of new conditions is five percent per year, and most adverse conditions (80 percent) are already known to the parent or child, so they potentially could generate a "sick visit." Of the defects, 75 to 80 percent are discovered by "simple" measurements at the visit, such as height, weight, blood pressure, and vision screening.

The above data lead us to conclude that payoff from examinations would be maximized if they were performed at birth, at 4 to 6 weeks, at 1 year, 5 years, and 12 to 14 years. Other considerations related to screening for other conditions, immunization, establishment and maintenance of physician-patient relationships, and public expectation led to our actual policy for frequency of these examinations as shown in Figure 1.

*Sumner G, Fritsch J: Postnatal parental concerns: The first six weeks of life. Health Education Department, Group Health Cooperative of Puget Sound, Seattle, 1975, unpublished monograph

**McGlocklin L: A study of a post partum series of four classes. Health Education Department, Group Health Cooperative of Puget Sound, Seattle, 1976, unpublished monograph

GROUP HEALTH COOPERATIVE OF PUGET SOUND

CHILD CARE SCHEDULE

DOCTOR

PATIENT'S NAME

PLAN | COV | REL | SEX | MO BIRTH | YR BIRTH | MO EFFECTIVE | YR EFFECTIVE | FILE CODE | CHG COV

MEDICAL HISTORY NO.

GROUP | CONTRACT HOLDER | ENROLL. NO.

ADDRESS | NO. SVCS | AMOUNT

Date											
Age	Birth	10-14 Days	6 Weeks	4-4½ Mo.	9 Mo.	15 Mo.	24 Mo.	3½ Yrs.	5 Yr.	8-9 Yr.	14-15 Yr.
Procedure											
Physical	☐		☐	☐	☐	☐	☐	☐	☐	☐	☐
Height-Weight	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Head Circum.	☐		☐	☐	☐	☐	☐				
Blood Pressure								☐	☐	☐	☐
Oral Polio (OPV)			☐	☐	☐		☐		☐		
DPT			☐	☐	☐		☐		☐		☐ Adult DT
MMR						☐					
TB-T					☐		☐		☐		☐
Hematocrit					☐				☐		☐
Sickle Cell	☐				☐						
Male & Female Urinalysis								☐	☐	☐	☐
Females Only Urine Culture								☐		☐	☐
Vision						OBSERVATIONAL SCREENING		☐			
Hearing	☐					OBSERVATIONAL SCREENING		☐			
Articulation								☐			
Development			DISCUSSED AT EACH VISIT								
Poisoning Info. & Ipeac					☐						
Safety – Auto & Other	☐		☐								
PKU	☐	☐									

☐ = BOX REPRESENTS VISIT WHEN PERFORMED

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Figure 1. Child Care Schedule of Group Health Cooperative of Puget Sound

The benefits to our membership and the organization as a whole of taking a well-organized approach to prevention seem self-evident, but data have been lacking. A recent quality of care evaluation of our Well Child Program as instituted in 1975, using a schedule slightly different from Figure 1, has shown, when comparing a random sample from 1975 to another from 1972 to 1974, during which time we had no overall approach agreed upon by the pediatric section as a whole, that the organized 1975 approach for the first two years of life was associated with:

1. improved immunization levels, and other process parameters,
2. a decrease in the average number of well child physical examinations in the first two years of life from 5.1 to 4.3, and
3. a decrease in "no show" appointments from 1.7 to 1.2.*

Automobile Safety

Fifteen thousand deaths per year in children less than 15 years of age are caused by accidents (accident deaths—40 percent automobile, 15 percent drowning, and 15 percent burns).[16] This is more than the leading six pediatric disorders combined.

Sherz has collected data showing morbidity and mortality of automobile accidents are less if children are in safety restraints. He also did a survey of the Madigan Army Medical Center in 1970 and found that of children 9 to 12 months old, only 38 percent were in restraints. He then instituted a controlled trial of a variety of ways of influencing people to use child safety restraints. The most successful method incorporated a talk to the mother on the second day of the child's life, a discussion by the visiting nurse at ten days of age, and emphasis by the physician at four weeks of age. This technique resulted in 96 percent use reported at 8 weeks, and 75 percent by 9 to 12 months.[17]

We have applied this technique at Group Health. We push child safety restraints hard in the nursery and at the six weeks visit. Approximately 90 percent of our children are reported to be in some type of restraint by the first physician visit. However, the very recent report by Reisinger and Williams suggests we still have much to learn in this area, as these authors showed that at most only 41 percent of persons given infant carriers in the nursery were observed to use them by two to four months later, and only one half of these used them properly.[18]

Well Adult Care

The Well Adult Evaluation Program had its genesis in December 1973, when the Preventive Care Task Force, a joint medical staff, management, and membership committee, was formed. The charge of this committee is well expressed in the early minutes, "A Health Maintenance Organization prides itself not only on treatment, but on prevention. Are we doing everything we could in regard to prevention?" After this initial kickoff, months of debate ensued as to the meaning of health, the meaning of disease, and definitions of differing kinds of prevention. In addition to the debate, an extensive literature review of programs and approaches undertaken elsewhere around the country was initiated.

At the end of this, it was determined that the most feasible way of proceeding was to take a *consensus* approach to the problem. Therefore, during the summer of 1974, those members of the medical staff providing primary care to adults were surveyed twice. From the results of this survey a body of procedures was selected, composed of those things which 85 percent of the medical staff *does* when presented with an adult for well person evaluation. It was from these surveys that the Well Adult Evaluation Schedule was derived (Figure 2).

Next, the schedule was discussed before the full medical staff in January 1975. As a result of this discussion, the schedule was endorsed as a reasonable set of guidelines for ongoing well adult evaluation.

In adopting the schedule the medical staff agreed that the guidelines:

1. are a *minimal* set which can be individually modified by physicians as indicated,

*Hsi AC, Thompson RS, Howell LJ, et al: Population based quality assessment of preventive services in the first two years of life. Group Health Cooperative of Puget Sound, Seattle, 1978, unpublished monograph

Figure 2. Well adult evaluation schedule

General health review by questionnaire* and physical examination:** Age 18, and then every four years starting at age 26, and every two years starting at age 50

Procedures and laboratory examinations: Age 18, and then every 2 years starting at age 26

Blood pressure	White blood count
Height	Urinalysis
Weight	Update: Immunizations
Anemia screen	Tuberculin testing

Chest x-ray: Age 18, and then every four years starting at age 26

Pap smear, breast examination, teaching self-examination: Age 18, and then yearly.

*We have developed a data base questionnaire which has been endorsed by the medical staff for use in conjunction with periodic health evaluations. It takes 25 to 30 minutes to complete and contains much information on life-style considerations and risk factors. Our ultimate hope is to evolve a standard data base questionnaire which is computerized.

**The precise content of an adult physical examination as performed at Group Health is *not* standardized but would generally include the measurements listed above plus examination of head, eyes, ears, nose, throat, neck, lungs, heart, abdomen, genitalia (pelvic examination in women) rectal examination in men and women, and a neurological examination.

2. will be changed as our own experience and the literature indicate,

3. are composed of relatively simple procedures many of which can be performed by nonphysicians (nurse practitioners or medex).

Thus, our Group Health schedule is a reasonably sparse set of recommendations arrived at by the consensus approach. It provides our adult members with a long desired set of guidelines for their use in that part of health maintenance performed by the medical sector, and it can be used by each practitioner to help cut down on unnecessary testing.

It is interesting to compare Group Health's consensus schedule with several other "ideal" schedules which have recently been prepared by various groups of experts.[19-21] These groups have all struggled just as we have to come up with their schedules, and the similarities to ours are more impressive than the differences.

Specifically:

1. All schedules call for definite preventive procedures at *specific ages* rather than a vague "check-up."

2. All indicate some rational periodicity rather than an "annual check-up."

3. All rely on both *scientific* proof and prudent interpretation of available evidence.

4. All include an emphasis on life-style considerations.

It is a long way from endorsement of a schedule to the weaving of it into the "warp and woof" of day-to-day practice here at Group Health. In essence, when implemented in such a manner, our Well Adult Schedule in combination with our pediatric program will constitute a version of the life-time health monitoring concept espoused by Breslow and Somers.[21]

We have had one trial implementation of the schedule using family nurse practitioners to the

maximum extent possible to perform the examinations. This experiment has been closely evaluated and potential implications are being considered.*

At the present stage of development, the medical staff is on record as endorsing an organized expeditious approach to prevention for members of all ages. Several of our facilities are pushing the adult schedule now in an organized way. A monitoring system has been set up to measure compliance by members and eventually the long-term efficacy. A Medical Staff Committee on Prevention (six members) has been formed to formally debate individual matters of primary and secondary prevention, and to develop position papers to serve as the basis for medical staff policy on matters of prevention for adults as well as children.

This has been an overview of the approach being implemented for well adult care here at the Cooperative. Below will follow some specific examples illustrating in varying degrees of detail the necessity for an organized approach.

The Physical Examination as a Screening Instrument

In 1977, Group Health performed 29,120 physical examinations (175/1,000 adult enrollees) on adult members at an inclusive cost of approximately $37 each for a total cost of $1.1 million. The validity of these examinations as a screening instrument remains to be proven. Other values "known" to practitioners, such as establishing or maintaining physician-patient relationships, are of great potential importance from a managerial as well as a humanistic view, but are also unproven.

The Chest Film as a Screening Instrument

Routine chest films were taken on the previously mentioned largely asymptomatic adults at the rate of 500/1,000 examinees, at an organizational cost of $312,000 (unit radiology cost $21.43). The chest film as a screening instrument in asymptomatic adults is highly questionable for tuberculosis, chronic obstructive pulmonary disease, heart disease, and lung cancer. The issue has recently been analyzed in detail by our Medical Staff Committee on Prevention. Our recommendation based on this analysis is that the chest film as a routine screening instrument in asymptomatic non–high-risk adults be deleted from the well adult schedule, thus, potentially saving the organization money and not compromising any member's health care.**

Multichannel Blood Tests (SMA-6, SMA-12, SMA-18)

In the interest of concise presentation this analysis does not rigorously follow Browder's six criteria mentioned in the introduction. What is attempted is an overview of salient points.

The first point to make is that all of the tests in these batteries use two standard deviations on either side of the mean as the "cutting point" for separating normal from abnormal results. This means that if you are entirely well you have a five-percent chance of having an "abnormal" result if one test is run. The mathematics of multiple tests are logarithmic as shown in the attached Figure 3, so with 12 tests the probability becomes 46 percent and with 20 tests, 66 percent, that one result will be "abnormal." Given these mathematics then, the number of false positive results climbs astronomically as more and more tests are added for low prevalence disease.

Experience with the use of these tests on a screening basis has borne out the mathematical expectations. For example, Kaiser (Oakland, California) reported a seven-year experience with an experimental and a control group of about 5,000 adults each. Experimentals received 3.5 multiphasic health check-ups, including multichannel blood testing, compared to 1.3 for controls in the seven-year period. They were unable to show that any of the multichannel blood tests contributed to longevity of those frequently screened as compared to controls, and had large numbers of false positive results to contend with.[22,23] Olson and others reported a similar experience with another controlled trial.[24]

Another specific example is the work of

*Thompson RS, Basden P, Howell LJ, et al: Evaluation of initial implementation of an organized adult health program at Group Health Cooperative of Puget Sound. Group Health Cooperative of Puget Sound, Seattle, 1978, unpublished monograph

**Johnson S, Rogers DA, Thompson RS: The chest film as a screening instrument in asymptomatic adults. Medical Staff Committee on Prevention, Group Health Cooperative of Puget Sound, Seattle, 1979

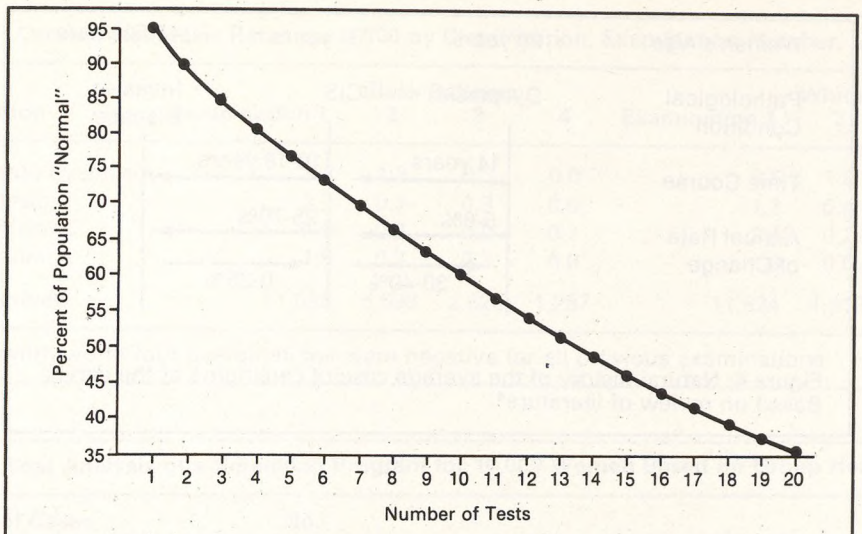

Figure 3. Mathematics of Multichannel Blood Tests (assuming Gaussian distribution of results and choosing 2 SD above or below the mean (ie, ± 2.5%) as "abnormal" in a totally well population)

Boonstra who analyzed 12,000 routine serum calcium determinations.[25] Six hundred twenty-seven of these fell outside the 95 percent confidence limits and were thus "abnormal." Seventeen of the 627 had disease which affects calcium metabolism. Seventeen out of 12,000 (0.14 percent) is a low yield for a screening test which necessitates the investigation of 610 false positives. The 17 persons with diseases of calcium metabolism were found to have conditions such as hyper or hypoparathyroidism, metastatic lung, or breast cancer. When these conditions are considered individually, it is highly questionable that the course of the disease is favorably influenced by discovery prior to overt symptoms which would bring the person to regular medical attention.

The tests cost money. At Group Health in 1977, SMA-18's or other multichannel blood tests were performed during about 50 percent of adult physical examinations for a cost of $43,500 (14,500 physical examinations at a $3 unit laboratory test cost = $43,500).

In conclusion, there is no evidence to show that multichannel blood tests have any beneficial effects when used as screening instruments on general populations. To the contrary, they lead to consternation for the high numbers of false positive screenees, and to additional unnecessary laboratory tests and procedures being ordered by physicians or to potential medicolegal jeopardy if "abnormal" results are not followed up.

As of this writing no policy recommendation on this issue has been made by the Medical Staff Committee on Prevention, although such is expected in the near future.

Screening for Carcinoma of the Cervix

This has been analyzed by Browder's six criteria in conjunction with Bliss[4] and incorporates the data from the Walton Report[26] from British Columbia, and the work of Miller, Lindsay, and Hill.[27]

1. Important Disease

A. Carcinoma in situ (CIS) has its highest incidence (1.2/1,000) in 25 to 29-year-old women.

B. Prevalence is higher = 5.5/1,000.

C. Number 5 killer for 50-year-old women—chance of dying in the next ten years (302/100,000 white, 724/100,000 black).

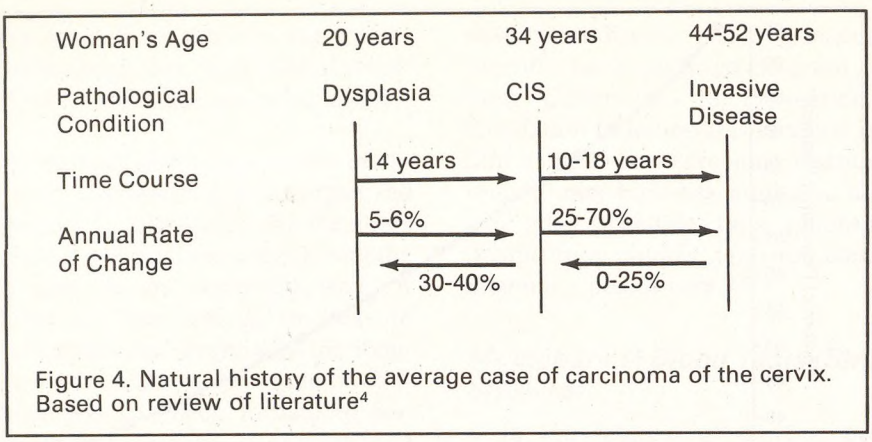

Figure 4. Natural history of the average case of carcinoma of the cervix. Based on review of literature[4]

D. Crude death rate for all women (mixed with cancer of body of uterus) in British Columbia = 10.3/100,000.

2. Presymptomatic Stage

As derived from the literature and as outlined in Figure 4, there seems to be general agreement that carcinoma of the cervix is a disease with a long presymptomatic period and a long lead time. On the average, dysplasia presents at about 20 years of age, and progresses over 14 years to carcinoma in situ, thence to invasive disease over another 10 years.[4]

3. Acceptable Test

Sensitivity=85 percent
Specificity=99 percent

No preventive value has ever been documented for repetitive pelvic examinations in asymptomatic women.[4]

4. Effective Treatment

The health benefits of a screening program are difficult to absolutely evaluate. No controlled trials have ever been performed. Three measures of "success" are available:

A. Decline in invasive cancer rates associated with constant CIS rate.[27]

B. "Left shift" in stage of invasive cancer at diagnosis toward less extensive disease.[28] This does not obviate potential problems with lead time (ie, labeling a person earlier as having the disease, but not truly contributing to increased survival).

C. Solid correlation exists between increased screening rates and decreasing mortality rates. Looking at data from two decades in British Columbia, Miller and Lindsay showed a relationship between screening and decline in mortality for the second decade.[26,27]

5. Follow-Up

The importance cannot be overstressed. This is not a problem at the Group Health Cooperative.

6. Resource Allocation

Pertinent facts to consider:

A. Maximal incidence of CIS, the generally recognized precursor to invasive disease, is in women 20 to 34 years of age (about 1 to 1.2/1,000).[26]

B. The overall yield is 5.5/1,000 first screen (prevalence) and 0.5/1,000 second screen (incidence), as reported by the Canadian Task Force on cervical cancer screening.[26] The yield with an increasing number of repeat smears is very small after two to three negative smears. This is illustrated in Table 1.[28]

A cost analysis using Group Health's data on cervical cancer screening for the years 1958 to 1967 as compiled by Dr. Charles E. Marshall follows.[29] Assumptions made in the cost analysis presented in Table 2 are that the prevalence of CIS at Group Health is 1/1,000 women screened, the

Table 1. Cervical Neoplasia Rates per 1,000 by Classification, Examination Number, and Race[28]

Classification	Black Patients				White Patients			
	Examination 1	2	3	4	Examination 1	2	3	4
Mild—moderate dysplasia	3.3	1.9	0.3	0.0	2.5	1.6	0.9	0.0
Severe dysplasia	2.7	0.7	0.3	0.0	1.2	0.4	0.4	0.0
Carcinoma in situ	1.0	0.8	0.0	0.7	2.4	0.2	0.0	0.0
Invasive carcinoma	1.8	0.7	0.3	0.0	1.8	0.6	0.0	0.0
Number examined	11,095	5,698	2,826	1,287	11,624	4,912	2,047	826

All women with two to four examinations were negative for all previous examinations

Table 2. Cost Analysis of a Screening Program for 10,000 Women Based on Group Health Data[29]

Smear No.	% of Cases Detected That Smear	Cumulative %	No. cases CIS	Incremental Gain Cases	Total $	Incremental $	Marginal* $	Average** $
1	64.5	64.5	6.45	6.45	25,000	25,000	3,880	3,880
2	20.9	85.4	8.55	2.09	49,984	24,984	11,954	5,846
3	6.8	92.2	9.23	0.68	74,965	24,981	36,736	8,122
4	4.5	96.7	9.68	0.45	99,942	24,977	55,504	10,325
5	3.2	100.0	10.00	0.32	124,918	24,976	78,050	12,492
6	0.0	100.0	10.00	0.00	149,893	24,975	—	14,989

*Marginal cost=Incremental cost÷Incremental gain—ie, if one has discovered 9 out of 10 cases, what is the cost of detection the last increment (10th case)
**Average cost per case=Total dollars expended÷Total cases found
CIS—Carcinoma in situ

cost of a smear is $2.50, and 10,000 women will be screened. The data thus derived show that after three smears CIS detection is 92.2 percent complete and 96.7 percent after four smears. Marginal costs begin to rise dramatically after the second smear. The increment gained by the third smear (0.68 cases of CIS) costs $36,736.

Such cost considerations, the age of maximal incidence of CIS as the precursor of invasive disease, and the long average time (ten years) for CIS to evolve to invasive cancer might lead one to propose a simple protocol for maximizing resource allocation. One such protocol (Figure 5) calls for no Pap smears in virgins. Nonvirgins would be screened yearly from age 18 to 35 years. Thereafter, if three or more negative smears had been obtained in the preceding five years, screening would be done every third year.[4]

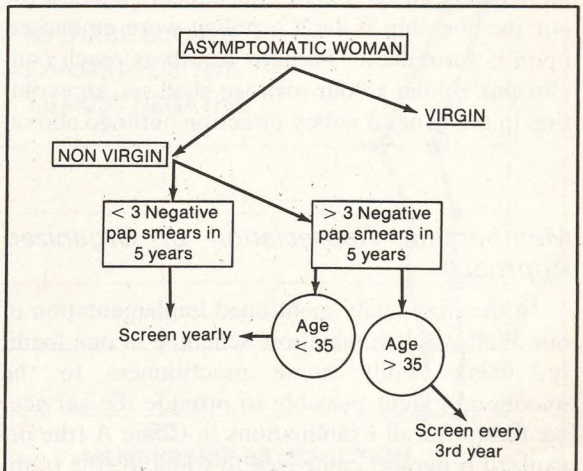

Figure 5. Protocol for more rational screening for carcinoma of the cervix

It is interesting to note that a Canadian Task Force assembled to consider that country's 25 years of recorded experience with cervical cancer screening reached similar but more drastic conclusions in 1976.

An effective and sufficient frequency of examination is as follows:

A. Initial smears should be obtained from all women over the age of 18 who have had sexual intercouse.

B. If the initial smear is satisfactory and without significant atypia, a second smear should be taken within one year.

C. Provided the initial two smears and all subsequent smears are satisfactory and without significant atypia, further smears should be taken at approximately three-year intervals until the age of 35, and thereafter at five-year intervals until the age of 60.

D. Women over the age of 60 who have had repeated satisfactory smears without significant atypia may be dropped from a screening program for squamous carcinoma of the cervix.

E. Women who are not at high risk should be discouraged from having smears more frequently than is recommended.

F. Women at continuing high risk should be screened annually. To facilitate this, provision for taking cytologic smears should be made at family planning clinics, student health clinics, youth clinics, and medical facilities where women are examined before admission to penal institutions.[26]

The above analysis was developed in conjunction with two members of our obstetrics and gynecology section. Despite this, when these findings were presented to that section, there was little interest in pursuing the results as a policy. Even if there had been agreement, the educational task for our membership if such a policy were embarked upon is formidable. Perhaps as others reach conclusions similar to our own we shall see an evolution in the general policy direction outlined above.

Membership Appreciation of Organized Approach

In the previously mentioned implementation of our Well Adult Evaluation Schedule in one facility, using family nurse practitioners to the maximum extent possible to provide the service, we found for all examinations in Clinic A (the organized program) compared to Clinic B (the traditional, nonstructured approach) that the level of satisfaction of examinees was uniformly higher for all 19 questions on a Likert six-point scaled questionnaire filled out immediately after the examination (Figure 6).* How much of this was due to the organized approach employed and how much was due to the family nurse practitioners is impossible to say with certainty, but it does suggest our members are ready for an organized approach even if it is more sparse than the annual physical examination dogma of the past.

Life-Style Considerations

Simple and potentially useful correlative data come from the work of Breslow, Belloc, and others in the Alameda County, California, population laboratory. This group followed 7,000 adults for $5^1/_2$ years and correlated habits with subsequent health and length of life.[30]

The habits which correlated positively with health and longevity looked like a list of the commonsense things your "grandmother told you":

Good Health Habits

1. Smoking either not at all or pipe and cigar only.
2. Weight plus or minus 20 percent of ideal.
3. Drinking either not at all or moderately.
4. Getting seven hours of sleep a night or more.
5. Eating three regular meals per day.
6. Eating breakfast every day.
7. Being physically active—running a mile or two, 2 or 3 times a week, bicycling, taking long walks several times weekly.

The potential for payoff here is enormous, since a man 45 years old with six or seven good health habits will live 14 years longer (81 years vs 67 years) than other males in his group displaying three or less. Those persons with four or fewer good health habits have a fourfold increased mortality rate over time compared to those with six or seven good health habits.

The above data are, of course, statistical correlations and do not necessarily imply causal relationship. This has been pointed out by Lewis Thomas and others recently.[31] On the other hand, scrutiny of the list shows that several are solidly established risk factors in their own right.

*Thompson RS, Basden P, Howell LJ, et al: Evaluation of initial implementation of an organized adult health program at Group Health Cooperative of Puget Sound. Group Health Cooperative of Puget Sound, Seattle, 1978, unpublished monograph

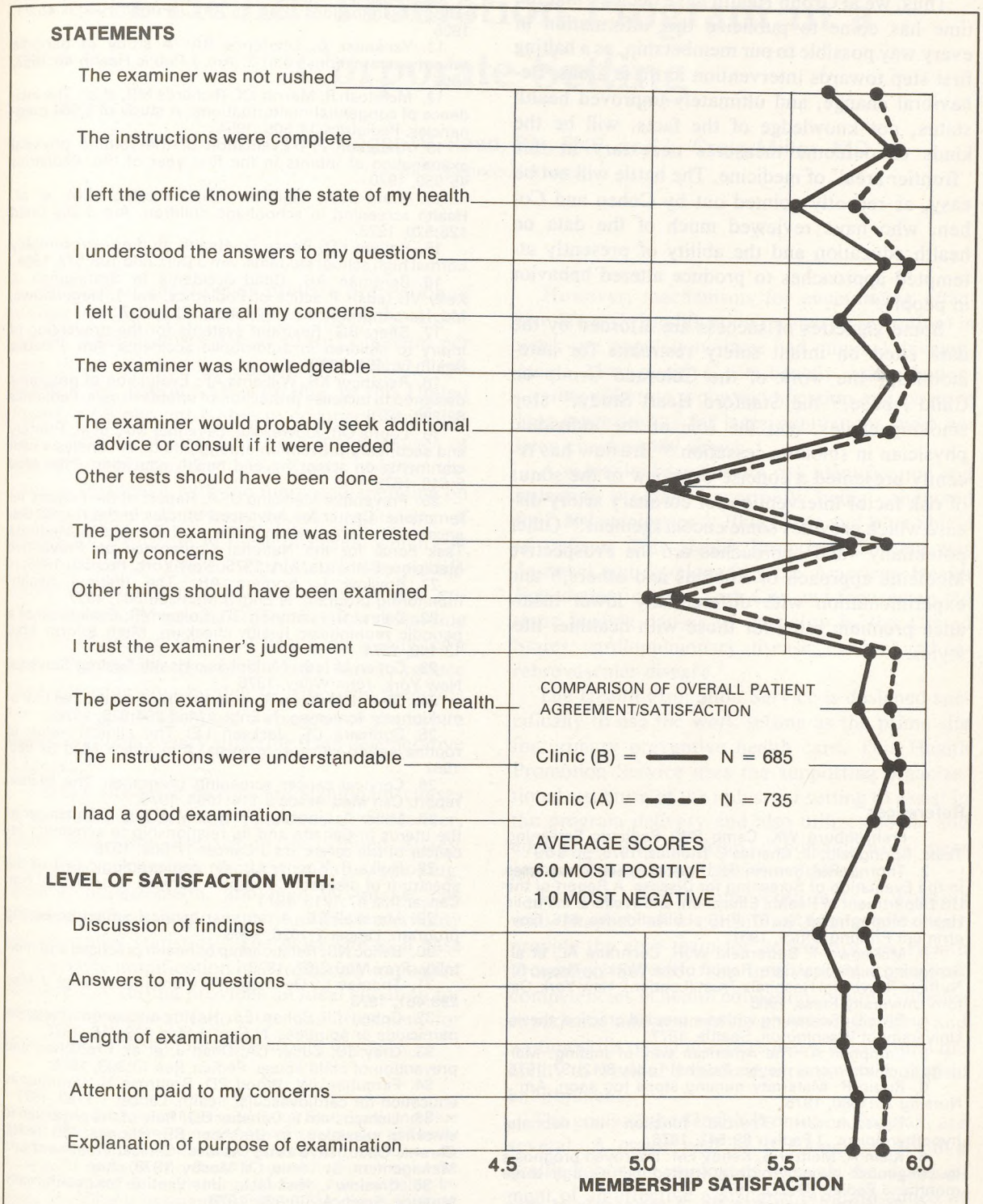

Figure 6. Examinee satisfaction with organized adult health care program (clinic A) compared to conventional clinic utilizing nonstructured, nonscheduled approach (clinic B)

Thus, we at Group Health have decided that the time has come to publicize this information in every way possible to our membership, as a halting first step towards intervention in these areas. Behavioral change, and ultimately improved health status, not knowledge of the facts, will be the kinds of outcome measures necessary in this "frontier area" of medicine. The battle will not be easy, as recently pointed out by Cohen and Cohen, who have reviewed much of the data on health education and the ability of presently attempted approaches to produce altered behavior in people.[32]

Some vignettes of success are afforded by the data cited on infant safety restraints for automobiles,[17] the work of the Colorado Group on Child Abuse,[33] the Stanford Heart Study,[34] stop smoking clinics, and the role of the individual physician in smoking cessation.[35] Breslow has recently presented a concise overview of the status of risk factor intervention for coronary artery disease which provides some encouragement.[36] Other potentially valid approaches are the Prospective Medicine approach of Robbins and others,[37] and experimentation with differentially lower insurance premium rates for those with healthier lifestyles.

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