

clinical contributions

2004 Vobs Award Honorable Mention

The Kaiser Permanente Northwest Cardiovascular Risk Factor Management Program: A Model for All

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Abstract

Proof of the effectiveness of preventive measures that reduce established risk traits for atherothrombotic disorders has spurred attempts to systematically apply these interventions among susceptible populations. One such attempt is the Cardiovascular Risk Factor Management (CVRFM) Program, launched in 2003 to optimize clinical management and outcomes for 75,000 Kaiser Permanente Northwest Region (KPNW) members with atherosclerotic cardiovascular disease (CVD) or hypertension. The CVRFM Program is a centralized, multidisciplinary, proactive telephone-based clinical management intervention consisting of an "outreach" call, an interview, a mailed individualized care plan and information packet, regular follow-up (including protocolized medication management) and—when "goal status" is achieved—transfer of the patient to a maintenance plan.

Quarterly evaluation of effectiveness entailed measurement of a range of clinical, utilization, and member satisfaction outcomes. Results by the fourth quarter were outstanding: For example, >98% of participants with coronary disease or diabetes had LDL cholesterol testing, >90% of coronary patients received aspirin or statin treatment, 99% were "extremely" or "very" satisfied with the program, and reductions were observed in the number of hospitalizations and visits to the emergency department and clinic. Mathematical models predict a decrease in myocardial infarctions and cardiovascular mortality within two years after implementing the program, the underlying principles of which should yield similar improvement in other Kaiser Permanente (KP) Regions and in other health care organizations.

Introduction

Atherosclerotic cardiovascular disease (CVD) is a pervasive condition affecting 23% of the US population. CVD remains the leading cause of death in the

United States, accounting for 39% of all deaths. The estimated direct and indirect cost of CVD in the United States is \$393 billion annually.¹

Diabetes takes an additional toll on the nation's health: The national prevalence of diagnosed diabetes is 6%. In addition, it is estimated that at least 5.6 million Americans—3% of the US population—have undiagnosed diabetes.² Several studies show that, for individuals with diabetes, the risk of myocardial infarction is nearly equivalent to that in people with coronary artery disease (CAD) and that diabetic persons with concomitant CAD are at very high risk of death.^{3,5} In many diabetic persons, CAD remains undetected; in one study, autopsy showed high-grade coronary atherosclerosis in nearly 75% of diabetic persons who did not have clinically evident coronary disease.⁶

Large population studies have identified modifiable risk factors that lead to CVD.⁷⁻¹³ These risk factors include diabetes or insulin resistance,¹⁴ elevated levels of low-density-lipoprotein cholesterol (LDL-C),¹³ diminished levels of high-density lipoprotein cholesterol

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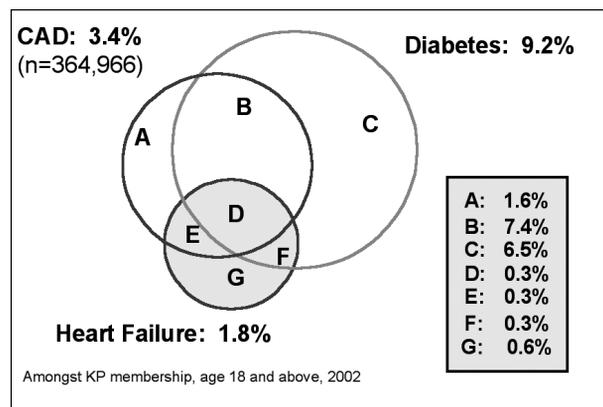


Figure 1. Figure shows co-occurrence of diabetes, coronary artery disease, and heart failure in 5.3 million adult KP members.

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Table 1. Risk reduction reported in major controlled trials

Treatment	Risk reduction for combined CVD outcomes	NNT	Treatment duration
Antiplatelet Agents ²²	22%	41	2 years
Beta Blockers ^{23,24}	24%	56	1 to 2 years
ACE inhibitors ²⁵⁻²⁸	23%	27	4 years
HMG Co-A Reductase inhibitors (Statins) ^{29,29-31}	22-31%	28-40	5 years
Diet ³²⁻³⁴	10-75%	12-93	2 to 3 years
Exercise ³⁵⁻³⁷	20-24% (for death only)	37-46	3 to 5 years

NNT = number needed to treat (ie, the number of patients that must be treated to prevent one adverse outcome)

(HDL-C),¹⁴⁻¹⁷ hypertension,¹⁷ obesity,¹³ tobacco use,^{13,14,17} and physical inactivity.^{13,18} These risk-associated traits can be modified by lifestyle change (eg, physical exercise, smoking cessation, reduction of dietary sodium and saturated fats), and medication (ie, given for hypertension, lipid abnormalities, or diabetes/insulin resistance).

The Need to Manage Multiple Conditions

During the past decade, the Kaiser Permanente Northwest Region (KPNW) has implemented disease-specific programs to facilitate management of members with diabetes, heart failure, or CAD. These programs have resulted in marked improvements in care processes as well as in clinical outcomes. Nonetheless, existence of three parallel, single-condition programs has not optimized care for KPNW’s members with concomitant cardiovascular diseases. Simultaneous management of comorbid conditions is crucial because of the high prevalence of coexistent conditions¹⁹ (Figure 1) and

because the risk of a cardiovascular event or death increases substantially with each additional cardiovascular risk factor.^{7,15,16,20,21}

In recent years, several large clinical trials have shown that behavior changes and medications (Table 1) can reduce CVD events and mortality for persons with chronic conditions or with traits associated with CVD risk.²²⁻⁴⁰ In response to these findings, KPNW designed and implemented the Cardiovascular Risk Factor Management (CVRFM) Program—an integrated, multidisciplinary approach to case management for all KPNW members with identified cardiovascular risk factors.

Target Population

Among KPNW’s 338,000 adult members, approximately 12,000 (3.6%) have been diagnosed with CAD; 22,000 (6.5%), with diabetes; and 6000 (1.8%), with heart failure. More than 8000 KPNW members (2.5%) have both diabetes and CAD. In addition, at least 60,000 (18%) of KPNW’s adult members have hypertension.

The CVRFM Program is a population-based, individually tailored intervention designed to optimize clinical management and outcomes for all KPNW members with CVD or with cardiovascular risk factors. However, when the program was launched in April 2003, inclusion and exclusion criteria (Table 2) were defined to direct initial resources toward approximately 27,000 members (8% of KPNW’s adult membership) who were at highest risk.

Program Design and Outreach Methods

The CVRFM Program is a centralized, multidisciplinary, telephone-based clinical management intervention. On the basis of analyzed clinical data, highly trained staff proactively contact KPNW members whose clinical parameters (eg, diagnosed comorbid conditions, abnormal lipid levels, poor glycemic control, inappropriate medication regimen) suggest opportunity for improving management of cardiovascular risk factors. To date, the CVRFM Program has reached out to more than 8000 members (about 30% of the initial target population).

KPNW members likely to benefit from the CVRFM Program are identified from electronic clinical data and from chart review done to confirm appropriateness of inclusion and to identify language preferences of potential participants. With the aid of an interpreter when appropriate, CVRFM staff then telephone members to invite their participation.

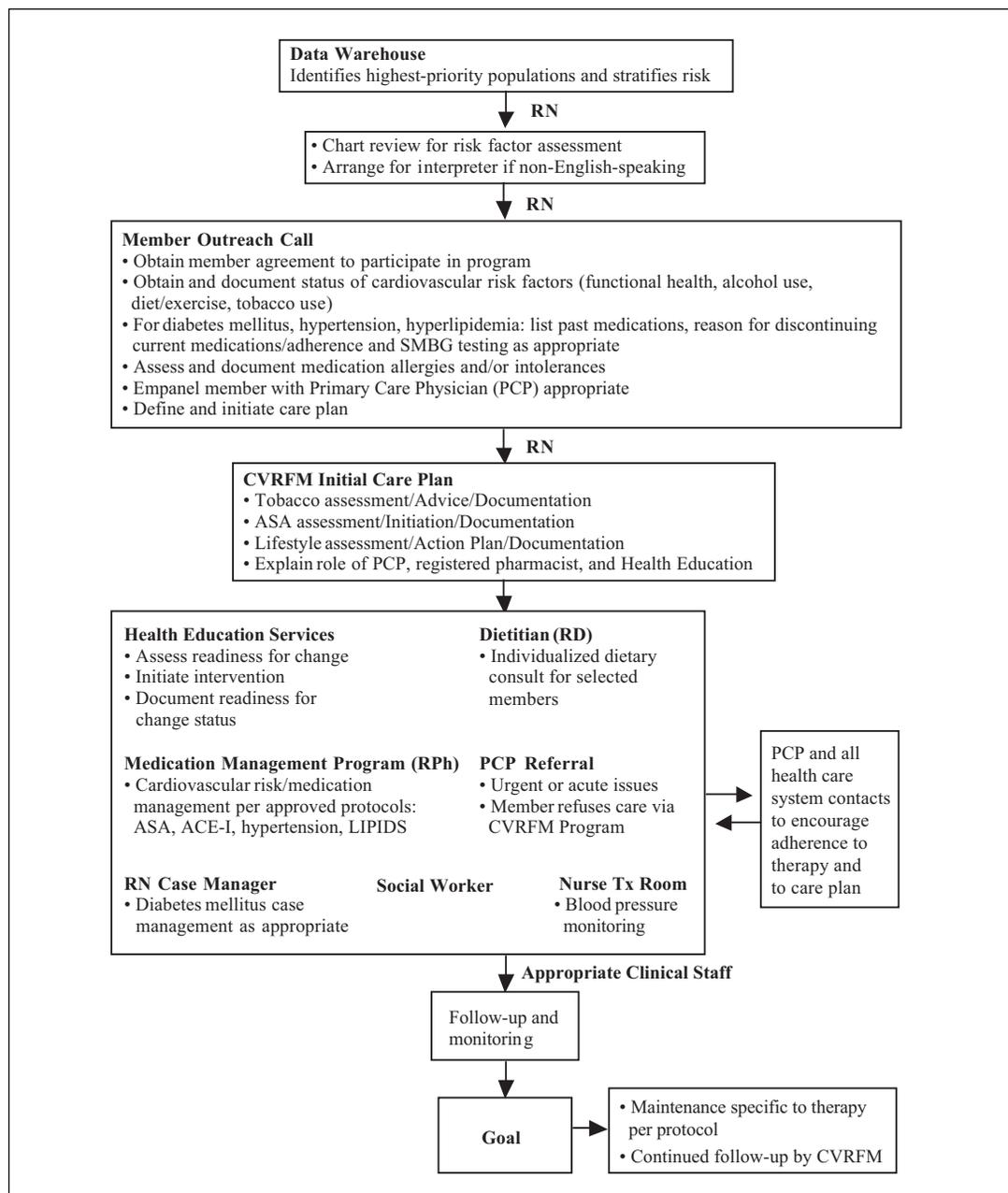
Table 2. Initial inclusion and exclusion criteria for prospective participants in the Kaiser Permanente Northwest Region (KPNW) Cardiovascular Risk Factor Management Program

Inclusion criteria	Exclusion criteria
<ul style="list-style-type: none"> Diabetes mellitus and/or CAD and/or history of stroke Age between 40 and 85 years 	<ul style="list-style-type: none"> Managed by another KPNW care management program Does not have a primary care physician Pregnant
<ul style="list-style-type: none"> Blood pressure >140/90 mmHg with CAD; or blood pressure >130/80 mmHg with diabetes mellitus 	<ul style="list-style-type: none"> Breastfeeding
<ul style="list-style-type: none"> LDL >100 mg/dL with CAD; or LDL >130 mg/dL with DM without CAD Not receiving statin drugs 	<ul style="list-style-type: none"> Receiving maximum dose of medications
<ul style="list-style-type: none"> Not receiving ACE-inhibitor drugs 	<ul style="list-style-type: none"> Liver function test results three times upper limit of normal
<ul style="list-style-type: none"> Not receiving aspirin or other antiplatelet drug 	<ul style="list-style-type: none"> Does not wish to participate

CAD = coronary artery disease
LDL = low-density lipoprotein

If a member agrees to participate (fewer than 3% of contacted members decline the invitation), a CVRFM nurse performs an intake interview by telephone. During this interview, several actions are taken:

1. The nurse reviews the member's *baseline information*, including tobacco use; blood pressure control; medication regimen and adherence to it; allergies; and lifestyle, including dietary habits.
2. On the member's specific risk profile, *tailored education* about cardiovascular risk factors is presented, and recommended interventions are provided.
3. *Readiness to change* is assessed by using motivational interviewing techniques.
4. A *care plan* is established which generally includes the member's goals for aspirin use, blood pressure and lipid control, and lifestyle behaviors, including tobacco cessation, dietary changes, and exercise.
5. Necessary *lab work* is ordered.



... fewer than 3% of contacted members decline the invitation ...

Figure 2. Flow diagram shows care-related component (processes) of CVRFM Program.

6. Appropriate *referrals* are given (eg, to primary care physician, specialist, health educator, pharmacist, social worker, dietitian, or case manager).

After the initial outreach call, an information packet—customized on the basis of the member’s risk factors and individualized plan—is mailed. The member then receives regular follow-up contacts and evidence-based clinical management, primarily by clinical pharmacists, on the basis of the CVRFM Program protocol. When “goal” status is achieved for all components of the care plan, the member is transitioned to a maintenance plan with continued (but less frequent) telephone follow-up (Figure 2).

Tools Designed to Support Implementation and Achievement of Results

A number of tools were developed to support effective design and implementation of the CVRFM Program. These include:

1. *Evidence-based clinical practice guidelines* for the management of
 - coronary artery disease (CAD)
 - diabetes
 - heart failure
 - hypertension

CVRFM Scripting for Blood Pressure Control

“I’m looking at the medications you take for your blood pressure. I show that you are taking _____.”

Note current medications, doses (in mg) and dosing schedule in the chart note.

(Information shown below is available in Correspondence also)

Blood pressure is the force of the blood pushing against the walls of the blood vessels. The pressure when the heart beats is called the **systolic pressure** (the first number in blood pressure readings). The pressure between beats, when the heart is at rest, is called the **diastolic pressure** (the second number). Hypertension is the medical term for uncontrolled or high blood pressure. It does not mean that a person is hyper, nervous, or tense. Uncontrolled blood pressure is a serious condition that often has no symptoms. It makes the heart work too hard and contributes to hardening of the arteries. As a result, patients with high blood pressure are at increased risk for stroke, heart attack, and kidney disease.

Recent information shows that patients who have controlled their blood pressure report that they feel healthier and rate their quality of life as better.

Ideal blood pressure for some individuals is lower than we used to think. This means that the blood pressure goal for someone with _____, like yourself, is

- diabetes ≤ 130/80
- high blood pressure ≤ 140/90
- heart disease ≤ 140/90
- kidney disease ≤ 120/80

There are two ways to approach lowering blood pressure:

- **Lifestyle changes.** Any changes you make can do a lot to lower your blood pressure and may decrease your need to take medications.
- **Treatment with medications.** Medication does not “cure” high blood pressure, and you may need to take blood pressure-lowering medication for the rest of your life.

Tips for lowering blood pressure:

- Get active! Exercise is good medicine. Start at ten minutes of walking daily, and work up to at least 30 minutes every day. Check with your health care provider before starting any exercise program.
- Lose weight if you need to. If you are overweight, losing just 6% of your body weight can make a big difference in your health. This means losing 6 pounds for every 100 pounds you weigh. If you can’t lose weight, then maintain your current weight and don’t gain any more.
- If you smoke, quit. This is the most important thing you can do for your health now, and it lowers your risk of heart disease.
- Choose healthy, low-fat foods.
- Don’t add salt to your food or eat salty food and snacks.
- Limit the amount of alcohol you drink to no more than one or two drinks per day.
- Limit the use of over-the-counter medications; herbs; and health food supplements that may raise your blood pressure.
- Take your blood pressure medicine as prescribed.

In our program, we may ask you to have regular blood pressure measurements and lab tests done at a KP clinic until you reach your target blood pressure. It may take several dose adjustments or more than one medication to control your blood pressure.

If you will have problems getting to a KP clinic on a regular basis, please let us know NOW.

Figure 3. Sample of scripts used in CVRFM Program for controlling patients’ blood pressure.

2. A *data querying tool* used to identify target members for intervention
 3. A *flow diagram* defining the steps, referral guidelines, and exit criteria for the Program (Figure 2)
 4. *Telephone scripts* for CVRFM Program staff to use when interacting with members
 5. *Medication management protocols* to ensure optimal pharmaceutical management
 6. *Documentation templates* embedded into the clinical record to ensure complete data capture
 7. A *measurement plan* to enable tracking of Program impact and evaluation of its effectiveness
 8. *Communication templates* to ensure that all members of the health care team are aware of CVRFM participants and their progress
 9. A *training curriculum* for CVRFM Program staff.
- Figures 3, 4, and 5 illustrate several components of the CVRFM Program.

Evaluation Methodology

A broad range of population-based measures—addressing clinical indicators, utilization, and member satisfaction—are evaluated quarterly. Data definitions for most CVRFM Program measures are consistent with HEDIS.⁴¹ However, KPNW uses broader inclusion criteria (eg, no upper age cutoff) to evaluate care for all members likely to benefit from the defined interventions. KPNW also monitors performance against more aggressive management targets (eg, LDL <100 mg/dL, blood pressure <130 mmHg/<80 mmHg) in addition to the HEDIS thresholds.

Utilization data were calculated by comparing utilization of the CVRFM Program's first 1545 members during the first nine months after enrollment (April 2003 through December 2003) with these members' use of services during the same months of the previous year (April 2002 through December 2002).

Satisfaction data were obtained from completed surveys distributed to all CVRFM participants.

Table 3 presents some results of these measures.

Innovation, Adaptability, and Impact Innovation

KPNW's CVRFM Program has several unique features:

- *Integration of multiple chronic conditions* into a *single* population management program. The single population management program for CAD, diabetes, heart failure, hypertension, and cardiovascular risk factors optimizes care processes and outcomes.
- Focus on *secondary prevention* of CVD in members at highest risk, applying interventions substantiated by much evidence.

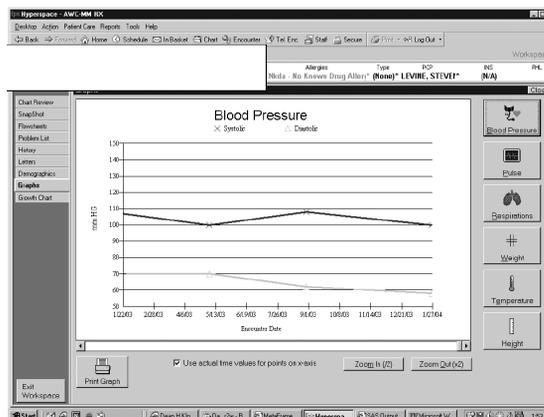


Figure 4. Screen "snapshot" shows example of a patient's blood pressure record as observed by CVRFM Program staff.

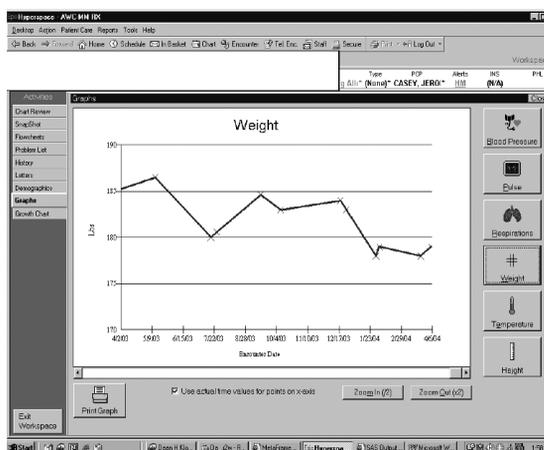


Figure 5. Screen "snapshot" shows example of a patient's weight record as observed by CVRFM Program staff.

- *Proactive, member-friendly, individually tailored* approach resulting in expression of great satisfaction by members.
- *Collaborative, multidisciplinary* care model that optimizes the complementary roles of each CVRFM team member.
- *Leverage of resource capacity* by team-based care, clear entry and exit criteria, a robust automated clinical record, and predominance of phone-based encounters.

Adaptability

In only 12 months, KPNW's CVRFM Program has effected substantial improvements in care and health outcomes for KPNW's members diagnosed with multiple cardiovascular risk factors. This model could easily be replicated in other health care organizations.

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The measurement approach is also easily transferable to other health care settings.

KPNW is currently exploring opportunities to adapt the CVRFM Program to other clinical areas. The underlying principles of this Program—including targeted outreach based on clinical considerations, protocol-based clinical management by a multidisciplinary team, emphasis on self-management, and the efficiency of a centralized, technology-leveraged service—can reasonably be expected to yield improvement in care processes

and in clinical outcomes similar to improvements obtained in other high-priority populations.

Impact

The impressive results reported here among highest-risk persons with CVD are expected to result in major outcome benefit. Biomathematical models predict that there will be measurable decreases in myocardial infarctions and CVD-related mortality within two years of Program implementation. ❖

Table 3. Comparison of selected results for all KPNW members, cardiovascular risk factor management program participants, and HEDIS benchmarks				
	KPNW performance 4th Qtr 2002	KPNW performance 4th Qtr 2003	CVRFM program participants^a 4th Qtr 2003	2003 HEDIS 90th percentile
Blood Pressure (BP) Control				
Controlling high blood pressure ^b	59.0%	63.6%	64.9%	68.0%
Diabetes, ^c BP ≤140/90 ^d	57.7%	62.6%	64.4%	65% ^d
Diabetes, BP ≤130/80	29.2%	35.0%	37.4%	n/a
Lipid Screening and Control				
CAD, ^e LDL testing ^b	78.4%	79.1%	98.0% ^f	86.5%
CAD, LDL <130 mg/dL ^b	72.2%	72.5%	91.8% ^f	74.3%
CAD, LDL <100 mg/dL	54.5%	52.5%	66.1%	n/a
Diabetes, LDL testing ^b	72.3%	75.0%	98.5% ^f	91.7%
Diabetes, LDL <130 mg/dL ^b	58.0%	60.1%	80.6% ^f	65.7%
Diabetes, LDL <100 mg/dL	37.2%	39.7%	65.3%	n/a
Glycemic Screening and Control				
Diabetes, HbA1c testing ^b	88.5%	88.5%	96.8% ^f	90.6%
Diabetes, HbA1c control ^d (<8.0)	64.9% ^f	72.9% ^f	80.6% ^f	55% ^d
Diabetes, HbA1c poor control ^b (>9.5)	19.6% ^f	16.2% ^f	7.0% ^f	20.6%
Medication Management				
Documented aspirin use	68.9%	69.8%	91.9%	n/a
CAD, % receiving statin drugs	67.2%	71.0%	90.7%	n/a
Diabetes, % receiving statin drugs	36.4%	46.6%	88.7%	n/a
Utilization				
Decrease in number of emergency department visits from prior year	n/a	n/a	8.8%	n/a
Decrease in number of hospitalizations from prior year	n/a	n/a	21.7%	n/a
Decrease in number of office visits from prior year	n/a	n/a	10.7%	n/a
Satisfaction				
“Extremely” or “Very” satisfied with program	n/a	n/a	99%	n/a
Would “Definitely” recommend program	n/a	n/a	80%	n/a

n/a = not applicable; CAD = coronary artery disease; LDL = low-density lipoprotein.

^a 4351 total CVRFM Program participants as of 4th quarter 2003. (See Table 2 for inclusion and exclusion criteria.)

^b Consistent with HEDIS (Health Plan Employer Data and Information Set) measure.

^c Total KPNW adult population with diabetes was 20,625 for 4th quarter 2002 and was 21,910 for 4th quarter 2003.

^d Consistent with DQIP (Diabetes Quality Improvement Project) measure and with NCQA (National Committee for Quality Assurance) Diabetes Physician Recognition Program threshold.

^e Total KPNW adult population with CAD was 11,088 for 4th quarter 2002 and was 11,705 for 4th quarter 2003.

^f Exceeds 90th percentile benchmark.

Acknowledgments

The CVRFM Program was developed through the collaborative efforts of KPNW's Clinical Strategies Integration Group, Population-Based Care Department, Cardiovascular Steering Committee, Diabetes Steering Committee, Primary Care Council, Guidelines Development Group, Pharmacy Services and Medication Management Program, Nutrition Services, and Health Education Services. KPNW drew from rigorously evidence-based guidelines—including those of KP's Care Management Institute, the American Heart Association, and JNC VI and VII²—for development of a comprehensive, multidisciplinary protocol which contains a portfolio of clinical interventions proven to improve outcomes for persons with cardiovascular risk factors.

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The Worth of Science

Ultimately, it is the physician's respect for the human soul
that determines the worth of her science.

— Norman Cousins, 1915-1990, writer, editor, citizen diplomat