STANFORD
SCHOOL OF MEDICINE

THE STANFORD CHRONIC CARE MANAGEMENT SYSTEM

This document is a print version of The Stanford Chronic Care Management System web site:

http://stanfordchroniccaresystem.com/index.html

Home Page

Welcome to Our Web Site

The Stanford Chronic Care Management System is a proven approach to home care for patients suffering from chronic conditions such as Congestive Heart Failure and Coronary Artery Disease.

Because of the structure of the US health care system, patients with chronic conditions are faced with difficult choices when they experience symptoms. In general, they either ignore the symptoms, which is often a bad decision, or they go to an Emergency Room for treatment, which is usually an expensive and inefficient choice.

To provide more effective care and at the same time reduce the total cost of care, the SCRP has developed a thoughtful, simple, and cost effective model of telephone triage, the SCCMS.

The system has been shown to reduce Emergency Room visits by up to 80%, while at the same time significantly improving the quality of care that patients receive. This equates to a cost reduction of 25-33% compared to the uncoordinated care that is presently available to patients.

The SCCMS is available to health care providers and employers for a modest licensing fee, and we are enthusiastic about working with you and the Stanford Office of Technology Licensing to bring the benefits of the system to your organization.

We hope that this web site provides you with the information you need to understand how the system works, and how it benefits all of the key participants in the health care system.

For additional information and to discuss a possible implementation, please contact Dr. Robert DeBusk at (650) 725-5007 or debusk@stanford.edu . We look forward to hearing from you.
Evidence for the Effectiveness of CMS

A pilot study of the effectiveness of CMS is currently being reviewed. The following report about this pilot study is currently available for download. View the report here.

Description Page

A Brief Description of the Stanford Chronic Care Management System

The Stanford Chronic Care Management System utilizes telephone triage and followup to manage enrolled patients with established coronary artery disease who experience recurrent cardiovascular symptoms.

The System has 3 key elements:

1. A training course that enables nurse care managers to establish and maintain telephone contact with enrolled patients. This includes triage and followup of patient-initiated telephone contacts and initiation of routine followup telephone contacts with patients.
2. An instructional course that permits patients to recognize important symptoms and initiate prompt telephone contact with SCCMS staff.
3. A database application that permits SCCMS nurse care managers and cardiologists to access patients' updated electronic medical records on the Web, and to enter data regarding interactions between SCCMS staff and patients and their physicians following patient-initiated telephone contacts. These elements have been developed and tested in actual clinical practice and, with further refinement, can be made available to potential partners through the arrangements described below. Each is part of a package of intellectual property that can be licensed by Stanford University to interested partners.

A key objective of SCRP since the outset has been to understand the clinical environment of the partner organizations in which the research has been conducted. These research studies have been conducted in Academic medical centers, including Stanford Hospital and Clinics; HMO's including Kaiser Permanente; public hospitals, including Santa Clara Valley Medical Center and San Francisco General Hospital; Veterans Affairs Medical Centers; and private hospitals, including Mills Peninsula Hospital and O'Connor Hospital.

Experience with these diverse medical centers and the distinctive populations they serve has underscored the need to tailor the elements of SCCMS to the needs of partner organizations. The underlying principle of the research has been to specify the many individual steps needed to embed the project into the workflow of the partner's organization. For example, nurses and others responsible for screening potentially eligible patients are provided with clear-cut criteria for eligibility and a clear understanding of criteria for exclusion. Detailed informational materials specifying the rationale and operation of SCCMS must be provided by nursing staff to patients and their physicians at the outset of the project. Similarly, criteria for describing clinical outcomes

such as rehospitalizations and ER visits and the use of medical resources must be provided to hospital-based nurses responsible for obtaining followup data.

To date, the telephone-based intervention has relied on Stanford-based cardiologists and nurse care managers, but a future option is to train these staff members located in partners' facilities. An important asset in training of these individuals is the nurse training course developed by SCRP. A related objective is for the Stanford-based staff to work with staffs of partners' facilities over a several-month period to evaluate compliance with the clinical algorithms and protocols developed by SCRP and to tailor these as needed to the needs of the partner. The ongoing clinical collaboration between SCRP and partners' staff represents a valuable opportunity to make mid-course corrections that enhance the likelihood of long-term adoption of SCCMS by partners.

This unique collaboration provides for clinical oversight and needed tailoring of the clinical algorithms. For example, some partners may provide patients with access to a same-day clinic, while others may refer patients to an urgent care clinic or to a specialized observation unit within the ER.

The ongoing collaboration between SCRP and partners' staff permits creation of a clinical "dashboard" that clearly depicts the progress of an entire cohort of patients and specifies the individual interactions occurring between SCCMS staff and these patients.

Specifically:

* How often and when did patients initiate telephone contact with SCCMS?
* What advice were they provided and what short-term care arrangements did they make (stay at home, visit a same-day clinic, call 911)?
* When these patients were contacted by SCCMS Operations Staff some months later, what were their clinical outcomes regarding the frequency of ER or same-day clinic visits, rehospitalizations, myocardial infarctions?

Based on these data, a partner is able to determine in scores or hundreds of patients how well the system is operating and whether it is achieving the expected reduction in unnecessary ER visits and rehospitalizations.

Implementation Page

Implementing SCCMS

Patients who have received ER or hospital care for acute coronary syndromes (ACS) often delay in seeking prompt help for subsequent cardiovascular symptoms. The Stanford Chronic Care Management System (SCCMS) incorporates patient-related and system-related initiatives to improve the care of patients treated for suspected ACS:

1. A behavioral intervention provided by the nurse care manager at a baseline visit helps patients to overcome obstacles to calling promptly for help when they experience symptoms.
2. A systems redesign provides ongoing telephone access to the nurse care manager and cardiologist on a 24/7 basis and a web-accessible clinical research database provides immediate access to updated patient-specific data.

* In the event of recurrent symptoms, patients at high risk of ACS are directed by SCCMS staff to contact 911.
* Patients at moderate risk of ACS are scheduled to attend a same-day cardiology clinic.
* Patients at low risk of ACS receive telephone guidance and follow-up.
* All patients initiating a telephone contact with SCCMS staff through a 1-800 number to report cardiovascular symptoms receive a telephone follow-up call at 24 hours and their physicians receive a printed medical status report.

Components of SCCMS

A. Baseline telephone instruction by nurse care manager

B. Routine out-bound (nurse-initiated) telephone contacts at 1, 2, 3 months and quarterly thereafter to study end

C. In-bound (patient-initiated) telephone access 24/7

D. Advice provided by nurse care managers and cardiologists: Stay at home + 24 hour phone follow-up

E. Visit a same-day cardiology clinic + 24 hour phone follow-up - Summon EMS (911) for ER visit + 24 hour phone follow-up

A. Baseline Telephone Instruction

Prior to baseline telephone instruction, patients will view an instructional video or DVD portraying SCCMS in action. This is provided by the research assistant during hospitalization or is sent via express mail to patients immediately after hospitalization. As soon as possible after randomization, the nurse care manager telephones the patient to assure that the patient has viewed the instructional materials, reviews patients' current medical status based on data entered by the research assistant into the clinical research database, instructs the patient on the intervention, provides the 24/7 telephone contact number, and establishes a schedule for routine follow-up telephone contacts. Family members and caregivers are encouraged to participate in this baseline telephone instruction.

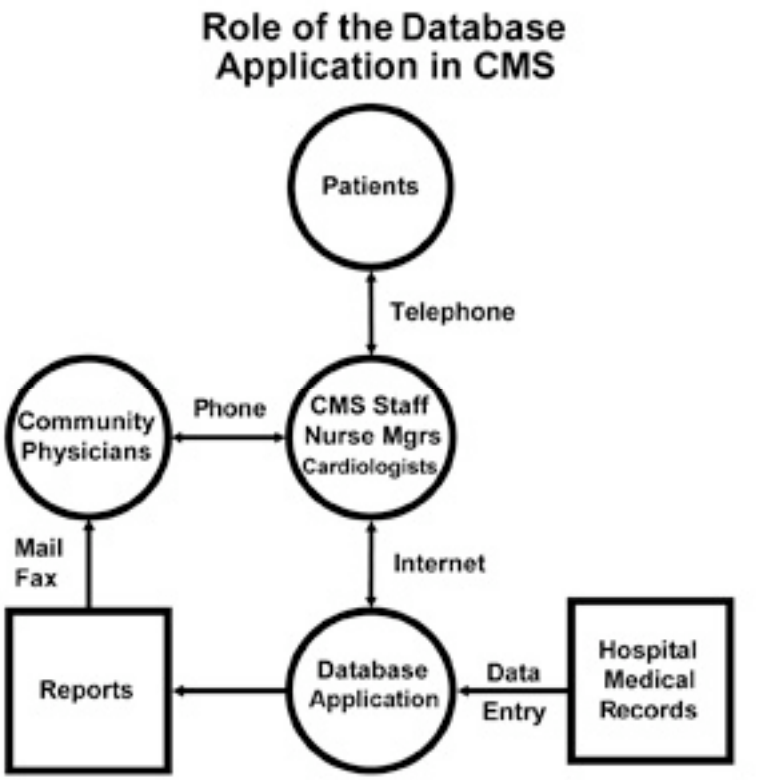
Instruction provided to patients and family members is designed to help patients distinguish between cardiovascular and non-cardiovascular symptoms and establish the need for a prompt response to cardiovascular symptoms. Nurse care managers will work closely with primary physicians to ensure that patients are prescribed combination pharmacotherapy (aspirin, beta blocker, statins, ACE inhibitors) and nitroglycerin in accordance with ACC/AHA guidelines. Nurses will assist patients to achieve optimal doses of medications, including antiplatelet and antianginal agents, and will instruct patients in the appropriate use of nitroglycerin.

Nurse care managers strategize with patients and family members on procedures for establishing timely telephone contact with SCCMS staff in case of symptoms of concern and describe how SCCMS staff will communicate with the patient's physician by telephone, and printed reports. Patients are oriented to the procedure for initiating a simulation telephone contact with the nurse care manager between 8 a.m. and 5 p.m., Monday-Friday, in the two weeks following the baseline telephone contact. Patients are oriented to the procedures for the same-day cardiology clinic . Finally, patients are provided with a 24/7 telephone access number (1-800) for the nurse care manager and the cardiologist and a schedule of routine nurse-initiated follow-up telephone contacts. To facilitate immediate telephone access to SCCMS when patients are away from their land line telephones, patients who own a cell phone are urged to carry it. Patients are advised that emergency crews responding to emergency (911) telephone contacts require a land line connection with the caller.

B. Routine Outbound (nurse-initiated) Follow-up Telephone Contacts

During these contacts, initiated at 1, 2, 3 months and quarterly thereafter, nurses will follow a standard protocol to evaluate patients' symptoms, review their medications, and obtain results of specialized tests, including ECG's, that have been obtained since the previous contact. These data are recorded electronically on a telephone contact form and the procedures and tests results form. Nurse care managers will inquire about any clinic visits, ER visits, or rehospitalizations since the previous telephone contact and will contact physicians, ER's, or hospitals to obtain a copy of the latest ECG, which will be scanned and uploaded to the clinical research database. Patients reporting worsening of symptoms during these telephone contacts may receive additional nurse-initiated telephone contacts and may undergo additional diagnostic testing, visits to their physicians, or dose adjustment of their anti-anginal medications.

The role of the database application in coordinating the care provided by SCCMS staff is shown in Figure 1. The database contains data abstracted from hospital medical records , clinic and ER visits by research assistants and augmented by data obtained during telephone contacts between patients and SCCMS staff and from subsequent EMS, ER, and hospital records. Medical status reports generated by the database are provided to SCCMS staff and community physicians as needed to facilitate patient care.



During clinic hours, the nurse care managers and cardiologists can access the clinical research database from their offices and clinics. After hours, cardiologists use wireless telephones to access the clinical research database containing current data on patients' current medical status. The database will alert SCCMS staff through text messaging that there is patient activity to be reviewed. Alarms embedded in the database also remind SCCMS staff to initiate follow-up contacts at 24 hours.

C. Inbound (Patient-Initiated) Telephone Contacts

Patients are provided with a 1-800 telephone number that connects them to the nurse care manager Monday-Friday 8 AM – 5 PM. After four rings, calls are automatically forwarded to the cardiologist on "first call", then to the cardiologist on "second call". If there is no answer from any of the three SCCMS staff within 10 minutes, patients are instructed to call again. In the rare case in which patients do not reach the nurse care manager or either of the two program cardiologists by telephone within 20 minutes during clinic hours , or the cardiologist after hours , patients are advised to call 911.

D. Advice Provided to Patients Initiating Telephone Contact

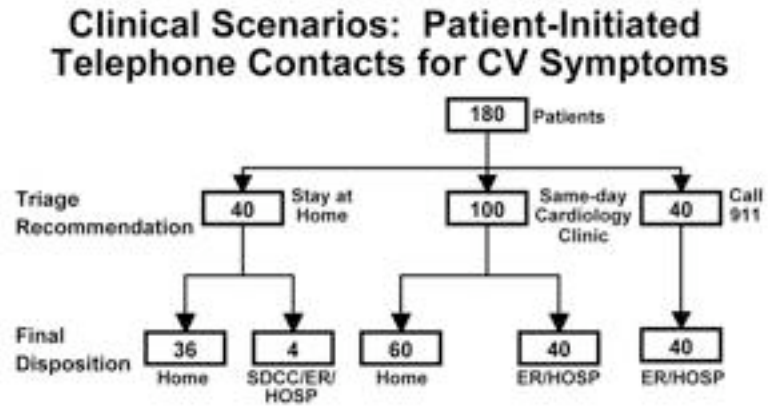
Decision-making by SCCMS staff is based on AHA/ACC guidelines for STEMI and non-STEMI/ unstable angina. Important features of baseline risk established upon enrollment include previous MI and the extent of left ventricular dysfunction and/or myocardial ischemia. Important features of the interval history since the patient's last contact with SCCMS staff include:

1. Frequency and severity of chest pain and other cardiovascular symptoms and changes in the pattern and dosage of anti-ischemic medications.

2. Frequency of unscheduled medical contacts prompted by new or worsening cardiovascular symptoms, including ER visits, hospitalizations, and patient-initiated telephone contact with the physician, and
3. Patients' reports of the results of any diagnostic tests.

Based on the work of Allison et al. and our pilot studies cited previously, as many as 200 of 900 patients receiving SCCMS (22%) are expected to experience recurrent cardiovascular symptoms in the year after enrollment. In approximately 20 such patients (10%, not shown in the figure), symptoms will be severe and rapidly progressive, irrespective of baseline risk. Those patients will be instructed during the baseline telephone session to contact EMS directly rather than through SCCMS.

The estimated flow of patients initiating telephone contacts to SCCMS staff to report cardiovascular symptoms, the triage recommendation, and the final patient disposition are shown in Figure 2.



Of the remaining 180 patients shown in Figure 2, approximately 40 will have low baseline risk, a stable clinical course, and mild symptoms that are often non-ischemic. The triage recommendation for these patients will be to stay at home , adjust medications and schedule clinic visits or follow-up testing such as treadmill testing as appropriate. They will be advised that worsening symptoms or recurrence of symptoms prior to a telephone contact from SCCMS staff at 24 hours should prompt another telephone contact to SCCMS. As many as 10% of these patients (i.e. 4) may experience recurrence or worsening of symptoms requiring a same-day cardiology clinic or ER visit.

Approximately 100 patients calling during clinic hours because of mild to moderate cardiovascular symptoms and a moderate risk at baseline will be advised to attend a same-day cardiology clinic if they can arrive by 4:30 pm. If this is not possible, they are advised to call 911 for transportation to the ER. Such clinics are presently operational in most medical centers. Approximately 60% of these patients will be discharged home and 40% will be hospitalized for evaluation. Finally, approximately 40 patients with high risk at baseline and mild to moderate cardiovascular symptoms are advised to call EMS for transport to the nearest ER. In all cases, patients retain the prerogative to call EMS at any time.

Emergency telephone staffing.

The maximum rate of "emergency" patient-initiated telephone contacts achieved by the end of the second year and maintained throughout the third year, is approximately 100 per month or 25 per week or 5 per day. Scheduled-nursing effort of 160 hours per month in each site is

commensurate with this need. Based on data obtained in the pilot implementation project at PAVAHS, at least three-quarters of these unscheduled (patient-initiated) telephone contacts are expected during clinic hours, when nurse care managers are available. One-quarter of them are expected after hours, when cardiologists are available. Thus, SCCMS cardiologists may receive up to 25 patient-initiated telephone contacts each month or 6 per week or fewer than one per day . In the pilot study, non-urgent telephone contacts with cardiologists were infrequent and were rarely made after hours. SCCMS cardiologists' effort, scheduled at 20% FTE, at the discretion of the site investigator, is commensurate with this need. Even if twice as many patients initiated telephone contact because of cardiovascular symptoms, staffing of SCCMS would be adequate to meet the need. Based on pilot studies, patients in the treatment group are expected to initiate an additional 200 non-emergency telephone contacts during the course of the clinical trial to obtain information on follow-up clinic visits with their physicians and resolve questions about drugs and the outcomes of specialized tests. These non-urgent issues will be largely referred to the primary physician. They may also be addressed during routine nurse-initiated follow-up telephone contacts at 1, 2, and 3 months and quarterly thereafter.

All inbound telephone contacts to report cardiovascular symptoms are documented in the clinical database using the Telephone Contact form . Patient-initiated telephone contacts trigger a medical status report that includes symptoms, medications, and the most recent ECG available in the database. This report is distributed to the patient's physician in electronic or in printed format 24 hours later.

E. Same-Day Cardiology Clinic

After the patient is triaged to this clinic by telephone, the nurse care manager apprises the patient's SCCMS cardiologist by telephone of the patient's imminent arrival in the clinic. He or she then prints out a medical status report and the most recent ECG stored in the database, and visits the clinic to secure a room for the patient. Immediately after the patient's arrival, the nurse care manager records an ECG and assesses the patient's clinical status. If the patient is clinically stable, the nurse care manager leaves the patient under the customary surveillance provided in the clinic and takes the medical status summary and the ECG's to the SCCMS cardiologist to discuss the case. If the cardiologist wishes to order a plasma troponin test on a clinically stable patient undergoing evaluation in the same-day cardiology clinic, the nurse care manager draws a blood sample, performs a point-of-service troponin test, and telephones the SCCMS cardiologist with the results. The cardiologist discharges the patient home or admits him or her to the hospital.

If the patient's symptoms have worsened or the patient appears ill on presentation to the same-day cardiology clinic, the nurse care manager immediately arranges for the patient's transport by gurney to the ER. He or she accompanies the patient to the ER and takes the medical status report and the newly-recorded ECG to the ER physician, who coordinates the patient's subsequent management with the patient's cardiologist. The SCCMS cardiologist maintains responsibility for the patient's care throughout the course of the patient's evaluation. The cardiologist bills for these services, which are provided as part of the usual care provided to the patient.

On the following day, the nurse care manager telephones the patient to determine his or her medical status, enters the relevant data into the database, and sends an updated medical status report to the SCCMS cardiologist and the patient's primary physician and/or cardiologist. The total number of same-day cardiology clinic visits is projected to be only 100 (see Figure 2). Even if this number were increased two or three-fold, it represents a small commitment of cardiologists' effort.

Costs and Potential Savings of SCCMS

We expect that SCCMS will reduce unnecessary ER visits, and many of the hospitalizations that follow them. To estimate the potential reduction in costs resulting from SCCMS, we obtained data from Stanford Hospitals and Clinics (SHC) on charges, net revenue and costs for ER and subsequent hospital care provided to 100 consecutive patients with suspected ACS. The charges for an ER visit were approximately $5,000, including nursing surveillance, diagnostic tests, drugs and physician fees. SHC recovers approximately 37% of this amount, or approximately $2,000, from third parties, including Medicare. The cost of providing this care is approximately 80% of this figure, or $1,600. Hospital charges for these patients averaged $12,000, of which SHC recovers approximately 30%, or $3,600 from third parties. The cost of providing this care is approximately 80% of this amount, or $2,800. Physician charges for a cardiology clinic visit at SHC range from $200 to $500, depending on the complexity of the case. Assuming that patients seen on an expedited basis in the same-day cardiology clinic fall into the higher billing category and also require an ECG and other tests, the total charge for a same-day cardiology visit is approximately $1,000, of which SHC recovers approximately 37%, or $370. The costs of providing this care are approximately 80% of this figure, or $300 per patient.

We project that at least 50 of the 200 patients presently undergoing ER evaluation for suspected ACS as part of their usual care (25%) could attend a same-day cardiology clinic or stay at home instead. Indeed, data from the pilot study of SCCMS implementation at PAVAHS showed a much greater reduction in ER visits. The estimated flow of patients initiating telephone contacts to SCCMS staff to report cardiovascular symptoms, the triage recommendations, and the final disposition are shown in Figure 2. A detailed breakdown of the costs of ER visits and hospitalizations expected under usual care alone and under SCCMS, which includes the costs of the same-day cardiology clinic, is shown in Table 2. We project that ER visits could potentially be reduced from 200 to approximately 74. We also project a reduction in hospitalizations, from 100 to 70.

COMPARISON OF COSTS FOR TREATMENT OF ACUTE CORONARY SYNDROMES

COST OF USUAL CARE ALONE for 200 Patients with Cardiovascular Symptoms

200 Direct ER Referral by 911 @ $1600	$320,000
100 Hospitalized @ $2800	$280,000
Total	$600,000

COST OF CARE UNDER SCCMS for 200 Patients with Cardiovascular Symptoms

20 Direct ER Referral by 911 @ $1600	$ 32,000
10 Hospitalized @ $2800	$ 28,000
10 Discharged from ER	$ -
40 Triaged by SCCMS to ER @ $1600	$ 64,000
20 Hospitalized @ $2800	$ 56,000
20 Discharged from ER	$ -
100 Triaged by SCCMS to Same Day Cardiology Clinic Visits @ $300	$ 30,000
10 Go to ER from Same Day Cardiology Clinic @ $1600	$ 16,000
10 Hospitalized @ $2800	$ 28,000
30 Hospitalized from Same Day Cardiology Clinic @ $2800	$ 84,000
60 Discharged from ER	$ -

40 Advised by SCCMS to Stay at Home	$ -
4 Subsequent ER Visits @ $1600	$ 6,400
36 Remain Asymptomatic at Home	$ -
Subtotal	$344,400

PROGRAM COSTS of SCCMS

Nurse Care Manager(s) 1.0 FTE	$135,000
Computers, SMART Phones, Telephone Charges, etc.	$ 15,000
Subtotal	$150,000

Total	$494,400

The elimination of 126 unnecessary ER visits at $1,600 each ($201,600) and of 30 unnecessary hospitalizations at $2,800 each ($84,000) would result in an aggregate cost saving of $285,600. Offsetting this saving is the cost of 100 same-day cardiology clinic visits at $300 each, or $30,000 and the effort of nurse care managers in coordinating same-day cardiology visits, which are not presently a feature of cardiology clinic visits at SHC. Nursing costs are dependent on the maximal "caseload" of patients managed under SCCMS by the nurse care managers. Two nurses, working at a combined effort of approximately 1.5 FTE, could manage as many as 900 patients, This is also the number of patients used to project the rate of ER visits and subsequent hospitalizations among patients enrolled into SCCMS.

Based on costs applicable at SHC, the total costs of care for all 900 patients receiving usual care alone are approximately $600,000 at the conclusion of one year. Total costs of care for patients receiving ER and hospital care under SCCMS, including the costs of the same-day cardiology clinic visits, are approximately $345,000. Program costs include salary support for nurse care managers, including fringe benefits ($135,000 for 1.0 FTE nursing effort) and the requisite costs of computers, Smart Phones and telephone charges to implement SCCMS on a service basis ($15,000), or a total of approximately $150,000. Under the assumptions and projections presented here, SCCMS would be cost-saving . It must be emphasized that these cost projections reflect a 20% annual rate of ER visits. The actual rate may prove to be substantially higher than this. The staffing level of 1.0 FTE for nurse care managers to provide SCCMS on a service basis allows for expansion of the patient caseload at little or no additional cost.

Program costs of SCCMS include nursing effort per patient documented by time-logs kept by the computer software, when nurses are "logged-on", and by time-logs kept by nurses during their contact with patients, physicians, and laboratories. The costs of time devoted by SCCMS cardiologists to telephone contact with patients or with nurse care managers are included in program costs. Additional program costs are for communications services and the clinical research database. The latter include computer systems support, provision of interval reports on individual patients and groups of patients for quality control and generation of reports of medical outcomes on individual patients.

Information for Physicians

Physicians in treatment practice benefit from the ability of the Stanford system to coordinate the care they provide to their patients and to minimize the number of “emergency” and “urgent” transactions that are disruptive to their practice.

Moreover, physicians appreciate the telephone advice that SCCMS nurse care managers provide to their patients and the telephone, email and printed follow-up reports they receive from SCCMS care managers on their patients’ current condition. Thus, SCCMS permits physicians to coordinate care with less disruption to the practice.

Most physicians do not wish to be disturbed during their clinic hours to attend to patient-initiated telephone queries that are rarely true emergencies, much less at night or on weekends.

On the other hand, they appreciate that the SCCMS provides prompt contact with them and for timely advice from the nurse care manager in the event of a true emergency.

Physicians have long relied on nurses and other non-physician personnel to carry out time-critical tasks in the hospital. SCCMS continues this tradition, exclusively in the outpatient arena, before the patient comes to the hospital.
Evidence for the Effectiveness of CMS

A pilot study of the effectiveness of CMS is currently being reviewed. The following report about this pilot study is currently available for download. View the report here.

Information for Employers

The Stanford Chronic Care Management System is a cost-effective innovation that minimizes the impact of disease on the workforce. Because many large employers are self-insured for medical costs incurred by their employees, especially older workers and retirees, innovations such as SCCMS that demonstrably diminish costs while maintaining quality of care are important to their cost control.

The Stanford system helps maintain quality by reducing healthcare costs related to unnecessary ER visits and the hospitalizations that follow them in nearly half the cases.

Employers also appreciate the ongoing advice and instruction provided by SCSCCMS nurse care managers, who help to assure the continuity of care provided by physicians.

Information for Foundations

The SCCMS will be of interest to nonprofit foundations that are concerned with the emerging American healthcare crisis, and are exploring innovations that enhance the quality of medical care and the access to medical care, especially among the underserved.

They may be particularly interested in innovations such as the SCCMS that are highly operationalized, efficient and capable of being readily disseminated into clinical care.

Users of SCCMS services such as public hospitals do not have to bear the costs of training SCCMS nurses or maintaining the computer database application or the telephone triage system that supports SCCMS, because these services can all be provided on a "subscription" basis by the Stanford Cardiac Rehabilitation Program.

Moreover, Stanford staff will work with any healthcare provider or hospital that wishes to adopt SCCMS to train and supervise nurse care managers in the transitional phase of adoption.

Further, healthcare providers may test SCCMS on a trial basis before making a permanent commitment.

Information for Government Agencies

Government agencies such as the Centers for Medicare and Medicaid Services (CMMS) are actively seeking out innovative programs that reduce the costs of care while maintaining the quality of care. Indeed, during the past 5 years, CMMS has sponsored clinical trials of innovations such as care management that were designed to achieve this goal. However, the results of these trials were decidedly mixed and there is no consensus on how to proceed in the future.

The Stanford Chronic Care Management System is one of the most highly leveraged initiatives yet proposed to address the costs of managing chronic medical conditions. SCCMS provides the considerable advantage of first contact with patients, even before 911 and other treatment alternatives are considered. SCCMS enables tailoring of the medical response to the needs of individual patients who initiate telephone contact with the program.

Pilot studies demonstrate that prompt telephone triage substantially reduces the frequency of ER visits and hospitalizations in patients with known coronary artery disease, substantially reducing overall system costs.

It is commonly perceived that major changes in healthcare delivery require many years of study, including randomized clinical trials involving many thousands of patients and costing many millions of dollars. Even when the efficacy of innovations is established, many additional years are often required for the innovation to take hold in treatment practice.

SCCMS is different for the following reasons:

1. The scientific basis of SCCMS, including methods for evaluating prognosis, is already well established.
2. The elements of the telephone triage system linking patients with SCCMS staff and the database used as the repository of clinical data in SCCMS, are already established.
3. The facilities that SCCMS relies on for the delivery of clinical care, including the outpatient clinic, the Urgent Care clinic and the ER, already exist.
4. The only remaining objective required to foster nationwide implementation of SCCMS is the demonstration of the safety of SCCMS and the satisfaction of patients and physicians with SCCMS.

Achieving these benchmarks is now the focus at Stanford. We are conducting clinical research with a variety of collaborators in the healthcare field.

How many patients monitored with SCCMS would be required to assure nationwide dissemination of this system? Between several hundred and several thousand.

Depending on the number of collaborators involved, this level of experience could be obtained within 12 months. It would not be necessary to randomize patients, since the elements of the present system of healthcare delivery have been unchanged for many years. It would be necessary only to match patients receiving SCCMS with those treated under the present system in previous years.

Nearly 15 million Americans have coronary artery disease, and nearly two-thirds of them are 65 or older. All are potential users of SCCMS.

This system could dramatically restructure the care of these patients by shifting the emphasis of care from the ER and hospital to the Urgent Care clinic and the outpatient clinic, resulting in huge savings.

In addition, SCCMS will help to coordinate the follow up care of patients initiating contact with SCCMS, assuring that patients receive optimal doses of recommended pharmacotherapy, and undergo needed tests to direct their future use of revascularization procedures. For example, the “open artery” hypothesis, which held that patients with established coronary artery disease would benefit from opening up previously occluded coronary arteries, even in asymptomatic individuals, was disproven by a major randomized clinical trial. This expands the potential of systematic and meticulous pharmacotherapy to favorably alter the prognosis and functional status of patients with coronary artery disease.

Information for Health Plans and Disease Management Companies

Health plans and disease management firms appreciate the high-quality, cost-effective care that SCCMS enables them to provide.

The SCCMS provides systemic enhancement of care that is also cost effective and readily implemented. They benefit from strategies built into the SCCMS that significantly reduce unnecessary ER visits and hospitalizations, contributing to an overall reduction in the costs of

healthcare. SCCMS is scalable to the needs of large healthcare providers such as Kaiser Permanente that elect to bring the SCCMS in-house by training and supervising their own nurse care managers.

Moreover, built into the SCCMS are measurement parameters that permit demonstration not only of the cost-effectiveness of SCCMS, but also the specific level of satisfaction with SCCMS among patients and among physicians, providing valuable ongoing feedback.

Information for Hospital Systems and Administrators

Public hospitals, which are often the “providers of last resort” for the underserved and indigent, rely on innovations such as SCCMS to protect their continued ability to provide services to their patients.

SCCMS virtually eliminates unnecessary ER visits, which enhances the ability of public hospital ERs to allocate their resources more effectively, and to better meet the needs of those truly in need of emergency services while at the same time providing a higher quality of service to those with chronic conditions.

To further control costs, public hospitals do not have to bear the costs of training SCCMS nurses or maintaining the computer database application or the telephone triage system that supports SCCMS, because these services can all be provided on a subscription basis by the Stanford Cardiac Rehabilitation Program.

Moreover, Stanford staff will work with healthcare providers and hospitals that wish to adopt SCCMS internally by training and supervising nurse care managers in the transitional phase of adoption.

The SCCMS is also offered on a trial basis, providing the opportunity for healthcare providers to understand the full scope of benefits before making a permanent commitment.

Information for Insurance Companies

Insurance companies, particularly non-profit insurers, seek to reduce the total costs of care, yet their success in doing so is limited by the effectiveness of the new alternatives for care that they are provided. The novel approach taken by the SCRP in developing and testing SCCMS relies on a deep background of studies demonstrating the effectiveness of timely telephone contact in coordinating care for various aspects of chronic disease.

Information for Nurses

Nurses are by far the largest group of non-physician care providers in the US, and in recent years they have taken on broader responsibilities for patient care.

Studies of nurse care management systems have demonstrated the effectiveness of nurses in implementing specialized treatment protocols, both in the hospital and in outpatient venues.

Nurses are highly accomplished in communicating with patients, and their success in meeting the broad needs of patients have contributed substantially to the success of nurse-managed programs for chronic disease.

Nurses working under SCCMS have found a high degree of satisfaction in meeting the needs of patients with known coronary artery disease. Their professional demeanor and empathy on the telephone have contributed significantly to the success of SCCMS in managing patients initiating telephone contact with SCCMS.

Information for Patients

Patients have been enthusiastic about the access to prompt professional consultation that SCCMS provides. They see SCCMS as a major upgrade to the healthcare they presently receive.

Healthcare is often equated with access to physicians, yet systems like SCCMS that rely on highly trained non-physician healthcare professionals are widely accepted by the public. For example, individuals who call 911 do not expect that the ambulance that comes to their home will be staffed by a physician, yet the care they are provided en route to the hospital is ultimately directed by physicians, just as physicians ultimately direct SCCMS. Thus, SCCMS does not substitute a non-physician for a physician, but assures the ready availability of a physician when one is needed.

Patients have shown complete willingness to rely on prompt telephone consultation with a SCCMS nurse care manager, providing a major advantage over the status quo in which patients often delay hours or days in seeking emergency care, in part because of the long delays that are often associated with the delivery of care in the ER.

Similarly, patients recognize that the SCCMS is a telephone “safety net” which assures that they will receive ER care when needed, and so they are happy to avoid unnecessary ER visits and the hospitalizations that often follow. Patients recognize that they receive more, not less, care under SCCMS than under the present, uncoordinated system of care.

"My experience with SCCMS and the health care professionals associated with it has been extremely gratifying. The consultations I have received and the help with making heath care decisions has contributed greatly to my overall health and well being. Knowing that I have prompt access to a highly trained nurse care manager who knows my medical history is invaluable." Robert D. Knight

Information for Pharmaceutical Companies

The Stanford system has demonstrated clearly that many patients who were recently discharged from hospitals are taking duplicate medications, and/or omitting prescribed medications. This occurs either because of the lack of coordination between the hospital and the outpatient clinic, or because of lack of effective communication between the prescribing physician and the patient.

The result of duplicates and omission is a significant reduction in the efficacy of pharmacotherapy, which detracts from the reputation of the pharmaceutical manufacturer and the medication itself.

If pharmacotherapy is to play a more prominent role in the treatment of coronary artery disease compared with surgical and other interventional techniques, it is vital that the infrastructure that supports the effectiveness of pharmacotherapy be strengthened. SCCMS is one of the most effective means for doing so.

In fact, pharmaceutical companies have a major stake in assuring that the medications prescribed by physicians are taken by patients in the manner prescribed, and over an extended period. As a result, these companies have invested substantially in methods for enhancing compliance with pharmacotherapy, including support of the care management approach that is incorporated into SCCMS. The database system built into the SCCMS, and the periodic telephone contacts initiated by the nurse care manager, help to assure that actual pharmacotherapy is consistent with prescribed pharmacotherapy, and that any side effects or other untoward effects are addressed promptly.

Use of the SCCMS thus provides a significant and highly cost effective benefit to the pharmaceutical industry.

Answers to Frequently Asked Questions

1. Why should a healthcare organization partner with Stanford to provide SCCMS to its patients?
2. How does Stanford staff work with medical, nursing and IT staffs of participating healthcare organizations to implement SCCMS?
3. What steps are taken to minimize any risk to patients resulting from their participation with SCCMS?
4. What steps are taken to minimize institutional risks to partners resulting from their participation in SCCMS?
5. What capabilities does SCCMS have that other systems do not have?
6. Why should a partner buy SCCMS rather than developing it in house?
7. What types of organizations are most likely to partner with Stanford to expand and refine SCCMS?
8. What skill sets are required by partners wishing to implement SCCMS?
9. What clinical information is required to implement SCCMS?
10. What are the advantages to the primary care physician of his/her patient's participation in SCCMS?
11. What distinguishes Stanford from other groups offering care management programs?
12. What is the process by which a partner acquires the IP underlying SCCMS?
13. How did the Stanford Cardiac Rehabilitation Program conceive of the idea of SCCMS in the first place?

1. Why partner?

Why should a healthcare organization partner with Stanford to provide SCCMS to its patients?

Our skilled staff is available to work with interested healthcare providers to assure that SCCMS is implemented appropriately and that benchmarks of performance are met by the partner organization. While it is quite unusual for a research group to provide services of this type, we do this because we know that it is important to the success of our partners.

2. Working together.

How does Stanford staff work with medical, nursing and IT staffs of participating healthcare organizations to implement SCCMS?

We arrange for a series of carefully structured meetings at the partner's facility to achieve consensus on overall goals and objectives, and to finalize plans for implementing SCCMS.

We establish ongoing telephone, email and videoconferencing contacts with partners to address any problems that may emerge during the implementation process, and monitor program costs, process measures, and clinical outcomes with the partner.

3. Minimizing risk to patients.

What steps are taken to minimize any risk to patients resulting from their participation with SCCMS?

There are two scenarios:

1. Patients enrolled in clinical studies conducted by Stanford in which telephone triage is provided by Stanford staff. As in the past, the Stanford University Institutional Review Board monitors the safety of the project.
2. Patients enrolled by partners' staff and undergo treatment without oversight of the Stanford IRB.

Regardless of which scenario obtains, 4 major levels of safety are incorporated into SCCMS:

1. Education of patients to recognize their own symptoms of importance, and to initiate prompt telephone contact with SCCMS staff at the onset of any symptoms.
2. Immediate availability of telephone contact with SCCMS staff.
3. Routine telephone follow-up by SCCMS in response to all telephone contacts initiated by patients.
4. Immediate availability of patients' medical records to SCCMS staff.

4. Minimizing risk to partners.

What steps are taken to minimize institutional risks to partners resulting from their participation in SCCMS?

Patients' participation in clinical trials of SCCMS conducted by Stanford are provided the protection of the Stanford IRB.

5. Capabilities.

What capabilities does SCCMS have that other systems do not have?

The SCCMS telephone triage approach permits patients who are experiencing cardiovascular symptoms to call the nurse care manager immediately. Past experience has shown that most patients who have discussed their symptoms with the nurse care manager, can remain at home, while some attend a same-day cardiology clinic, and a very small percentage call 911 for transportation to the ER.

In contrast, almost all nurse telephone triage systems advise patients reporting any cardiovascular symptoms to call 911 for immediate transportation to the ER, incurring significant unnecessary costs.

Following a patient-initiated telephone contact, SCCMS provides for routine followup telephone contact with patients to assure continuity of care, and an update of the medical record that is incorporated into a report to the patient's primary care physician.

6. Why outsource?

Why should a partner buy SCCMS rather than developing it in house?

Few health care organizations want to bear the risks and costs of creating new clinical programs such as SCCMS from the ground up. Partnering with SCRP mitigates these risks and costs.

7. Types of organizations.

What types of organizations are most likely to partner with Stanford to expand and refine SCCMS?

Those already in the healthcare delivery field, principally publicly-supported or pre-paid health plans and hospitals that will benefit significantly from more efficient management of patients, including provision of alternatives to the ER, such as same-day clinics. Large healthcare providers that coordinate regional care for patients are also suitable.

Private hospitals, including University-affiliated medical centers, are not generally disposed to adapt SCCMS because their revenue comes from providing ad hoc care to patients requiring ER evaluation.

Disease management companies support the use of SCCMS, so long as they do not breech the existing doctor-patient relationship. However, these companies are often enthusiastic supporters of SCCMS once economic incentives are aligned through prepaid programs for cancer and other chronic conditions.

Potential partners for SCCMS also include information technology firms concerned with developing interoperable medical records.

8. Skills required.

What skill sets are required by partners wishing to implement SCCMS?

There are two general options: intramural and extramural.

Under the intramural option, partners' staff provides telephone triage and followup. Nurse care managers and a supervising cardiologist are required to implement the system. An IT specialist is needed to emulate SCCMS on the partner's existing electronic medical record. A supervising physician, which could be the supervising cardiologist, is needed to evaluate the clinical outcomes and costs of implementing SCCMS and represent the program to administrators responsible for resource allocation. An assistant is needed to provide educational materials to patients and families, and interact with patients at specified intervals by telephone or email regarding clinical outcomes and patients' satisfaction with SCCMS.

Under the extramural option, all functions of patient enrollment, intervention, followup with medical and nursing staff are provided by Stanford personnel and periodic reports on project costs

and clinical outcomes are created by Stanford staff for distribution to the partners' supervising physician.

9. Clinical information required.

What clinical information is required to implement SCCMS?

The main requirement is the documentation of coronary artery disease. The richest source of current, reliable information on patient's current medical status and their future need for medical services is a hospital summary or ER report. In most cases, fewer than 30 clinical variables are required to establish the patient's prognosis and inform decisions regarding the patient's future needs. These data are often found in several sources, including the hospital and ER and the medical records maintained separately by the physicians providing patient care.

Some of the most salient data potentially available from patients enrolled in SCCMS is otherwise unavailable in EMR's maintained by physicians and hospitals. These data concern patients' day to day clinical status, including symptoms, limitations of activities, medications actually taken, health-related habits and encounters with healthcare providers in disparate locations.

The nurse care manager gathers and enters these data, and follows up as needed by telephone to obtain needed details of tests and treatments.

Interoperable electronic medical record systems such as Smart Health, currently under development in Silicon Valley, will facilitate access to data currently residing in multiple electronic medical records operated by clinics, hospitals and physician offices.

10. Advantages to primary care physicians.

What are the advantages to the primary care physician of his/her patient's participation in SCCMS?

Most of the patient-initiated contacts with SCCMS staff are not cardiac emergencies and do not require the immediate attention of the primary physician. The clinical outcomes of patient-initiated telephone encounters deemed to require the immediate attention of the primary physician are summarized and communicated with the physician within 24-72 hours of the patient's initial contact. At the time of the patient's enrollment, the physician can elect to be contacted for all patient-initiated contacts or only those requiring a same-day clinic visit or ER visit. In any case, SCCMS staff follows an established protocol to meet the patient's needs and communicate with the primary physician.

11. The Stanford Cardiac Rehabilitation Program

What distinguishes Stanford from other groups offering care management programs?

We are a nonprofit organization focused on scientific demonstration of the efficacy of care management systems that we have developed. Successful dissemination of new systems like SCCMS requires a deep understanding of how care is presently provided by potential partners and how small changes in partners' existing methods to permit the use of SCCMS. We tailor SCCMS to partners' needs and follow up with them to assure that any issues in the dissemination process are resolved promptly. The Stanford team has experience in medical, nursing, informatics

and administrative issues arising from dissemination of SCCMS into the patient care provided by partners.

12. Acquiring the System.

What is the process by which a partner acquires the IP underlying SCCMS?

An interested partner licenses the intellectual property from Stanford University for a fee negotiated by the Stanford University Office of Technology Licensing.

In addition, partners can provide a directed research grant to Stanford University that supports the efforts of the Stanford team in implementing dissemination research projects focused on demonstrating the cost effectiveness of SCCMS in treatment practice. These grants permit Stanford staff to work with partners to evaluate important benchmarks of success regarding SCCMS. In addition, partners may elect to consult directly with Stanford staff on issues lying outside the scope of the directed research grants.

13. The original idea.

How did the Stanford Cardiac Rehabilitation Program conceive of the idea of SCCMS in the first place?

The idea evolved over nearly 30 years, during which the Stanford team demonstrated the efficacy of successive generations of physician-directed, nurse-managed telephone-mediated care management approaches for the management of chronic cardiovascular conditions.

It was the failure of the last of these studies, conducted in Kaiser Permanente Hospitals 1999-2001 and focused on reducing readmissions for heart failure, that the investigators had an epiphany: to change treatment practice, it is necessary to establish telephone contact with patients at the very outset of symptoms of concern to them, not after they have seen their physicians in clinic or undergone ER evaluation. The “default” decision in these clinical settings is to refer patients from clinic to the ER and from the ER to the hospital. However, if patients call immediately after the onset of symptoms, it is usually possible to resolve their problems without the need for ER visits or hospitalizations.

The Stanford team would not have evolved SCCMS without prior experience in managing non-urgent conditions by telephone. The critical insight came from posing the question “Is this patient having a true cardiac emergency or something else?” Our pilot study provided patients with the means to contact SCCMS staff by telephone on a 24/7 basis. The results of the study indicated clearly that most patient-initiated contacts did not require an emergency response, although a few patients did undergo clinic evaluation on the same day.

The Stanford team is presently conducting a clinical trial of patients enrolled into SCCMS who will be compared with patients receiving usual care in the 2 years preceding the onset of the clinical trial. Stanford is seeking collaboration with various healthcare providers interested in incorporating SCCMS into their clinical practice.

About Us Page

A Brief Description of the Stanford Cardiac Rehabilitation Program

The Stanford Cardiac Rehabilitation Program is a research unit within the Cardiovascular Medicine Division of the Department of Medicine within the Stanford University School of Medicine. During its 33-year existence, beginning in 1974, the research conducted by SCRP has been supported by Federal, foundation and other non-profit sector grants and industry-sponsored grants. The total amount of this support, including University indirect costs, has been approximately $28 M.

In 1996, Stanford University granted an exclusive license to use a care management system for chronic disease developed by SCRP called MULTIFIT to a disease management company currently known as Matria HealthCare, but known at the time as Ralin Medical, Inc. and later CorSolutions.

In addition to the licensing fees, the firm made Directed Research Grants to Stanford University of more than $1 M to support the testing and expansion of the MULTIFIT system by SCRP.

MULTIFIT, now in wide use in the Kaiser Permanente healthcare system, has achieved results similar to those achieved during the Stanford-Kaiser research collaboration that established the efficacy of MULTIFIT.

Stanford University has retained the rights to MULTIFIT.

The SCRP has now developed a second care management system, the Stanford Chronic Care Management System, which is provides telephone triage and followup to enrolled patients with established coronary artery disease who experience recurrent cardiovascular symptoms.

The SCRP has always operated as a non-profit entity with the support of research grants to Stanford University. SCRP wishes to continue this tradition.

An organizing principle of the research is that any clinical trials conducted by the SCRP designed to test or refine the elements of SCCMS are conducted under the aegis of the Committee on Human Subjects at Stanford University. This arrangement is essential to the protection of one of the chief assets of SCRP: adherence to the high standards of safety and objectivity established by

the Committee, including the obligation to disclose any untoward effects of the interventions on patients and to publish the results of the research in high-quality peer-reviewed journals.

There are 3 major principles that guide the dissemination research conducted by SCRP:

1. The clinical outcomes observed in patients receiving the SCCMS intervention (ER and rehospitalization rates, etc.) are systematically compared with outcomes documented in cohorts of clinically similar patients not receiving SCCMS. This permits evaluation of the safety and efficacy of SCCMS.
2. The costs of providing SCCMS to patients, termed program costs, are measured systematically. These costs reflect primarily personnel costs to permit the SCCMS staff to maintain and establish ongoing telephone contact with patients and physicians. Additional program costs are those associated with acquiring baseline data required to establish the database and followup data regarding clinical outcomes and satisfaction of patients and physicians. The costs of adapting the database application developed by SCRP to the needs of individual partners represent additional program costs.
3. The medical care costs (rehospitalizations, ER visits, coronary revascularizations, etc.) incurred by patients enrolled into SCCMS are systematically compared with those of patient cohorts that do not participate in SCCMS. These data help to establish the potential cost reductions achieved by SCCMS and the potential net savings associated with the use of SCCMS.

These elements of the SCRP approach to research help not only to establish the scientific validity of the research, but the feasibility of achieving comparable results in a variety of clinical venues.

Robert F. DeBusk, MD, is Professor of Cardiovascular Medicine at the Stanford University School of Medicine, at Stanford, California. He was educated at Stanford and Harvard Universities. In 1973 he founded and continues to direct the Stanford Cardiac Rehabilitation Program, a research program devoted to the development of integrated systems for chronic disease management.

Nancy Houston Miller, RN, BSN, is the Associate Director of the Stanford Cardiac Rehabilitation Program and adjunct clinical assistant professor at the University of California San Francisco (UCSF) School of Nursing and the Johns Hopkins School of Nursing. She attended the University of Washington School of Nursing where she obtained her Bachelor of Science Degree in Nursing.

Lynda Raby is the Operations Coordinator of the Stanford Cardiac Rehabilitation Program. She has been on the SCRP team for the past 25 years.

A Glossary of Terms

The following terms have been used throughout this web site. The definitions provided below may be helpful in understanding the meaning and intent of SCCMS.

baseline telephone instruction: Instruction provided to patients by the nurse care manager by telephone as part of the enrollment process. The instruction focuses on all aspects of the patient's subsequent telephone interaction with CMS staff as well as training in the recognition of important cardiovascular symptoms.

behavioral intervention: This refers to the fact that patients' psychological status is an important determinant of their effectiveness in summoning help in the event of cardiovascular symptoms of concern. The nurse care manager trains patients to anticipate and overcome their potential reluctance to seek prompt help.

clinical algorithms: These are the rules that determine the advice provided by CMS staff in response to patients' reports of symptoms of concern. The rules match the intensity of the medical response to the risk of a heart attack. For example, most patients determined to be at low risk by the clinical algorithms will be advised by CMS staff to remain at home rather than attending a same-day clinic or calling 911.

clinical dashboard: This metaphor captures the sense of an interval assessment of a patient's status. The patient's status is generally stable and satisfactory or unstable and unsatisfactory. The dashboard also permits a clinician to view the progress of a population of patients.

criteria for eligibility: The chief criterion for eligibility is the presence of coronary artery disease, which places the patient at an increased risk of a heart attack or sudden cardiac death.

criteria for exclusion: These criteria identify patients unable to interact with CMS staff members to implement the treatment program. Examples of exclusion criteria are mental illness, substance abuse and dementia. Patients with these conditions require specific treatments.

MULTIFIT: This is an acronym for the Multiple Risk Factor Intervention Trial, conducted 1988-1991, which was the first clinical trial conducted by the Stanford Cardiac Rehabilitation Program to incorporate multiple interventions simultaneously to enhance recovery from heart attack.

nurse care manager: A CMS-trained nurse care manager is a registered nurse with specialized training in the management of cardiovascular conditions in outpatients, who usually interacts with patients by telephone.

nurse training course: This course, provided by CMS, permits registered nurses to assume the responsibilities of a nurse care manager.

research assistant: This individual is responsible for telephoning patients at specified intervals to determine patients' satisfaction with CMS and obtain data necessary to establish the patient's medical status. This individual has no role in the intervention process.

telephone contact form: This electronic form captures the telephone interactions between the nurse care manager and the patient, whether these interactions are initiated by the patient or the nurse care manager.

telephone triage: This is the process of providing the appropriate advice to patients reporting symptoms of concern by telephone to the nurse care manager. Based on this interaction and the information available prior to the patient's telephone contact, CMS staff recommend that the patient remains at home, visits a same-day clinic or calls 911 for transportation to an ER.

Contact Information

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SCRP Publications

The following SCRP publications are available for download at the National Center for Biotechnology Information web site . Once there, please search for DeBusk RF to see all the publications listed below that do not have an existing direct link to the full text.

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