Stepwise Implementation of a Cardiovascular Risk Management Care Program in Primary Care: A Research Article

Geert Smits (✉ g.smits@pozob.nl)

Julius Center for Health Sciences and Primary Care: Julius Centrum voor Gezondheidswetenschappen en Eerstelijns Geneeskunde <https://orcid.org/0000-0002-6956-0167>

Monika Hollander

Julius Centrum voor Gezondheidswetenschappen en Eerstelijns Geneeskunde

Sander van Doorn

Julius Centrum voor Gezondheidswetenschappen en Eerstelijns Geneeskunde

Michiel Bots

Julius Centrum voor Gezondheidswetenschappen en Eerstelijns Geneeskunde

Research article

Keywords: Primary care, Cardiovascular disease, Programmatic care, Practice Nurse, Implementation

Posted Date: February 19th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-243883/v1>

License: This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background: Primary care plays a pivotal role in sustainable cardiovascular risk management (CVRM) but little is known about the organizational process of implementing the guidelines. The aim of the study was to describe the approach taken by a primary care group to implement the CVRM guideline.

Methods: Stepwise introduction and implementation of a programmatic CVRM care program was organized and facilitated by the care group between April 2010 and April 2012 in 143 affiliated general practices with 190 committed general practitioners (GPs), in the vicinity of Eindhoven, Netherlands. Care group support comprised sufficient staff, support with data extraction based on ICPC and ATC codes and with identification of eligible patients by scrutinizing patient health records and adequate coding of disease conditions.

Results: Within 2 years, patient selection based on availability of structured information on ICPC codes and risk factor levels from the electronic health records, led to 38,082 eligible patients in 2013. October 2020, the CVRM program is still running in 157 practices with 49,380 patients receiving programmatic CVRM care. Linking problems between 8 different electronic health record systems and the multidisciplinary information system for integrated care (Care2You) delayed adequate data collection until the beginning of 2013.

Conclusion: Introduction and implementation of integrated primary care for cardiovascular risk management is feasible when a number of conditions are met: commitment of affiliated GPs, adequate coding of diagnoses and risk factors, a structured approach and additional funding for sufficient staff support. This approach constitutes the basis for long-term follow up and annual evaluation.

Background

Cardiovascular diseases (CVD) are the most important cause of morbidity and mortality in low, middle and high income countries (1, 2). The most important modifiable risk factors for CVD are smoking, unhealthy lifestyle (alcohol consumption, unhealthy diet, physical inactivity), overweight, elevated blood pressure, unfavorable lipid levels and diabetes mellitus. These are considered to be responsible for 80–90% of preventable CVD (3). National and international guidelines have been published to recommend approaches for prevention (4, 5, 6). According to the Prevention Guideline of the European Society of Cardiology “the general practitioner (GP) has a unique role in identifying individuals at risk for CVD and assessing their eligibility for intervention based on their risk profile”(7). In 2009 the PoZoB primary care group started with the development of the cardiovascular risk management (CVRM) care program for their affiliated GPs. A care group is an organization with a legal entity in which health providers work together. The care group is responsible for the coordination and provision of contracted care in a particular region (8). The aim of the CVRM care program is to prevent or reduce the risk of or postpone a new cardiovascular event or complications of previous cardiovascular events. Here we describe how we

introduced and implemented a carefully designed program offered by the care group to affiliated GPs in order to make CVRM care effective and sustainable.

Methods

Study population

Primary care group PoZoB (vicinity of Eindhoven, south-east part of the Netherlands) was founded in 2002 and started with implementing the chronic care programs Diabetes Mellitus type 2 (DM2) and Asthma/COPD (AC) in 2005 and 2008, respectively. At the start of the CVRM implementation project in 2009, the care group comprised 143 GP practices (190 GPs) with 402623 registered patients living in the south-eastern part of the province of Brabant, and the western part of the province of Limburg in The Netherlands.

Identification of suitable patients for CVRM care

The implementation process was initiated in basically three steps; first: identification of patients, second: inclusion/exclusion in the program, and third: treatment and follow-up. Before starting the implementation process, the PoZoB primary care group contacted every individual GP to identify suitability for participation in the CVRM care program, defined as participation in running care programs for diabetes and asthma/COPD, and having sufficient available working hours allowed for the trained practice nurse (PN) and the GP to pay full attention to new patients eligible for integrated CVRM care. If these conditions were met, the identification process started. Identification was based on 2 steps. The first step was extraction of information from the electronic health record (EHR) to identify which patients had an increased risk for cardiovascular disease or a history of cardiovascular disease. Extraction was carried out by a certified organization for multidisciplinary data management and scientific research ("Meetpunt Kwaliteit", since 2015 INZO = Instituut voor ZorgOptimalisatie) based on medical diagnosis, on prescribed medication in patients older than 18 years and on labels that practices already used for identifying patients. Medical diagnosis was linked to the International Classification of Primary Care (ICPC) code and prescribed medication was linked to the Anatomical Therapeutic Chemical (ATC) classification. For the ICPC and ATC codes used for identification see supplementary file 1.

The second step was inclusion or exclusion in the CVRM care program for which the EHR was scrutinized if diagnoses or risk factors were set correct, based on discharge letters from the specialist. Practices were given one year to complete the EHR investigation for correct ICPC codes and labeling, invite patients and start with CVRM care. A mandatory group course was offered to the GP and PN to standardize registration of patients. During this year, all practices were visited two or three times by specialized care group nurses to monitor progress and to discuss unclear diagnoses. If necessary, staff nurses were reachable by phone to discuss in- or exclusion in the CVRM care program.

Criteria for inclusion in the CVRM care program were:

Patients with CVD or kidney disease: (i) documented ischemic or atherosclerotic heart disease (myocardial infarction and angina pectoris), heart failure, atrial fibrillation, aneurysm of the abdominal aorta, peripheral arterial disease, transient ischemic attack, ischemic or hemorrhagic stroke, chronic kidney disease and (ii) primarily treated in primary care and (iii) aged 18 years or above.

Patients at high risk of CVD: (i) a 10 year cardiovascular mortality risk > 5%, based on the SCORE table from the 2006 National Guideline for Cardiovascular risk management (4) or (ii) use of antihypertensive or lipid lowering drugs in men aged ≥ 55 years and women aged ≥ 60 years or (iii) Systolic blood pressure > 180 mm Hg and/or total cholesterol > 8 mmol/l ever measured, independent of the 10 year mortality risk and (iv) primarily treated in primary care and (v) aged 18 years or above.

Exclusion criteria for both groups were: (i) primarily treated by a specialist in hospital or outpatient clinic or (ii) Diabetes mellitus (as they received cardiovascular risk management in a diabetes care program).

Chain Information System

In 2010 a Multidisciplinary Information System for integrated care (Chain Information System, CIS: Care2U) was introduced. CIS data registered by the PN ended up automatically in the EHR. All patients were labeled in the CIS and in the EHR as follows:

- V1: Patients at high risk for CVD, treatment and follow up by the GP/PN
- V2: Patients at high risk for CVD, treatment and follow up by a specialist in hospital or out-patient clinic
- V3: Patients at high risk for CVD, refusing care by a GP/PN
- Z1: Patients with CVD, treatment and follow up by the GP/PN
- Z2: Patients with CVD, treatment and follow up by a specialist in hospital or out-patient clinic
- Z3: Patients with CVD, refusing care by a specialist

Ultimately, only patients who had their treatment and follow up in primary care (V1 and Z1) were included in the CVRM care program.

Measurements

Once the patient was eligible for CVRM care he/she received an invitation letter from the general practice to make an appointment with the PN, who plays a central role in the care program. If the patient did not respond within 2 weeks, the practice assistant called the patient. During the first consultation the patient was asked whether he/she was willing to participate in the CVRM care program. Time for the intake was estimated 45 minutes and was often split in 2 visits to the practice. The intake comprised an interview, check of in- and exclusion criteria, a physical examination and referral for blood testing to determine the cardiovascular risk profile. The main items from the interview the PN conducted with the patient are summarized in Table 1.

Table 1: Summary of the PNs interview

- Physical, psychological and social well-being, stress related problems, sexual problems
- Cardiovascular (familial) history: 1st degree family member (< 60 years) with previous CVD
- Cardiovascular complaints:
 - Chest pain
 - Shortness of breath
 - Palpitations
 - Headache
 - Blurred vision
 - Fatigueless
 - Swollen ankles
 - Leg pain while walking
- Daily food intake:
 - Salt intake less than 6 grams a day
 - 200 grams of vegetables a day and 2 pieces of fruit
 - Eat fatty fish twice a week
 - Reduce saturated fat intake
 - Alcohol intake
- Smoking
- Exercise 30 minutes a day, 5 days a week
- Laboratory results
- Cardiovascular medication use
 - Adherence (based on patients estimate how often medication was forgotten every week)
 - Possible side effects and interactions
 - New prescription(s)

The physical examination, based on the PoZoB protocol that was based on the CVRM guidelines of the Dutch Society of General Practice, assessed blood pressure, height and weight and body mass index (BMI kg/m²), heart rate and waist circumference. Blood and urine samples were taken for fasting glucose, lipids (total cholesterol, HDL, LDL and triglycerides) and kidney function (serum creatinine, estimated glomerular filtration ratio (eGFR) and proteinuria). Blood tests performed less than 3 months ago could also be used. Blood sampling was performed at a local hospital laboratory or at a local diagnostic health center. Based on test results, for patients without a history of a cardiovascular disease and without preventive cardiovascular medication, a 10 year cardiovascular risk was estimated using the SCORE table from the 2006 National Guideline for Cardiovascular risk management (4). For patients younger than 55 (Male) or 60 (Female) years of age the SCORE had to be calculated based on blood pressure or cholesterol levels before starting medication. If the SCORE was < 5%, the patient was not eligible for the CVRM care program.

Treatment and follow-up

After determining the cardiovascular risk profile, the PN made an individual care plan with the patient and supported self-management by informing about CVD or risk factors and motivating the patient to take the lead in coping with it in the best possible way. The PN discussed the individual care plan with the GP, who

had final medical responsibility. The PN was responsible for preparing and discussing the individual care plan with the patient, comprising non-pharmacological and pharmacological treatment.

Although treatment goals were set in shared decision with the patient, in most cases targets values were used according to the National Guideline CVRM 2006. Treatment guidelines and treatment targets based on the Dutch Guideline CVRM 2006 are listed in supplementary 2.

If necessary, the PN referred the patient to a smoking cessation program, a physiotherapist or a dietician. If lifestyle advice resulted in insufficient effect on the risk factors level, blood pressure or lipid lowering medication could be initiated after consultation with the GP. When a cardiovascular event occurred or a patient failed to meet target values for blood pressure or lipids after maximum drug therapy, the GP referred to or consulted a specialist according to the criteria outlined in Table 2.

Table 2. Referral recommendations

Criteria for consultation of a nephrologist:

- Patients < 65 years with a eGFR 45-60 ml/min/1,73 m²
- Rapid deterioration of the renal function (> 3 ml/min/year)
- Patients > 65 years with a eGFR 30-45 ml/min/1,73 m²
- Increase of albuminuria despite adequate pharmacological treatment

Criteria for referral to a specialist

- A new cardiovascular event
- Failure to meet target values despite adequate medication
- Familial dyslipidemia
- Premature, familial or undefined vascular disease
- Suspicion of secondary hypertension.
- Hypertension emerged in a short time and at young age (< 35 years)
- Suspected malignant hypertension (diastolic blood pressure > 120 mm Hg or clinical manifestations appropriate to cerebral complications like reduced consciousness, delirium, confusion, sudden impairment of vision or epileptic phenomena)
- Macro-albuminuria (> 30 ml/min) and/or eGFR (< 30 ml/min/1,73 m²)
- Patients with suspected underlying kidney disease, familial kidney disease or specific sediment abnormalities

Regular follow up was agreed with the patient, depending on presence of comorbidity, complexity, achievement of treatment goals and advice according to the CVRM guideline. Patients were seen at least once a year by the GP to discuss laboratory results and seen 1-3 times a year by the PN to discuss lifestyle improvement and setting of new treatment goals if needed or wanted.

Data registration

Patient data (anamnestic, biometric, laboratory) were collected in the CIS. The CIS automatically called patients for annual blood tests by linking the call to the date of birth. Due to registration problems in the EHR and to linking problems between 8 different EHR systems and the CIS, data collection was delayed and limited at the beginning. In the first quarter of 2013 these problems were finally solved. From April 2013, CIS data were monitored monthly and every practice was able to view their data (process and outcome) any time.

Results

On April 1st 2010, 30 practices (43 GPs) with 87458 registered patients started with the selection process which led to the identification of 11891 patients suitable for integrated CVRM care (13,6 % of the total practice population). Because 400 patients (0,5%) eligible for primary prevention, decided not to take part in the program and for 3037 patients (3,5%) cardiovascular care was delivered in hospital or outpatient clinic, 8454 patients (9,7%) participated in the CVRM care program: 5988 high risk patients (6,8%) and 2466 CVD patients (2,8%). Every 3 months it was possible for practices to start with the implementation and from October 1st 2010 the remaining 113 practices gradually started. April 2012, all 143 practices had started with programmatic CVRM care, with another 8 practices starting in 2013, 2014 and 2015. The number of patients participating in programmatic CVRM care, patients under specialist care and patients refusing CVRM care between 2010 and 2020 are listed in table 6.

Table 3: Number of patients, eligibility and patients participating in programmatic CVRM care

Year	2010*	2011*	2012*	2013*	2014*	2015**	2016**	2017**	2018**	2019**
Registered pat	87458	378099	402623	406119	416433	422296	401077	405956	422452	436009
Eligible	11891	50938	55015	61709	63846	65692	64877	65166	67194	68989
(%)	13,6	13,5	13,7	15,2	15,3	15,6	16,2	16,0	15,9	15,8
Programmatic CVRM care	8454	32666	38082	41233	44245	45818	46055	44405	46834	49380
(%)	9,7	8,6	9,5	10,2	10,6	10,8	11,5	10,9	11,1	11,3
Specialist Care	3037	10978	11606	12643	12450	11857	10390	9899	9592	9374
(%)	3,5	2,9	2,9	3,1	3,0	2,8	2,6	2,4	2,3	2,1
Refusing care	400	7293	5302	7833	7151	8017	8432	10812	10768	10235
(%)	0,4	1,9	1,3	1,9	1,7	1,9	2,0	2,7	2,5	2,3

*Numbers from annual accountability reports

** Numbers from quarterly feedback reports

Discussion

Summary

The aim of this paper was to provide insight into how a chronic care program can be introduced and implemented in daily general practice. As yet, there is limited to no data on how to organize effective indicated prevention of CVD in primary care. With a well-defined protocol for introduction and implementation developed by the care group, commitment of affiliated GPs, a structured approach and sufficient staff support we were able to organize indicated prevention for high risk patients.

Our approach constitutes the basis for evaluation of the effects of the CVRM care program in routine clinical practice.

Strengths And Limitations

With all participating practices being affiliated to the care group, optimal reach, adoption and implementation of the CVRM program was assured. With 190 affiliated GPs, 402623 registered patients and 38082 participating patients (January 2013) living in rural, suburban and urban areas, the PoZoB care group is a representative sample of Dutch GPs. The Dutch National Guideline for cardiovascular risk management 2006 has provided criteria to identify high risk patients. When using structured files in the EHR as primary source for identification of eligible patients, the completeness and correctness relies on the ICPC and ATC coding of patients performed in general practice. The proportion of potentially eligible patients per practice based on ICPC and ATC codes varied between 14,8% and 30,3%, suggesting that inadequate coding may exist, potentially leading to a considerable number of high risk patients who unfortunately remain out of sight. This is in line with an evaluation in 2012 of ICPC coding in 311 Dutch practices showing that ICPC coding varied substantially between practices and between EHRs (9). We emphasize that adequate coding of disease and medication is an important prerequisite for implementation of a CVRM program in general practice. Another consideration is that most patients (men ≥ 55 y, women ≥ 60 y) with prescribed medication for hypertension and hypercholesterolemia were automatically included in the CVRM care program, while we did not know whether the diagnosis hypertension and hypercholesterolemia was set correctly according to the National CVRM Guideline (4), which may have led to overrepresentation. Monitoring the CVRM care program by means of quarterly reports ensures that results can be followed closely and adjusted if necessary. This is in line with the principles of the "Learning Healthcare System" (LHS) in which daily care data from electronic health records are compared and discussed to create continuous learning and improved health care delivery (10).

Comparison with existing literature

According to Grol et al (11,12), commitment for chronic care, a stepwise and structured approach, sufficient staff support and implementation with regular feedback, are important facilitators. Organizational changes in patient care, in terms of enhancing performance of non-physicians (practice nurses), computer systems supporting in reminders and clinical decision support are known to be effective in improving patient care with reduced costs and patient outcomes improve with multidisciplinary teams and integrated care services (13).

Implications for research and/or practice

Using a Multidisciplinary Information System for data collection gives the opportunity for monitoring (i) the development of the CVRM care program and (ii) performance of individual practices based on process and outcome indicators over a long period of time. With annual collection of biometric and laboratory data it is possible to assess improvements in cardiovascular risk factors and reduction in cardiovascular events. In feedback meetings GPs and PNs were able to discuss further development of the care program and in meetings between PNs and nurse staff experiences were exchanged. As such, evaluation follows a qualitative approach according to the RE-AIM framework, which is based on 5

elements (Reach, Effectivity, Adoption, Implementation, Maintenance) for assessing the impact of innovation on individual and organizational level (14,15). The CVRM care program provides a solid basis for scientific evaluation on registration and outcomes of CVRM care and its determinants to explore practice variation and identify modifiable factors for improvement. Real-world data, which are becoming increasingly important in providing evidence of treatment effectiveness in clinical practice, allow us to evaluate the effect of our program in terms of improved cardiovascular outcomes and reduced cardiovascular events, and against which costs.

Abbreviations

PoZoB: Praktijkondersteuning Zuidoost Brabant; CVRM: Cardiovascular risk management; GP: General Practitioner; ICPC: International Classification of primary Care; ATC-codes: Anatomical Therapeutic Chemical-codes; CVD: Cardiovascular diseases; DM: Diabetes mellitus; COPD: Chronic Obstructive Pulmonary Disease; PN: Practice Nurse; EHR: Electronic Health Record; CIS: Chain Information System; SCORE: Systematic Coronary Risk Evaluation; LHS: Learning Healthcare System; REAIM: Reach Effectivity Adoption Implementation Maintenance

Declarations

Ethical approval Not applicable. All methods including the care groups protocol for data extraction, identification, examination and follow up were based on the Dutch National Guideline for CVRM 2006.

Consent for publication Not applicable

Availability of data and materials No patient data have been used for this paper

Competing interests The authors declare that they have no competing interests

Funding This research received no specific grant from any funding agency in the public, commercial or non-profit sectors

Author Contributions The PoZoB Care Group designed the implementation protocol. GS drafted the first version of the manuscript. MH, SD and MB critically reviewed and revised the manuscript before providing final approval.

Acknowledgements The contributing members of the PoZoB care group are listed alphabetically: Romeijnders A, MD, GP, medical director of PoZoB

Rozema H, Manager care program Cardio Vascular Risk Management

Wijnands C, Msc, epidemiologist

References

1. Global Health Estimates 2016: Deaths by Cause, Age, Sex, by Country and by Region, 2000-2016. Geneva, World Health Organization; 2018.
2. GBD 2013 DALYs and HALE Collaborators. Global, regional, and national disability-adjusted life years(DALYs) for 306 diseases and injuries and healthy life expectancy (HALE) for 188 countries, 1990-2013: quantifying the epidemiological transition. *Lancet*. 2015 Nov 28;386(10009):2145-91. doi: 10.1016/S0140-6736(15)61340-X. Epub 2015 Aug 28. PubMed PMID: 26321261; PubMed Central PMCID: PMC4673910.
3. Yusuf S et al. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): a case control study. *Lancet* 2004; 364: 937-52.
4. Smulders YM, Burgers JS, Scheltens T, van Hout BA, Wiersma T, Simoons ML; Guideline development group for the Dutch guideline for multidisciplinary cardiovascular risk management. Clinical practice guideline for cardiovascular risk management in the Netherlands. *Neth J Med*. 2008 Apr;66(4):169-74. Review. PubMed PMID: 18424866.
5. NHG Standaard Cardiovasculair risicomanagement (eerste herziening) *Huisarts Wet* 2012;55(1):14-28.
6. Nederlands Huisartsen Genootschap NHG-standaard Cardiovasculair risico management (tweede herziening). *Huisarts Wet* 2019; 62(4):55-7
7. Piepoli MF, Hoes AW, Agewall S et al. 2016 European Guidelines on cardiovascular disease prevention in clinical practice. The Sixt Joint Task Force of the European Society of Cardiology and Other Societies on Cardiovascular Disease Prevention in Clinical Practice (constituted by representatives of 10 societies and by invited experts) Developed with the special contribution of the European Association for Cardiovascular Prevention & Rehabilitation (EAPCR). *European Heart Journal* 2016 August 1;37(29):2315-2381.
8. v Til JT, de Wildt JE, Struis JN: De organisatie van zorggroepen anno 2010. Huidige stand van zaken en de ontwikkelingen in de afgelopen jaren. RIVM rapport 260332001/2010 www.rivm.nl
9. Visser S, ten Veen P, Verheij R: Kwaliteit van ICPC-codering. *Huisarts Wet* 55(10), Oktober 2012, p 459.
10. Maddox TM et al: The Learning Healthcare System and Cardiovascular Care. A Scientific Statement from the American Heart Association. *Circulation* 2017;135:e826-e857. DOI:10.1161/CIR.0000000000000480.
11. Grol R, Braspenning J, Dijkstra R, Hulscher M, Wensing M. Implementation of NHG guidelines: success or problem? *HuisartsWet* 2010;53(1):42-6.
12. Grol R, Grimshaw J. From best evidence to best practice: effective implementation of change in patient care. *Lancet* 2003; 362: 1225-30.
13. Wensing M, Wollersheim H, Grol R. Organizational interventions to implement improvements in patient care: a structured review of reviews. *Implementation Science* 2006, 1:2 doi:10.1186/1748-5908-1-2
14. Holtrop JS, Rabin BA, Glasgow RE: Qualitative approaches to the use of the RE-AIM framework: rationale and methods. *BMC Health Services Research* (2018) 18:177

<https://doi.org/10.1186/s12913-018-2938-8>.

15. Gaglio B, Shoup JA, Glasgow RE. The RE-AIM framework: A Systematic Review of Use Over Time. *Am J Public Health*. 2013;103:e38–e46. doi:10.2105/AJPH.2013.301299.