

# **Practice accreditation to improve cardiovascular risk management in general practice**

Elvira Nouwens

The studies presented in this thesis have been performed at the Scientific Institute for Quality of Healthcare (IQ healthcare). IQ healthcare is part of the Radboud Institute for Health Sciences (RIHS), one of the research institutes of the Radboud University Nijmegen Medical Center.

Financial support by the Scientific Institute for Quality of Healthcare (IQ healthcare) for the publication of this thesis is gratefully acknowledged.

**Print**

De Raddraaier, Amsterdam

**Design**

Femke Herregraven

**ISBN**

978-94-6279-081-0

Nijmegen, 2015

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Chapter 5 – The Netherlands Journal of Medicine

Chapter 6 – American Journal of Managed Care

Chapter 7 – BMJ Publishing Group Ltd.

# **Practice accreditation to improve cardiovascular risk management in general practice**

Proefschrift

ter verkrijging van de graad van doctor  
aan de Radboud Universiteit Nijmegen  
op gezag van de rector magnificus prof. dr. Th.L.M. Engelen,  
volgens besluit van het college van decanen  
in het openbaar te verdedigen op donderdag 26 februari 2015  
om 14.30 uur precies

door

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# Chapter 1

## Introduction

## INTRODUCTION

This thesis concerns the effectiveness of a practice accreditation program on the quality of care in general practice with respect to patients with established cardiovascular diseases. Accreditation in healthcare is a widely used method to assess and improve the quality of healthcare organizations. Most accreditation systems assess the performance of organizations by comparing and appraising their compliance with standards, using methods such as self-assessment surveys, data review and structured visits by surveyors.<sup>1</sup> Despite the substantial worldwide investments in accreditation, the evidence-base supporting its effectiveness is weak and contradictory.<sup>2</sup> Given the time investments and effort required to implement accreditation programs it is important to know which program components and contextual factors contribute to the effects of accreditation on quality and outcomes of healthcare. In this thesis we explore the effectiveness of accreditation in general practice and explore which contextual factors contribute to its impact. We focus on patients with established cardiovascular diseases. Management of this group of patients remains high on the professional and societal agenda.

### Accreditation

In many healthcare systems, regulatory strategies have been established for performance assessment such as, practice accreditation, pay-for-performance, and public reporting of performance scores.<sup>3</sup> These regulatory strategies to enhance quality of health care have been developed and implemented worldwide.<sup>4-6</sup> Nevertheless, substantial numbers of patients do not receive recommended care and some provided care is potentially harmful or unnecessary.<sup>7,8</sup> Regulation of healthcare providers has three main purposes. The first is to ensure that minimally acceptable standards of care are met. The second is to provide accountability of quality of care to authorities, purchasers and the public. The third aim is to enhance quality of care by providing insight into current practice and fostering improvements in performance.<sup>9</sup> Accreditation programs may have positive effect on quality and safety of clinical care and organizational performance, but available studies mostly are observational and focused on hospitals.<sup>10</sup>

In recent years many countries implemented accreditation programs also in general practice. However, in most health systems practice accreditation has yet to become widely accepted by general practitioners (GPs).<sup>11</sup> To enhance continuous improvement in general practice, the Dutch College of General Practitioners (DCGP) initiated

a formal accreditation and improvement program. This practice accreditation program in the Netherlands is a service, which has been offered since 2005. Practices have to comply to some minimum standards in order to be eligible for participation.<sup>12</sup> It is a comprehensive program including elements of clinical performance, practice organization and patient experiences. The program strongly focuses on chronic illness care, particularly diabetes mellitus (DM), asthma, COPD, and cardiovascular disease (CVD). The practice accreditation program comprises, firstly, a comprehensive audit and written feedback to the practice. This feedback covers a range of clinical domains (CVRM, DM, asthma and COPD), practice management, and patient experiences and consists of a comparison with benchmarks of other general practices and helps to identify substandard performance domains. The second obligatory component, the planning of improvements in the practice according to the principles of quality management, is based on this feedback. Practices which perform the procedure as planned are all accredited, so accreditation does not imply that a certain minimum score on performance indicators has been obtained. Practices receive a certification for the time period of one year which demonstrates (to the public) their involvement in continuous quality improvement. Every year the practice will be audited and every year new improvement plans have to be formulated. The practice accreditation program in the Netherlands is an innovative approach of accreditation because of its focus on learning and improving using improvement plans, and therefore distinguishing itself from other accreditation programs.

### **Cardiovascular risk management in general practice**

In the Netherlands, the majority of CVD patients are treated in general practices.<sup>13</sup> Many activities have been developed to prevent CVD in public health and in general practice.<sup>14,15</sup> Despite these activities and a range of practice guidelines,<sup>16,17</sup> many individuals receive suboptimal cardiovascular risk management. Many cardiovascular disease patients do not attain the lifestyle, risk factor and therapeutic targets that are recommended.<sup>17,18</sup>

A completely revised practice guideline on cardiovascular risk management was published by the DCGP late 2005 and a slightly revised version of this was published in 2006.<sup>19</sup> The latest set of guidelines contain important changes in recommendations, such as different cut-off levels (e.g. LDL<2,5 mmol/l and SBP<140 mmHg) and higher treatment targets for clinical intervention. The recommendations on cardiovascular risk management are based on explicit prediction of cardiovascular adverse events and on efficiency considerations regarding preventive interventions. Life style advice is targeted at stop smoking, physical

exercise, healthy diet, weight reduction, and moderate alcohol use. Pharmacological treatment comprises cholesterol lowering drug therapy, antihypertensives, antithrombotic medication, and other disease specific medication. Usual care is unlikely to meet the new treatment targets. The DCGP has developed a number of products and activities to implement these guidelines, including a national kick-off conference for GPs (December 2005) and a supportive package ('kwaliteitskoffer') used in the accreditation program consisting of educational materials and software for assessment of cardiovascular risk.

Better structuring of (primary) health care for patients with chronic diseases is expected to result in better outcomes for patients and societies.<sup>20</sup> In the Netherlands, disease management programs are governed by so called "care groups". A care group is an organization of 50-100 general practices which is responsible for the coordination and provision of contracted care in a particular region.<sup>21</sup> Almost all care groups in the Netherlands have a bundled payment contract for the diabetes care program. However, few care groups have focused on CVD in the years that the research in this thesis was done.

This thesis addresses the effect of practice accreditation on quality of care in general practice with respect to cardiovascular risk management. It is divided in two sections. The first section explores the effects of practice accreditation in general practice and its influence on quality of care in the context of cardiovascular care in general practice. The second section concerns aspects of care with a possible influence on the quality of cardiovascular care in general practice.

In the Netherlands general practice is part of primary care. In the articles in this thesis, the terms general practice and primary care both are used.

### **Section 1**

#### **Accreditation in general practice**

Internationally, an increasing number of practice accreditation programs have been developed to assess and enhance quality and safety in general practice.<sup>11</sup> Research evidence about the impact on quality of healthcare of regulatory interventions including accreditation is primarily drawn from observational studies. This implies that the links between regulation and improvements in quality cannot be interpreted as causal effects. Furthermore most studies are situated in the US, making the contextual interpretation challenging for other countries.<sup>22</sup> A study of practice accreditation in general practices showed that it improved aspects of practice organization, but this study did not measure or

assess impact on clinical processes or outcomes.<sup>23</sup> Overall, research evidence on effectiveness and efficiency of practice accreditation is limited.<sup>3,22,24</sup> Effects of accreditation on clinical performance, organizational processes and financial status are inconsistent and most studies were done in hospitals.<sup>25</sup>

The added value of formal accreditation in general practice remains unclear as most studies on accreditation have reported associations with quality of care in observational study designs. Furthermore, the organizational impact of accreditation programs remains unclear because of inconsistent findings in literature.<sup>25</sup> Also more research is needed on tailoring methods, as not every GP needs the same type of intervention.<sup>26</sup>

In the first section of this thesis we first present the study protocol of the cluster randomized trial we performed as the studies in this section are based on data resulting from this trial. Chapter three reports the effects that we found in the cluster randomized trial. In chapter four we describe the process evaluation, which identified factors and processes related to the effects of the practice accreditation program.

**Section 2**

**Contextual factors of influence on cardiovascular risk management in general practice**

There are numerous contextual factors that can influence the quality of care provided by health professionals. In the second section of this thesis we will draw attention to three potential contextual factors: patients' comorbidity, substitution of care from GPs to nurses, and indicator development.

Patient-related factors as the presence of comorbidity in CVD patients may have consequences for treatment outcomes.<sup>27-29</sup> Although adherence to a guideline for one disease may have a negative effect in treatment of a co-existing disease, practice guidelines tend to ignore comorbidity.<sup>29</sup> Whether higher guideline adherence results in better health outcomes in patients with comorbidity is, as yet, unclear. In chapter 5 we explore the impact of diabetes and Chronic Obstructive Pulmonary Disease (COPD) on measures of cardiovascular risk management in patients with established cardiovascular disease. The preventive treatment of DM, COPD and CVRM is overlapping, which is illustrated by overlapping quality indicators.<sup>19,30,31</sup>

Practice development, particularly the introduction of practice nurses, could be crucially important to organize and provide structured chronic care.<sup>32</sup> In general practice across the world clinical tasks have

been shifted from physicians to nurses at varying degree. Re-allocation of such tasks from GPs to nurses has been found to be associated with improved, or at least equivalent, quality and outcomes of chronic disease care.<sup>33-37</sup> In chapter 6 we outline the potential contribution of task allocation to nurses in general practice on the implementation of structured chronic care in general practice for patients with cardiovascular conditions.

Indicators for assessing quality and outcomes of healthcare delivery provide health care professionals feedback to enhance learning and improvement of clinical practice.<sup>38</sup> Indicators should be valid and reliable and therefore need to be developed and evaluated systematically.<sup>39</sup> Nevertheless methodological questions on indicator development procedures remain.<sup>40-47</sup> In chapter 7 we will present a study in which we performed an indicator set development procedure comparing the results of different procedures and different panels.

In table 1 the main research questions and research methods are summarized.

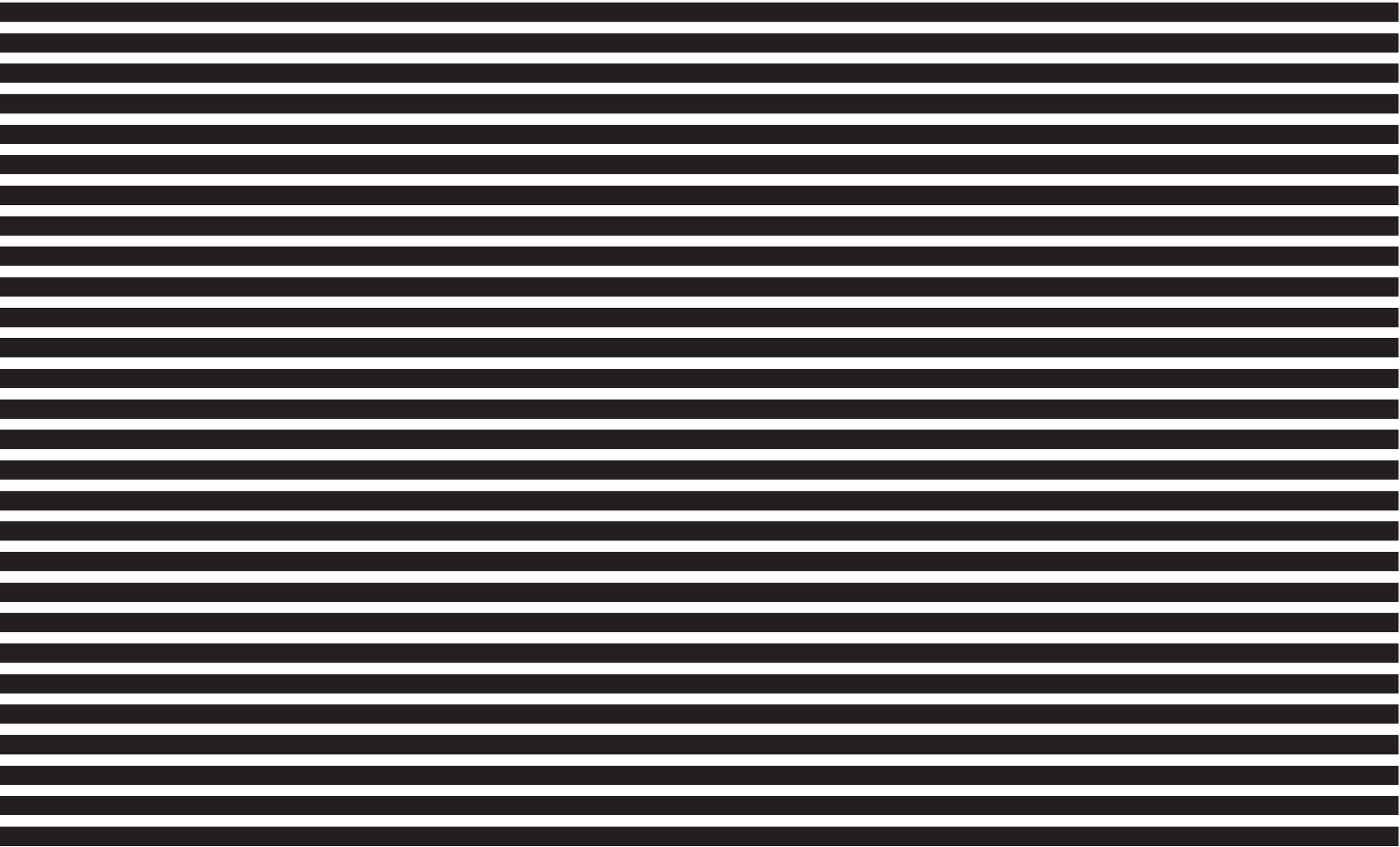
**Table 1. Overview of research questions and methods used in this study.**

Chapter	Research Question	Research methods	Measures
3	What is the effectiveness of improvement plans in practice accreditation in general practice?	RCT, block randomization design	Medical record audit
4	What factors and processes related to the practice accreditation program can be identified? Does organizational and policy context influence its outcomes?	Qualitative study	Interviews with quality coordinators
5	What is the impact of DM and Chronic Obstructive Pulmonary Disease on measures of cardiovascular risk management in patients with established cardiovascular disease?	Observational study	Medical record audit
6	What is the potential contribution of task allocation to nurses in general practice on the implementation of structured chronic care in general practice for patients with cardiovascular conditions?	Observational study	Practice questionnaire
7	Do different indicator development procedures give different indicator sets for cardiovascular risk management? What is the influence of Delphi panel composition on the indicator selection?	Rand modified Delphi procedure	Questionnaire by e-mail

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## Chapter 2

# Effectiveness and efficiency of a practice accreditation program on cardiovascular risk management in primary care: study protocol of a clustered randomized trial

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**ABSTRACT****Background**

Cardiovascular risk management is largely provided in primary healthcare, but not all patients with established cardiovascular diseases receive preventive treatment as recommended. Accreditation of healthcare organizations has been introduced across the world with a range of aims, including the improvement of clinical processes and outcomes. The Dutch College of General Practitioners has launched a program for accreditation of primary care practices, which focuses on chronic illness care. This study aims to determine the effectiveness and efficiency of a practice accreditation program, focusing on patients with established cardiovascular diseases.

**Methods/design**

We have planned a two-arm cluster randomized trial with a block design. Seventy primary care practices will be recruited from those who volunteer to participate in the practice accreditation program. Primary care practices will be the unit of randomization. A computer list of random numbers will be generated by an independent statistician. The intervention group (n = 35 practices) will be instructed to focus improvement on cardiovascular risk management. The control group will be instructed to focus improvement on other domains in the first year of the program. Baseline and follow-up measurements at 12 months after receiving the accreditation certificate are based on a standardized version of the audit in the practice accreditation program. Primary outcomes include controlled blood pressure, serum cholesterol, and prescription of recommended preventive medication. Secondary outcomes are 15 process indicators and two outcome indicators of cardiovascular risk management, self-reported achievement of improvement goals and perceived unintended consequences. The intention to treat analysis is statistically powered to detect a difference of 10% on primary outcomes. The economic evaluation aims to determine the efficiency of the program and investigates the relationship between costs, performance indicators, and accreditation.

**Discussion**

It is important to gain more information about the effectiveness and efficiency of the practice accreditation program to assess if participation is worthwhile regarding the quality of cardiovascular risk management. The results of this study will help to develop the practice accreditation program for primary care practices.

## BACKGROUND

Cardiovascular diseases (CVD) remain an important cause of mortality and morbidity worldwide. In public health and in primary care, many efforts have been made to prevent CVD.<sup>1,2</sup> Although cardiovascular care has improved in recent years,<sup>3</sup> a substantial number of individuals receive suboptimal cardiovascular risk management (CVRM) and do not attain the lifestyle, risk factor, and therapeutic targets that are recommended.<sup>4,5</sup> A range of interventions to improve healthcare delivery is available.<sup>6-8</sup> In recent years, programs have been developed for performance indicators, accreditation, pay-for-performance, and public reporting.<sup>9</sup> These approaches make use of market forces and pressure for accountability, but research evidence on effectiveness and efficiency is limited.<sup>9-11</sup>

The slow improvement of cardiovascular primary care may be caused by the one-off and condition-specific character of many improvement activities (e.g., a continuing education session or audit without follow-up). To enhance continuous improvement in primary care in the Netherlands, the Dutch College of General Practitioners (DCGP) initiated in 2005 a nationwide comprehensive practice accreditation program for primary care practices. This program consists of a systematic audit on the basis of validated performance indicators for diabetes mellitus, CVRM, asthma, chronic obstructive pulmonary disease (COPD), practice organization, patient experience, educational feedback to practices, the requirement to develop structured improvement plans, and a check on the implementation of these plans after one year. If the procedure is performed, primary care practices receive a certificate that provides accreditation for a time period of one year. While accreditation serves a range of purposes, improvement of professional performance and practice organization are prominent among these.<sup>12-14</sup> While the impact of audit and feedback is mixed and moderate,<sup>15</sup> it is unknown what the added value of the accreditation procedure is. A study of practice accreditation in German primary care practices showed that it improved aspects of practice organization, but this study did not measure or assess impact on clinical processes or outcomes.<sup>16</sup> Given the resources invested in accreditation schemes and the high expectations, an evaluation of the impact on quality and outcomes of care is needed.

A substantial number of performance indicators used in the practice accreditation program is related to CVD. These indicators are derived from the completely revised guideline on CVRM that was published by the DCGP late 2005.<sup>17</sup> The new set of guidelines on CVRM describes the clinical interventions to be implemented in patient care

in this project. They contain important changes in recommendations, such as different cut-off levels (e.g., LDL-cholesterol <2.5 mmol/l and systolic blood pressure <140 mmHg). The DCGP has developed a number of products and activities to implement these guidelines, including a national kick-off conference for general practitioners (GPs) in December 2005, and a supportive package ('kwaliteitskoffer') consisting of educational materials and software for assessment of cardiovascular risk. The practice accreditation program is an important approach to improve primary care, but controlled evaluations of its effect have not yet been done.

### Aims and objectives

The overall aims of the study are to determine the effectiveness and efficiency of the practice accreditation program in primary care, focused on its effect on CVRM. Key objectives are:

1. To determine the effectiveness of the program on primary performance indicators for CVRM by comparing practices in the accreditation program that focus their improvement plans on CVRM to practices in the accreditation program that focus their improvement plans on other domains of chronic care. Primary outcomes are documented controlled blood pressure, serum cholesterol, and prescription of recommended preventive medication (effect evaluation).
2. To determine the potential effect of the program on other indicators for CVRM, self-reported goal attainment in the intervention group, and unintended consequences. Secondary outcomes are all other indicators for CVRM, self-reported goal attainment in the intervention group, and unintended consequences (effect evaluation).
3. To determine the economic efficiency of the program in the observed period regarding the primary outcomes.
4. To explore what factors and mechanisms are associated with change (or absence of change) of performance in CVRM.

## METHODS/DESIGN

### Trial design

The study design is a cluster randomized controlled trial with a block design, considering primary care practices as units of clustering.

### Ethical approval and informed consent

The Medical Ethics committee Arnhem-Nijmegen waived approval for this trial. At follow-up practices will send a letter of invitation and informed consent to 100 patients with established CVD. Patients return their letter with informed consent to Radboud University Nijmegen Medical Centre with permission for audit of their medical records. The privacy of the participating patients will be protected, and all data will be coded and processed anonymously. For the baseline-measurement, mandatory information on indicators for patients with established CVD will be used, collected by practices on behalf of the practice accreditation program.

### Participants

#### *Primary care practices*

Seventy primary care practices will be recruited from practices in the Netherlands who voluntarily apply to start the practice accreditation program. An invitation letter for the study will be sent as part of the instruction manual for the program. Practices with a clear preference for a specific improvement plan will be excluded from participation in the study while participating practices will be randomized to a group which starts with an improvement plan on CVRM or to a group that does not. This also accounts for practices that participate in regional programs for enhancing disease management.

#### *Patients*

The study focuses on patients with established CVD. This includes patients with angina pectoris, acute myocardial infarction in their medical history, other chronic ischemic heart diseases, transient ischemic attack (TIA), ischemic stroke, peripheral arterial disease, and aneurysma aortae. Selection of patients out of electronic medical records with these conditions will be based on corresponding diagnostic International Classification of Primary Care codes (ICPC-codes K74, K75, K76, K89, K90.3, K92.1 and K99.1), a worldwide system to label conditions in primary care.<sup>18</sup>

### *Randomization*

General practices will be the unit of randomization. A computer list of random numbers will be generated by an independent statistician and then used to randomly allocate practices to equally sized intervention group or control group. This will be done in a randomized block design in blocks of four practices in order of enrolment. We assume that improvement activities in the control group will not influence cardiovascular care.

### *The practice accreditation program*

The practice accreditation program is an existing procedure provided since 2005 by an independent body (NPA) that has a license to use the accreditation procedure developed by the DCGP. The DCGP remains responsible for the content and further development of the procedure; it will be responsible for adequate delivery of the practice accreditation program in this study. The practice accreditation program comprises, firstly, of a comprehensive audit (using validated performance indicators) and written feedback to the practice, which covers a range of clinical domains (mainly chronic diseases), practice management, and patient experiences. The feedback, which consists of a comparison with benchmarks of other primary care practices, is discussed with a non-physician observer in a feedback consultation and helps to identify substandard performance. The second obligatory component, the planning of improvements in the practice according to the principles of quality management, is based on this feedback. The practice team is supported by a trained non-physician consultant. Practices that perform the procedure as planned are all accredited, so accreditation does not imply that a certain minimum score has been obtained (the latter is usually labeled certification). In the practice accreditation program, validated instruments are used: the Visit Instrument to assess Practice management (Visitatie Instrument Praktijkvoering, VIP),<sup>19</sup> clinical performance, and Europep.<sup>20</sup> Practices in the program receive a reimbursement of some insurance companies consisting of a bonus per patient per year. Furthermore they receive a certification for the time period of one year that demonstrates (to the public) their involvement in continuous quality improvement. Every year the practice will be audited, and every year new improvement plans have to be formulated that have to be approved by the auditor.

### *Intervention group*

The intervention starts with volunteering for the practice accreditation program. After enrolment for the study, practices will be contacted by

telephone for further explanation of the study protocol and to schedule the data collection. After data is collected, practices are randomized. Practices allocated to the intervention group are instructed to focus their improvement plans on cardiovascular diseases in the first year of the program.

*Control group*

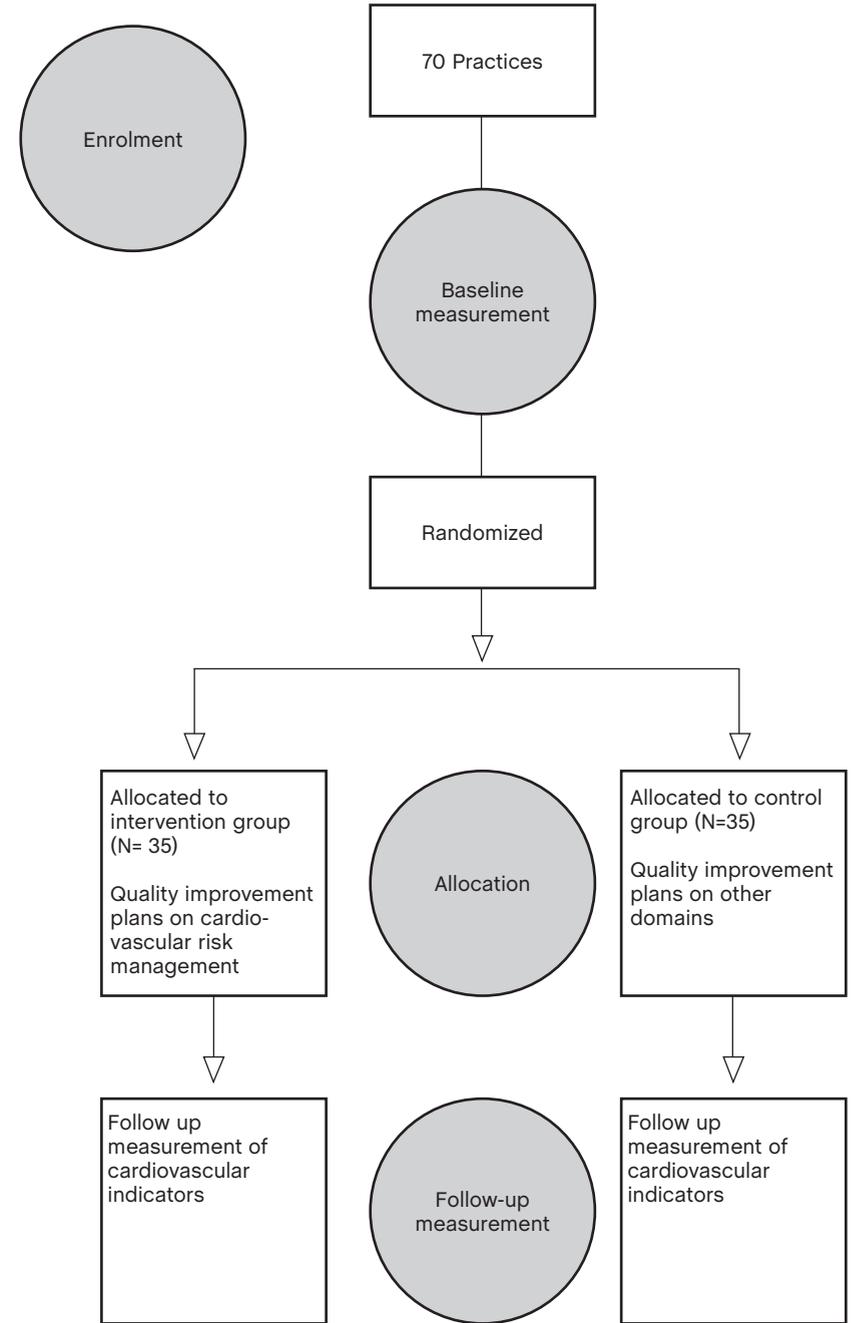
The control group also starts with volunteering for the practice accreditation program and follows the same routine as described for the intervention group. Practices allocated to the control group are instructed to focus their improvement plans on other domains than cardiovascular disease and diabetes mellitus (they may target CVD later after the study period of one year). They are instructed to focus their improvement plans on other clinical areas than CVD or diabetes.

Both intervention and control group receive feedback on CVD indicators as part of the normal practice accreditation program. Practices in the intervention group are instructed to set targets related to process and outcomes of cardiovascular care (and not just focused on improvement of registration of cardiovascular disease in the medical record system). All practices will receive a minimum of four hours of support by outreach consultants for no cost, which is available in all regions. Also, the practices are provided with examples of improvement plans, which saves time and would make study participation more attractive.

*Measurement procedures*

In each practice, measurements are done at baseline and at follow-up (Figure 1). At baseline, medical records of 40 patients with established CVD are audited as part of the clinical performance measurements in the practice accreditation program. Data on performance indicators of CVRM as included in the practice accreditation program will be used for the analysis. At follow up, the following measurement methods will be used: medical record audit based on the same indicators of CVRM as in the baseline measurement, patient questionnaires, and a semi-structured interview for a contact person in each practice. Data will be collected consistently as this is done by two persons with similar training.

Figure 1. Flow diagram



### Measures of effectiveness

The effect evaluation aims to determine the effectiveness of the program on primary performance indicators for CVRM and to determine the potential impact of the program on other indicators for CVRM, self-reported goal attainment in the intervention group, and unintended consequences.

Primary outcomes have been selected from the 20 quality indicators for established CVD<sup>21</sup>, which were developed by DCGP (Table 1), and are:

1. The percentage of patients in the practice with known established CVD who have systolic blood pressure below 140 mmHg.
2. The percentage of patients in the practice with known established CVD who have LDL cholesterol below 2.5 mmol/l.
3. The percentage of patients in the practice with known established CVD with a record that aspirin, an alternative anti-platelet therapy, or an anticoagulant has been prescribed.

Data concerning indicators are extracted from medical records and will be available at patient level so that linkage to other measures (resource use, patient characteristics) can be made at patient level.

Secondary outcomes consist of the 17 remaining indicators used and include: measurement of systolic blood pressure, measurement of LDL-cholesterol, prescription of statin, smoking status, stop smoking advice, measurement of body mass index (BMI), BMI <25 kg/m<sup>2</sup>, measurement of waist circumference, fasting glucose measurement, influenza vaccination, registration of alcohol intake, control and advice for exercise and diet, and comprehensive risk assessment (Table 1). Furthermore, secondary outcomes are measured in interviews with the contact person of the practice and contain perceived goal attainment regarding the improvement plans, which is measured on a Likert scale, and unintended consequences as result of participating in the practice accreditation program.

Table 1. Indicators for cardiovascular risk management

Type of indicator	
Process	Smoking status
Outcome	Patient is a smoker
Process	Stop smoking advice
Process	BMI measured
Outcome	BMI <25 kg/m <sup>2</sup>
Process	Influenza vaccination
Process	Exercise control
Process	Systolic blood pressure measured
Outcome	Systolic blood pressure <140 mmHg <sup>1</sup>
Process	LDL cholesterol measured
Outcome	LDL cholesterol <2.5 mmol/l <sup>1</sup>
Process	Advice physical activity
Process	Diet control
Process	Counseling about diet
Process	Registration of alcohol intake
Process	Patients with LDL cholesterol ≥ 2.5 mmol/l with statin prescription
Process	Waist circumference measured
Process	Prescription antiplatelet drugs <sup>1</sup>
Process	Fasting glucose measured
Process	Comprehensive risk assessment *

\* Positive score when there is a record of: blood pressure, BMI, waist circumference, fasting glucose measurement, LDL cholesterol measurement, smoking behavior, alcohol intake, advice and control of diet and physical exercise in the past 12 months.

<sup>1</sup> Primary outcome

### Measures of costs

In follow-up measurements items of use of healthcare will be extracted from the medical records with a retrospective three-month observation period. These items include number of contacts in the practice (face to face, telephone, email), use of various types of cardiovascular medication, use of hospital care or other care providers for cardiovascular diagnosis or therapy. Additional information will be collected with patient questionnaires, particularly on other healthcare use (e.g., home care) and productivity losses, using a one-month retrospective observation period. Also, at follow-up in both groups, time and other resources of practice teams spent on quality improvement in the total period of 18 months will be documented. Data-collection on performance indicators will be done in the follow-up measurement by medical record audit.

### Other measures

1. Exposure to other quality improvement activities: both study groups report on their exposure to relevant professional education and practice improvement activities (e.g., training for practice nurses). This will be measured in semi-structured telephone interviews.
2. Potential confounders: at follow up, potential confounders will be measured. These include patient characteristics, particularly patient age, gender and multi-morbidity. Furthermore, data on practice characteristics will be collected. These include practice size, physician workload, volume of assistance in the practice, delegation of medical tasks to assistants, and involvement of practice nurses in chronic care. These practice characteristics have shown to be associated with better chronic disease management in Dutch primary care practices.<sup>22</sup>
3. Patient reported outcomes: at follow up, patients receive questionnaires that include items on demographic characteristics, labor activities and healthcare use. Furthermore the EQ-5D (five items and VAS scale) will be added to measure health outcome.<sup>23</sup> To measure chronic care delivery, the Patient Assessment of Chronic Illness Care (PACIC) will be used.<sup>24</sup> Questionnaires for physical exercise (RAPA, nine items),<sup>25</sup> and the Treatment Self-Regulation Questionnaire (TSRQ)<sup>26</sup> to measure the motivation for being physically active will be included.

### Statistical methods

The study groups will be compared at baseline regarding known determinants of cardiovascular care and its improvement. These include patient factors<sup>27,28</sup> (e.g., age, multi-morbidity, ethnicity at practice level)

and practice characteristics<sup>22,29</sup> (e.g., availability of nurses, delegation of medical tasks to assistance, practice size). Only factors emerging from previous research are considered to avoid overcorrection in the primary analysis. A logistic regression model will be constructed for each outcome to analyze these outcomes in relation to group (intervention, control) and measurement moment (baseline, follow-up). Identified differences between the groups at baseline will be included in this analysis. Random coefficients will be included to allow for the clustering of data within practices. Each of the secondary outcomes (clinical and organizational indicators) will also be analyzed in this way. Finally, if an internally consistent scale can be constructed (reflected by high reliability coefficients of the combined score), we will develop an aggregated measure of outcome, and use this in a similar random coefficients linear regression analysis.

To identify the effectiveness of this program on attainment of practice-defined goals and its perceived unintended consequences, the second key objective, a descriptive analysis will be performed aimed at determining what proportion of self-defined goals for improvement was achieved by the practices and straightforward listing of the GP views on unintended consequences of the practice accreditation program.

### Economic analysis

The economic analysis, the third key objective, aims to determine the efficiency of the program in the observed period regarding the primary outcomes. The economic evaluation also investigates the relationship between costs, performance indicators, and accreditation. The economic evaluation provides incremental cost-effectiveness ratios: incremental cost per percentage patients gained with systolic blood pressure below 140 mmHg; incremental cost per percentage patients gained with LDL cholesterol <2.5 mmol/l; incremental cost per percentage patient gained with aspirin, an alternative anti-platelet therapy or an anti-coagulant. For the economic analysis, costs analyses will be based on the competing health production processes respectively, including and excluding resources attributed to accreditation. Specific unit-costs include, for example medical care (contacts in primary care practice, tests, treatments, etc.) and improvement related costs (accreditation tariff, time for audit, planning and implementing improvement, exposure to other relevant quality improvement, etc.). Units of resources are monetary valued on the basis of prevailing Dutch guidelines<sup>30</sup> or national CVZ tariffs. The analysis aims to provide incremental cost-effectiveness ratios (ICERs). The ICERs will be computed, and uncertainty will be determined using the bootstrap method to account for skewness in

the underlying parameter distributions. Uncertainty will be presented in a Bayesian fashion using cost-effectiveness acceptability curves (CEAC's) that are able to evaluate efficiency by using different thresholds for the ICER (varying the willingness to pay for a percentage patients gained for each of the primary outcomes). Uncertainty in deterministic parameters will be examined with sensitivity analysis based on the range of extremes.

#### *Process evaluation*

The process evaluation, the fourth key objective, aims to explore what factors and mechanisms are associated with change (or absence of change) of performance on CVRM indicators. Semi-structured telephone interviews will be held with primary care physician or the quality coordinator of the practice after data collection for follow-up measurement is concluded. Topics of this interview are: practice characteristics; feedback reports; composing improvement plans; and reasons to participate in and experiences with the practice accreditation program. We want to explore if specific elements of the practice accreditation program are the cause of change in CVRM. All interviews will be conducted by the same person and will be audiorecorded. Interviews will be transcribed verbatim. Two researchers will independently review the transcripts. Data analysis will be done according to the framework approach.<sup>31</sup> Topics in the interviews will be used as coding frame. Software package Atlas ti. will be applied to analyze qualitative data. The primary analysis of the interview data aims to identify determinants of (change of) practice as perceived by participants.

#### *Sample size*

In the practices in the practice accreditation program up to 2006 (n = 139), the following median values at practice level were found on indicators referring to patients with CVD: 53% for acceptable blood pressure levels; 36% for acceptable cholesterol levels; and 38% for use of anticoagulents (unpublished data at IQ healthcare, 2005 and 2006). These data suggest that the current scores on the primary outcomes are in the range of 35% to 55%, which imply that substantial improvement is possible in many practices. The proposed study has been powered to detect a difference of 10% (from 55% to 65%), not yet taking control for baseline values into account because of uncertainty regarding the correlation between baseline and follow-up measures.

We expected that the accreditation and improvement program will have an effect of 5% to 10% absolute change, which is the median value of effect sizes in a comprehensive review of 235 studies on quality improvement.<sup>14</sup> Other assumptions were a power = 0.80, alpha = 0.05, and ICC = 0.05. Given the sample of 30 patients per practice per indicator, we aimed to include 31 practices in each group. Allowing for dropout, we aim to include 35 practices in each group (n = 70 practices in total). This number is feasible, given the recruitment rate for the accreditation in 2006.

#### *Time frame of the study*

The study is planned from September 2008 until September 2012. In months 1 to 18, practices are recruited and included in the project and go through the accreditation procedure. The baseline data collection will take place in these months. During months 3 to 42, practices (in the intervention group) work on improving their management of CVD, practices in the control group on improvements in other areas. In months 18 to 42, follow-up measurements in intervention and control practices are planned. During months 43 to 48, data will be analyzed and reported.

## DISCUSSION

The sample of participating primary care practices in this study is composed of volunteers for the practice accreditation program and therefore not nationally representative for primary care practices in the country. This reflects current practice, in which practice accreditation is a voluntary activity. It implies that study results cannot be generalized to the (currently hypothetical) situation of obligatory accreditation. Furthermore, we only collect data on CVRM; therefore, we cannot make statements about the effects of the program on other chronic illnesses. Because both intervention and control groups start with accreditation, this project cannot pick up nonspecific effects of the practice accreditation program. For example, we expect that practices prepare for accreditation by improving their practice (e.g., involve a practice nurse). We intend to compare the groups with other, independent samples of practices that provide data on cardiovascular care to get an impression of the representativeness of our sample of practices.

With the results of this study, we hope to make a contribution with regard to further development and adjustment of the practice accreditation program. Previous research<sup>32</sup> has shown that the program is time-consuming for participating practices. Furthermore, it costs

a considerable amount of money to participate in the program. It is important to gain more information about the effectiveness and efficiency of the program to assess if participation is worthwhile regarding the quality of CVRM. With these results, stakeholders can make policy and management decisions with regard to the use of the program. No data cleaning or analysis has occurred prior to submission of the manuscript.

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## Chapter 3

# Effectiveness of improvement plans in primary care practice accreditation: a clustered randomized trial

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**ABSTRACT****Background**

Accreditation of healthcare organizations is a widely used method to assess and improve quality of healthcare. Our aim was to determine the effectiveness of improvement plans in practice accreditation of primary care practices, focusing on cardiovascular risk management (CVRM).

**Method**

A two-arm cluster randomized controlled trial with a block design was conducted with measurements at baseline and follow-up. Primary care practices allocated to the intervention group (n=22) were instructed to focus improvement plans during the intervention period on CVRM, while practices in the control group (n=23) could focus on any domain except on CVRM and diabetes mellitus. Primary outcomes were systolic blood pressure <140 mmHg, LDL cholesterol <2.5 mmol/l and prescription of antiplatelet drugs. Secondary outcomes were 17 indicators of CVRM and physician's perceived goal attainment for the chosen improvement project.

**Results**

No effect was found on the primary outcomes. Blood pressure targets were reached in 39.8% of patients in the intervention and 38.7% of patients in the control group; cholesterol target levels were reached in 44.5% and 49.0% respectively; antiplatelet drugs were prescribed in 82.7% in both groups. Six secondary outcomes improved: smoking status, exercise control, diet control, registration of alcohol intake, measurement of waist circumference, and fasting glucose. Participants' perceived goal attainment was high in both arms: mean scores of 7.9 and 8.2 on the 10-point scale.

**Conclusions**

The focus of improvement plans on CVRM in the practice accreditation program led to some improvements of CVRM, but not on the primary outcomes.

## INTRODUCTION

Accreditation of healthcare organizations is a widely used method to assess and improve the quality of healthcare. Most accreditation systems assess and rate the performance of organizations and service by evaluating their progress and appraising their compliance with standards, using mechanisms such as self-assessment surveys, data review and structured visits by surveyors.<sup>1</sup> Although the terms accreditation and certification are often used interchangeably, accreditation usually applies to healthcare organizations, while certification applies to practitioners and organizations.<sup>2</sup> In many countries accreditation is also emerging in primary care.<sup>3</sup> In the Netherlands, primary care practice accreditation is a voluntary activity comprising of an extensive audit, which covers clinical and organizational domains, followed by structured planning of improvements and formal review by an external assessor.<sup>4</sup> The program was initiated by the Dutch College of General Practitioners (DCGP) and is delivered by an independent organization (NPA). Improvement of professional performance and practice organization are prominent in the Dutch program.<sup>5-7</sup>

Rigorous evaluations of the effectiveness of practice accreditation are rare.<sup>8</sup> Effects of accreditation on clinical performance, organizational processes and financial status are inconsistent and most studies focus on hospital care.<sup>9</sup> A study of practice accreditation in German primary care practices showed that it improved aspects of practice organization, but this study did not measure the effect on clinical processes or outcomes.<sup>10</sup> Given the role of audit and feedback in practice accreditation, research on this strategy may provide clues to the potential impact. A Cochrane review with 150 trials found that audit and feedback had a median effect of 4% improvement on aspects of professional performance, with substantial heterogeneity of effect sizes across studies. Audit and feedback combined with target setting and action planning, which is done in the Dutch practice accreditation, had 11% effect of measures of professional performance.<sup>11</sup> The Dutch practice accreditation model was an innovative approach of accreditation, because of its focus on learning and improving. In the Netherlands the majority of cardiovascular disease (CVD) patients receive necessary cardiovascular risk management in primary care practices.<sup>12</sup> In this paper we report on a study, which aimed to assess the effectiveness of improvement plans in practice accreditation of primary care practices, focused on cardiovascular risk management (CVRM).

## METHODS

### Trial design

The study design was a two-arm cluster randomized controlled trial with a block design, taking primary care practices as units of clustering, with measurements at baseline and at follow-up in independent samples of patients. The study protocol was published elsewhere.<sup>13</sup> The trial was registered at [clinicaltrials.gov](http://www.clinicaltrials.gov) nr NCT00791362, <http://www.clinicaltrials.gov/ct2/show/NCT00791362?term=NCT00791362&rank=1>

### Ethical approval and informed consent

The Medical Ethics committee Arnhem-Nijmegen waived approval for this trial after assessing the study protocol (file number 2008/258). For the baseline-measurement mandatory information on indicators for patients with established CVD was used collected by practices on behalf of the practice accreditation program. At follow-up patients were requested informed consent in writing for permission to audit their medical records. The privacy of the participating patients was protected, and all data was coded and processed anonymously.

### Participants

#### *Primary care practices*

Primary care practices were recruited from practices in the Netherlands who had applied to start the practice accreditation program. After baseline data collection practices were randomized to study arms. Participating practices were randomized to a group which was instructed to improve CVRM (intervention arm) or to a group which was instructed to postpone improvement in CVRM or diabetes mellitus (DM) (control arm) until the intervention period was finished. Practices with a clear preference for a specific improvement plan were excluded from participation in the study.

All practices received a minimum of 4 hours support by outreach consultants for free.

Practices were recruited between September 2008 and April 2010. The date of receiving accreditation was the starting point of the intervention. Data concerning follow-up measurement were collected from February 2010 until May 2012, over the course of 12 months after the starting point of the intervention.

#### *Patients*

The study focused on patients with established atherosclerosis-related cardiovascular disease, as defined by prevailing clinical guidelines and

recorded in patients' medical records,<sup>14,15</sup> including angina pectoris (K74), acute myocardial infarction (K75), other chronic ischemic heart diseases (K76), transient ischemic attack (K89), ischemic stroke (K90.3), peripheral arterial disease (K92.1) and aneurysma aortae (K99.1). Patients had to be in treatment for established CVD for a minimum period of 12 months. Patient selection from electronic medical records was based on corresponding diagnostic International Classification of Primary Care codes (ICPC-codes), an international classification system that is widely used in the Netherlands.<sup>16</sup>

### The practice accreditation program

The practice accreditation program is a service, which has been offered since 2005. Practices have to comply to some minimum standards in order to be eligible for participation.<sup>17</sup> It is a comprehensive program including elements of clinical performance, practice organization and patient experiences. The program focuses strongly on chronic illness care, particularly DM, asthma, COPD, and CVD.

The practice accreditation program comprises, firstly, of a comprehensive audit (using validated performance indicators on a randomly selected sample of 40 patients per clinical domain) and written feedback to the practice, which covers a range of clinical domains (CVRM, DM, asthma and COPD), practice management, and patient experiences. The feedback, which consists of a comparison with benchmarks of other primary care practices, is discussed with a trained observer in a feedback consultation with the whole practice team and helps to identify substandard performance domains. The second obligatory component, the planning of improvements in the practice according to the principles of quality management, are based on this feedback. The practice team may choose to rely on a trained consultant to develop an improvement plan. Practices which perform the procedure as planned are all accredited, so accreditation does not imply that a certain minimum score on performance indicators has been obtained. In the practice accreditation program validated instruments are used: VIP,<sup>18</sup> clinical indicators<sup>19</sup> and Europep.<sup>18,20</sup> Practices could claim an allowance for the costs of the accreditation program from health insurance companies. Furthermore they received a certification for the time period of one year which demonstrates (to the public) their involvement in continuous quality improvement. Every year the practice will be audited and every year new improvement plans have to be formulated which have to be approved by the auditor. The prolongation of the accreditation depends on having met the objectives of the improvement plans.

### Outcomes

Primary results were selected from the 20 quality indicators for established CVD,<sup>15</sup> which were developed by the DCGP: the percentage of patients with known established CVD with systolic blood pressure below 140 mmHg, the percentage of patients with known established CVD with a LDL cholesterol level below 2.5 mmol/l, and the percentage of patients with known established CVD with a record that aspirin, an alternative anti-platelet therapy or an anti coagulant has been prescribed. Secondary outcomes consisted of the 17 remaining indicators and included: measurement of systolic blood pressure, measurement of LDL-cholesterol, prescription of statin, smoking status, patient is a smoker, stop smoking advice, measurement of Body Mass Index, Body Mass Index <25 kg/m<sup>2</sup>, measurement of waist circumference, fasting glucose measurement, influenza vaccination, registration of alcohol intake, control and advice for exercise and diet and comprehensive risk assessment. The indicators consist of process indicators, which give an indication of the progress of processes in an organization and outcome indicators, which give an indication of the outcome of care.

Medical data extraction was performed using a standardized procedure and documented for each included patient. Another secondary outcome was the perceived goal attainment in the chosen improvement plans. This was documented in interviews with general practitioners or nurses on a likert-scale.

### Sample size

In the practices who voluntarily applied the practice accreditation program up to 2006 (n=139) the following median values at practice level were found on indicators referring to patients with CVD: 53% for acceptable blood pressure levels; 36% for acceptable cholesterol levels; and 38% for use of anti coagulants (unpublished data, 2006). These data suggest that the scores on the primary outcomes are in the range of 36 to 53%, which imply that substantial improvement is possible in many practices. The proposed study was powered to detect a difference of 10% on all primary outcomes. We expected the practice accreditation program had an effect of 5% to 10% absolute change, which is the median value of effect sizes in a comprehensive review of 235 studies on quality improvement.<sup>7</sup> Other assumptions were a power=0.80, alpha=0.05, and ICC=0.05.<sup>21</sup> Given the sample of 30 patients per practice per indicator, we aimed to include 31 practices in each group. Allowing for drop-out, we aimed at 35 practices in each group.

**Randomization**

General practices were the unit of randomization. A computer list of random numbers was generated and used to randomly allocate practices to equally sized intervention group or control group by an independent statistician. This was done in a randomized block design in blocks of four practices based only on time period in order of enrolment.

**Blinding**

General practitioners were aware of the allocated arm as the intervention consisted of making and implementing their own improvement plans. Data collectors were blinded to allocation. Blinding of patients was unnecessary as only medical records were assessed.

**Statistical methods**

Descriptive data were analyzed using the SPSS 16.0 software package (Chicago, Illinois, USA). All indicators (all dichotomous measures) were included in a two-level logistic regression, taking into account the hierarchical structure of our study (patients nested within practices). In the logistic model covariates on the practice level that were taken into account included practice located in deprived area, availability of nurses for CVRM-related tasks and practice type (solo, duo, group). Patient's co-morbidity, age and sex were also included in the regression models. The analysis was performed in the SAS 9.2 package with procedure PROC GLIMMIX. We used a logistic regression model with a binomial distribution, a logit link function, a random intercept, and all other variables fixed.

Perceived goal attainment of participants was analyzed in a one-level regression model.

**Results**

336 Practices applied for the practice accreditation program in the recruitment period and were invited to participate in the study. 45 Practices were willing to participate in the study (Figure 1). A total of 22 practices was allocated to the intervention group en 23 practices to the control group. For follow-up measurement data on 20 practices were available in the intervention arm and data on 21 practices in the control arm.

Figure 1. Flow Diagram

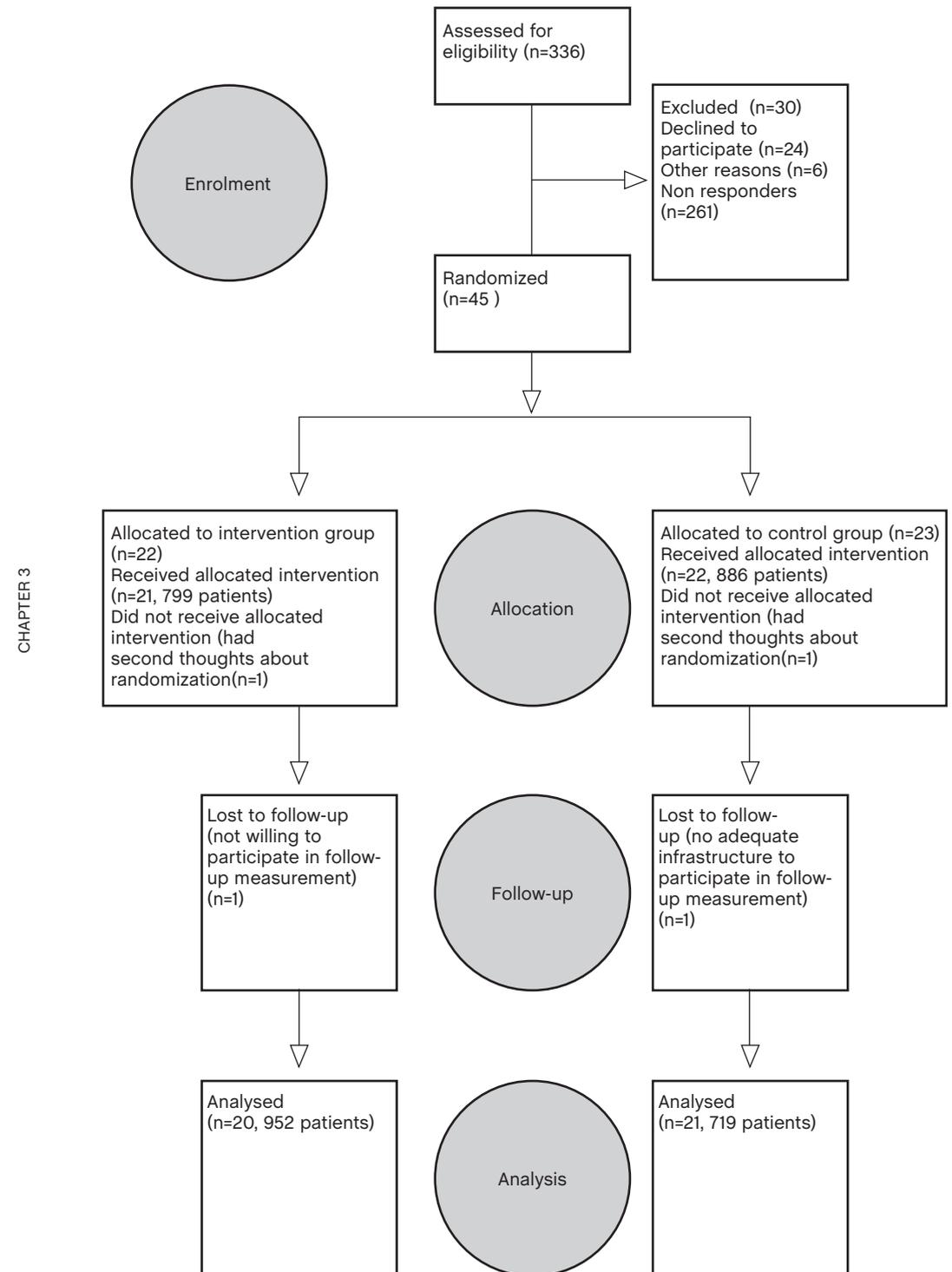


Table 1 presents the characteristics of practices in the intervention and the control arm. In the intervention arm 57.1% of practices were solo practices, 19.0% were duo practices and 23.8% were group practices. For control arm practices this was 36.4%, 36.4% and 27.3% respectively. Of practices in the intervention group 6.3% participated in a care group with focus on CVRM, for control arm practices this was 35.0%.

**Table 1. Characteristics of Practice Population, Intervention vs. Control group**

	Intervention		Control	
	T0	T1	T0	T1
Number of practices	21	20	22	21
Number of patients	799	952	886	719
Practice Size (mean)	4417	4487	3559	3559
Solo practice	57.1%		36.4%	
Duo practice	19.0%		36.4%	
Group practice	23.8%		27.3%	
FTE general practitioners	2.0 (SD 1.5)		1.7 (SD 0.8)	
FTE practice assistants	2.5 (SD 1.9)		2.1 (SD 1.3)	
FTE nurse practitioners	0.8 (SD 0.6)		0.7 (SD 0.5)	
FTE nurses	3.3 (SD 2.4)		2.8 (SD 1.7)	
Training practices	84.0%		60.0%	
Participation in care Group* with focus on CVRM	6.3%		35.0%	

\* Regional organizations that have contracts with health insurers to coordinate CVRM-related care in a particular region with the objective to improve quality of care.

Table 2 presents characteristics of patients in the study population. At baseline 799 patients were included in the intervention group and 886 patients were included in the control group. At follow-up measurement 952 patients were included in the intervention group and 719 in the control group. In both study groups most common co-morbidity was diabetes and most common cardiovascular history was angina pectoris.

**Table 2. Characteristics of Patient Population, Intervention versus Control group**

	Intervention		Control	
	T0 (n=799)	T1 (n=952)	T0 (n=886)	T1 (n=719)
Age (years)	69.41 (sd 11.65)	69.42 (sd 10.04)	68.88 (sd 12.22)	68.02 (sd 10.29)
% Female	37.0	32.6	39.1	33.7
Diabetes (%)	23.2	16.9	25.2	22.8
COPD (%)	10.5	10.2	10.7	11.5
Astma (%)	5.6	6.4	4.0	6.5
Angina Pectoris	37.8	33.3	35.7	31.8
Myocardial Infarction	31.1	31.1	27.7	28.1
Other chronic ischemic heart diseases	9.4	10.7	12.1	17.1
TIA	14.3	14.8	15.2	13.6
Ischemic stroke	5.0	10.8	8.4	8.9
Peripheral arterial disease, claudicatio intermittens	8.8	11.0	14.3	13.8
Aneurysma Aortae	4.8	5.3	5.0	7.9

### Primary outcomes

None of the primary outcomes showed significant improvements (Table 3). Patients with a systolic blood pressure <140 mmHg decreased in the study arm (from 50.5% to 39.8%) as well as the control arm (from 50.6% to 38.7%). Patients with LDL cholesterol <2.5 mmol/l hardly changed. Patients with a prescription of antiplatelet drugs decreased in the intervention group from 84.3% to 82.7% and in the control group from 84.9% to 82.7%.

### Secondary outcomes

Of the 17 secondary outcomes, six showed significant improvements as a result of the intervention. These were, patients with known smoking status (27.2% and 14.2% change respectively;  $p < 0.0001$ ); registration of physical exercise (9.9% and 2.9% change respectively;  $p = 0.0042$ ); registration of diet control (3.6% and 0.9% change respectively;  $p = 0.0258$ ); registration of alcohol intake (16.0% and 6.1% change respectively;  $p = 0.0007$ ); measurement of waist circumference (5.8% and 5.6% change respectively;  $p = 0.0346$ ) and measurement of fasting glucose (10.1% and 1.8% change respectively;  $p = 0.0360$ ). The other 11 secondary outcomes did not show significant changes.

### Perceived goal attainment

The objectives of the chosen improvement plans on CVRM mainly concerned the establishment of a CVRM-consultation hour, the identification of patients eligible for CVRM and the improvement of registration in electronic medical records. The participants' perceived goal attainment on plans concerning chronic care management was documented for 30 practices. The findings suggest that goals were largely perceived to be met (Table 4). In the intervention arm the mean score for goal achievement was 7.9 (SD 1.2) and in the control group the mean score was 8.2 (SD=1.2). There was no significant difference between the study arms ( $p = 0.45$ ) which implies CVRM related goals were achieved to the same extent as goals focusing on other domains of chronic care.

Table 3. Record of indicators for cardiovascular risk management in electronic medical records

Type of indicator	Interventiongroup		Change %	Controlgroup		Change %	Between Group change %	
	Baseline T0 (n=799)	Follow-up T1 (n=952)		Baseline T0 (n=886)	Follow-up T1 (n=719)			
Outcome	Systolic blood pressure <140 mmHg	297/588 (50.5)	283/712 (39.8)	-10.7	342/676 (50.6)	225/581 (38.7)	-11.9	1.2
Process	Systolic blood pressure measured	588/796 (73.9)	712/948 (75.1)	+1.2	676/886 (76.3)	581/716 (81.1)	+4.8	-3.6
Outcome	LDL cholesterol <2.5 mmol/l	174/382 (45.6)	232/521 (44.5)	-1.1	215/448 (48)	217/443 (49)	+1.0	-2.1
Process	LDL cholesterol measured	384/793 (48.4)	521/937 (55.6)	+7.2	448/884 (50.7)	443/716 (61.9)	+11.2	-3.0
Process	Patients with LDL cholesterol $\geq$ 2.5 mmol/l with statin prescription	137/207 (66.2)	200/289 (69.2)	+3.0	146/233 (62.7)	176/225 (78.2)	+15.5	-12.5
Process	Prescription antiplatelet drugs	671/796 (84.3)	787/952 (82.7)	-1.6	751/885 (84.9)	593/717 (82.7)	-2.2	-0.6
Process	Smoking status	293/796 (36.8)	609/951 (64)	+27.2	436/882 (49.4)	457/719 (63.6)	+14.2*	13.0
Outcome	Patient is a smoker	93/292 (31.9)	134/609 (22)	-9.9	136/436 (31.2)	123/457 (26.9)	-4.3	5.6
Process	Stop smoking advice	58/93 (62.4)	69/133 (51.9)	-10.5	67/134 (50)	65/118 (55.1)	+5.1	-15.6
Process	Exercise control	220/798 (27.6)	357/951 (37.5)	+9.9	264/885 (29.8)	234/715 (32.7)	+2.9*	7.0
Process	Advice physical activity	155/798 (19.4)	198/951 (20.8)	+1.4	191/884 (21.6)	182/714 (25.5)	+3.9	-2.5

Type of indicator	Interventgroup		Controlgroup		Change %	Between Group change %
	Baseline T0 (n=799)	Follow-up T1 (n=952)	Baseline T0 (n=886)	Follow-up T1 (n=719)		
Process	191/799 (23.9)	261/949 (27.5)	237/886 (26.8)	185/715 (25.9)	-0.9*	4.5
Process	196/799 (24.5)	266/952 (27.9)	224/883 (25.6)	230/716 (32.1)	+6.5	-3.1
Process	197/797 (24.7)	383/941 (40.7)	277/885 (31.3)	266/711 (37.4)	+6.1**	9.9
Process	87/788 (11)	158/938 (16.8)	125/873 (14.3)	140/705 (19.9)	+5.6*	0.2
Process	501/799 (62.7)	687/944 (72.8)	621/881 (70.5)	516/714 (72.3)	+1.8*	8.3
Process	217/797 (27.2)	362/921 (39.3)	241/882 (27.3)	278/695 (40)	+12.7	-0.6
Outcome	33/217 (15.2)	66/362 (18.2)	46/241 (19.1)	45/278 (16.2)	-2.9	5.9
Process	609/799 (76.2)	475/758 (62.7)	669/884 (75.7)	520/634 (82)	+6.3	-19.8
Process	32/799 (4)	63/952 (6.6)	51/886 (5.8)	62/719 (8.6)	+2.8	-0.2

\* P-value <0.05 (difference in change corrected for patients nested in practices)

\*\* P-value <0.001 (difference in change corrected for patients nested in practices) positive score when there is a record of: blood pressure, BMI, waist circumference, fasting glucose measurement, LDL cholesterol measurement, smoking behavior, alcohol intake, advice and control of diet and physical exercise in the past 12 months.

Table 4. Perceived goal attainment on plans concerning chronic care management<sup>1</sup>

	Intervention <sup>a</sup> (N=14)	Control <sup>b</sup> (N=16)
Min	6	6
Max	10	10
Mean	7.9	8.2
SD	1.2	1.2

<sup>1</sup> Measured on a Likert scale (1-10)

<sup>a</sup> Plans concerning CVRM

<sup>b</sup> Plans concerning chronic care management other than CVRM

## DISCUSSION

The Dutch accreditation program for primary care practices is strongly focused on learning and improving healthcare delivery, using a comprehensive audit and feedback procedure that is largely focused on the management of chronic diseases. We found that this program improved some aspects of professional performance concerning CVRM in the practices who focused their improvement plans on CVRM, but not on the primary outcomes. The participants largely perceived to achieve chosen goals of their improvement projects.

Although accreditation schemes have been evaluated in observational studies, this is one of the first controlled evaluations of this method to enhance quality of healthcare. A notable exception is a controlled study in German primary care practices,<sup>10</sup> which also reported positive effects, however, this German accreditation program focused on organizational domains rather than clinical processes. If we compare our primary outcomes with the results of trials of audit and feedback (a key component of the Dutch practice accreditation), we found effects at lower end of the range of effect sizes. The effects on a few secondary outcomes were only slightly higher than other studies of audit and feedback, combined with target setting and action planning, have found. So, this study did not provide evidence that the context of practice accreditation had an added value to the effectiveness of the audit and feedback.

A possible explanation for the lack of stronger effects is the impact of patient related factors on the outcomes, such as poor compliance with treatment<sup>22</sup> and patients' comorbidity. Furthermore,

a substantial part of practices in the intervention arm were solo practices. Group practices might have more defined processes to address quality issues. In the follow-up measurement the number of patients with diabetes decreased. A smaller contribution of this otherwise relatively well treated sub group<sup>23</sup> will lead to lower overall scores.

A number of secondary outcomes improved more in the intervention arm. Assuming participating in the accreditation program induces better monitoring of patients and improvement of registration behavior in general, we would expect all secondary outcomes to improve and not only the six outcomes as demonstrated in this study.

Practices in the control arm also showed improvements on the measures of CVRM quality at follow up. This might be explained by increased attention on CVRM in integrated care groups, increased awareness for quality of care in general in addition to improvement plans and furthermore increased awareness of registration behavior in general when participating in an accreditation program.

### Strengths and weakness of the study

To our knowledge this is one of the first trials of an accreditation program in primary care. The performance indicators in the program were carefully developed.<sup>24, 25</sup> Data in this study were manually collected from electronic medical support systems. The sample size calculated was 30 patients per practice. However, practices participating in the practice accreditation were required to collect data on 40 patients which gives more body of evidence to the baseline-measurement. In the analysis baseline-measurements were included in the model which amplifies the power and therefore compensates for the calculated number of 35 clusters per group that was not achieved.

Follow-up of the same cohort of patients would have been more efficient but was not feasible. We measured aspects of clinical process and outcomes on patients as an indicator of change in clinicians, who remained the same throughout the study. The different samples were taken into account in the data-analysis approach, resulting in somewhat reduced accuracy compared to following up the same cohort of patients.

The control group in this study also showed improvements. This could be the effect of contamination as practices in the control group also participated in the Dutch accreditation program. A different study design might have demonstrated a larger effect, but this was not feasible. Another limitation of the study is the risk of selection bias in the follow-up measurement as patients had to give informed consent for

data collection from their electronic medical record. Selection bias may also be the effect of the fact that randomization only occurred in order of time of enrolment due to feasibility problems.

Randomization determined the focus on CVRM for the improvement plans in the first year of the cycle, ideally the outcome of feedback determines the focus of the plans. Furthermore this might explain why invited practices declined to participate. In this study practices could establish their own goals for improvement plans without limitations or guidance. If plans would be more focused on improvement of outcome measures, the effects might have been larger.

It was not feasible to assess outcomes on patient level such as death, myocardial infarction or stroke, however it would have been interesting to examine if the accreditation program is of influence on these outcomes.

We have failed to mention the covariates included in this study with registration of this trials. However, the covariates were discussed in the published studyprotocol.<sup>13</sup>

### Generalizability

General practices in this study all voluntarily applied for the practice accreditation program. This could imply that practices included in this study have a more than average affinity with quality of care and have higher baseline measurements and therefore have less to improve. Furthermore the practice accreditation program was initiated in 2005, practices included in this study are the early adaptors<sup>26</sup> among general practices in the Netherlands, especially taking into account the program is voluntary, and for that reason more eager to initiate improvement. A substantial number of practices in our study are training practices. Of these practices it is to be expected they are more open to innovations. On the other hand they may have felt pressure to participate.

The results of our study can be compared to a large observational study in European primary care (EPA-Cardio), which provided data on CHD on the basis of validated quality indicators in eight European countries, including the Netherlands.<sup>27</sup> In Dutch practices in EPA-cardio 28.9% of patients had a systolic blood pressure below 140 mmHg, which is lower than in our study at both baseline and follow-up measurement. In addition, 43.0% of patients in EPA-cardio had a LDL cholesterol level below 2.5 mmol/l which was comparable to our sample. Anti-platelet drugs were prescribed in 82.8% of patients which was also comparable to the results of our study. So, accrediting practices in our study are comparable to other practices in the Netherlands.

## Implications

The Dutch accreditation program for primary care practices is a method which encourages practice teams to use a planned and cyclic approach to learning and improving their performance. It intends to stimulate improvement in organizational and clinical domains, focusing largely on chronic illness care. This study showed there was ample room for improvement on all aspects of CVRM, which implies the legitimacy of the Dutch accreditation program. The accreditation program stimulates team collaboration,<sup>28</sup> transparency of performance, and shared responsibility for delivering the best possible primary care. Although the primary outcomes did not show improvements, participating practices in our study perceived to achieve chosen goals for improvement projects to a large extent. Effects might be larger when this study would be repeated in the second or third year of the accreditation cycle when organizational aspects are improved and practices can focus more on the improvement of outcome measurements.<sup>29</sup>

We believe it is too early to conclude that the accreditation program is not effective, because it includes a number of well established methods and principals of behavior change. To obtain more substantial improvements, goals in the improvement plans should be formulated related to outcome measurements. Furthermore, additional interventions may be required, such as financial incentives for practices with high performance or public reporting on quality scores. It is unlikely that these methods will be 'magic bullets' for improving healthcare delivery, but they may help to optimize the effectiveness of the program.

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## Chapter 4

# Determinants of change in a practice accreditation program in primary care: a qualitative study

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Submitted.

**ABSTRACT****Background**

Practice accreditation is a widely used method to assess and improve the quality of healthcare services. In the Netherlands, a practice accreditation program was implemented in primary medical care. We aimed to identify determinants of change related to the practice accreditation program, building on the experiences of primary care professionals who had participated in an accreditation program.

**Methods**

An interview study was done to document the experiences of 33 participating primary care professionals and used to identify determinants of outcomes. The Consolidated Framework for Implementation Research (CFIR) was used as framework for the qualitative analysis.

**Results**

After analyzing 23 interviews saturation was reached. The practice accreditation program is based on structured quality improvement, but only some of its elements were identified as determinants of change. Factors that were perceived to facilitate implementation of the program were: designating one person responsible for the program, ensuring clear lines of communication within the whole practice team and having affinity with or stimulate enthusiasm for improving quality of care. Contextual factors such as participation in a care group and being connected to the general practitioner educational institute were important for actual change. The accreditation program was perceived to have positive effects on team climate and commitment to quality of care in the practice team. The perception was that patient care was not directly influenced by the accreditation program. Receiving a certificate for completing the accreditation program seemed to have little added value to participants.

**Conclusions**

Practice accreditation may have positive outcomes on quality of care, but not all planned elements may contribute to its outcomes. Both factors in the accreditation process and in the context were perceived as determinants of quality improvement. The challenge is to build on facilitating factors, while reducing the elements of accreditation that do not contribute to its impact.

## INTRODUCTION

Accreditation and certification are widely used methods to assess and improve healthcare services. These are complex interventions, which typically comprise an audit of a healthcare provider, an assessment of performance, followed by formal allowance of accreditation or certification. Accreditation programmes can have positive effects on quality and safety of clinical care and organizational performance.<sup>1</sup> Worldwide, accreditation focuses on promoting continuous improvements, applying standards and providing feedback.<sup>2</sup> Given the opportunity costs involved, it is important to know which components and contextual factors contribute to the outcomes of accreditation on quality and outcomes of healthcare. However, little is known about this.

In the Netherlands, primary care practice accreditation is a voluntary activity comprising a comprehensive audit, which covers clinical and organizational domains, followed by structured planning of improvements and formal review by an external assessor.<sup>3</sup> The program was initiated by the Dutch College of General Practitioners (DCGP) and is delivered by an independent organization (Netherlands Institute for Accreditation in Healthcare, NPA). While accreditation may serve several purposes, improvement of professional performance and practice organization are prominent among these in the Dutch program.<sup>4-6</sup> Previous research with respect to the Dutch practice accreditation program showed that general practitioners (GPs) were willing to assess their practice in order to improve the quality of care. Furthermore the practice accreditation program is used to obtain understanding of the practice organization in order to enhance the quality of care in the practice.<sup>7</sup>

The aim of this study was to identify and map out determinants of change related to the practice accreditation program, building on the experiences of primary care professionals who had participated in the accreditation program.

## METHODS

### Study design

A qualitative study was conducted, which was linked to a cluster randomized trial of the practice accreditation program in the Netherlands.<sup>8</sup> All participating practices participated in the practice accreditation program and all were invited for the qualitative study. We used semi-structured interviews with participating primary care professionals to

identify relevant factors. The Consolidated Framework for Implementation Research (CFIR) was used as framework for analysis.<sup>9</sup>

### Setting

The primary care practice accreditation program in the Netherlands has been offered on a voluntary basis since 2005. Practices have to comply to few minimum standards in order to be eligible for participation.<sup>10</sup> The practice accreditation program comprises, firstly, of a comprehensive audit (using validated performance indicators) and written feedback to the practice, which covers a range of clinical domains (cardiovascular risk management (CVRM), diabetes mellitus (DM), asthma and COPD, practice management, and patient experiences). The feedback, which consists of a comparison with benchmarks of other primary care practices, is discussed with a trained observer in a feedback consultation with the whole practice team and helps to identify substandard performance domains. The second obligatory component, the planning of improvements in the practice according to the principles of quality management, is based on this feedback. The practice team may chose to rely on a trained consultant to develop an improvement plan. Participants who perform the procedure as planned are all accredited, so accreditation does not imply that a certain minimum score on performance indicators has been obtained. In the practice accreditation program validated instruments are used: VIP,<sup>11</sup> clinical indicators<sup>7</sup> and Europep.<sup>12</sup> Participants receive a certification for the time period of one year which demonstrates (to the public) their involvement in continuous quality improvement. Every year the practice will be audited and every year new improvement plans have to be formulated which have to be approved by the auditor. The prolongation of the accreditation depends on having met the objectives of the improvement plans.

### Participants

Participants in the study were team members of the primary care practice with a coordinating role in the implementation of the practice accreditation program in the primary care practice.

### Interviews

Semi-structured interviews with one team member per practice were conducted. All interviews were held by one person (EN), a health scientist and physiotherapist. All practices included in the cluster randomized trial<sup>8</sup> were approached to participate in the interviews. An interview guide was used and was adjusted during the process of interviewing based on interim reviewing of the results. Interviews (by telephone due to feasibility) lasted approximately half an hour.

The interview guides were developed on the basis of literature<sup>7</sup> and during several core-group meetings. Topics that guided the development of the interview were: reasons to participate in the practice accreditation program, consequences of participating in the program, preparation and implementation of improvement plans, incentives for quality improvement, dealing with feedback and the significance of participating in the program.

The study was undertaken to identify determinants of change related to the practice accreditation program, building on the experiences of primary care professionals who had participated in the accreditation program in primary care, therefore a qualitative method was appropriate.

### Data analysis

All interviews were audio-taped and transcribed verbatim. Interviews were repeatedly read and analyzed in an iterative approach by three researchers, who had three rounds of separate analysis of interviews followed by collaborative interpretation and consensus. Interview data were analyzed until saturation was reached. A stepwise analytical approach was used.<sup>13</sup> We provisionally coded all statements referring to program components or contextual factors which appeared to be determinants of change. In a second stage, the codes were linked to the logical steps in practice accreditation (Figure 1). We then used the CFIR framework, which provides constructs from multiple domains for identifying potential influences on implementation of interventions,<sup>9</sup> in a deductive analysis. The CFIR constructs are organized into five major domains and, as applies to this study, are: characteristics of the practice accreditation program (evidence strength and quality, relative advantage, adaptability, complexity, design quality and packaging, cost); the outer setting (patient needs and resources, cosmopolitanism, peer pressure, external policies and incentives); the inner setting; the process used to implement the program; characteristics of individuals involved (Appendix 1).<sup>9</sup>

### Ethical approval and informed consent

The Medical Ethics committee Arnhem-Nijmegen waived approval for this trial after assessing the study protocol (file number 2008/258). All participants consented to recording of the interviews. All data was coded and processed anonymously.

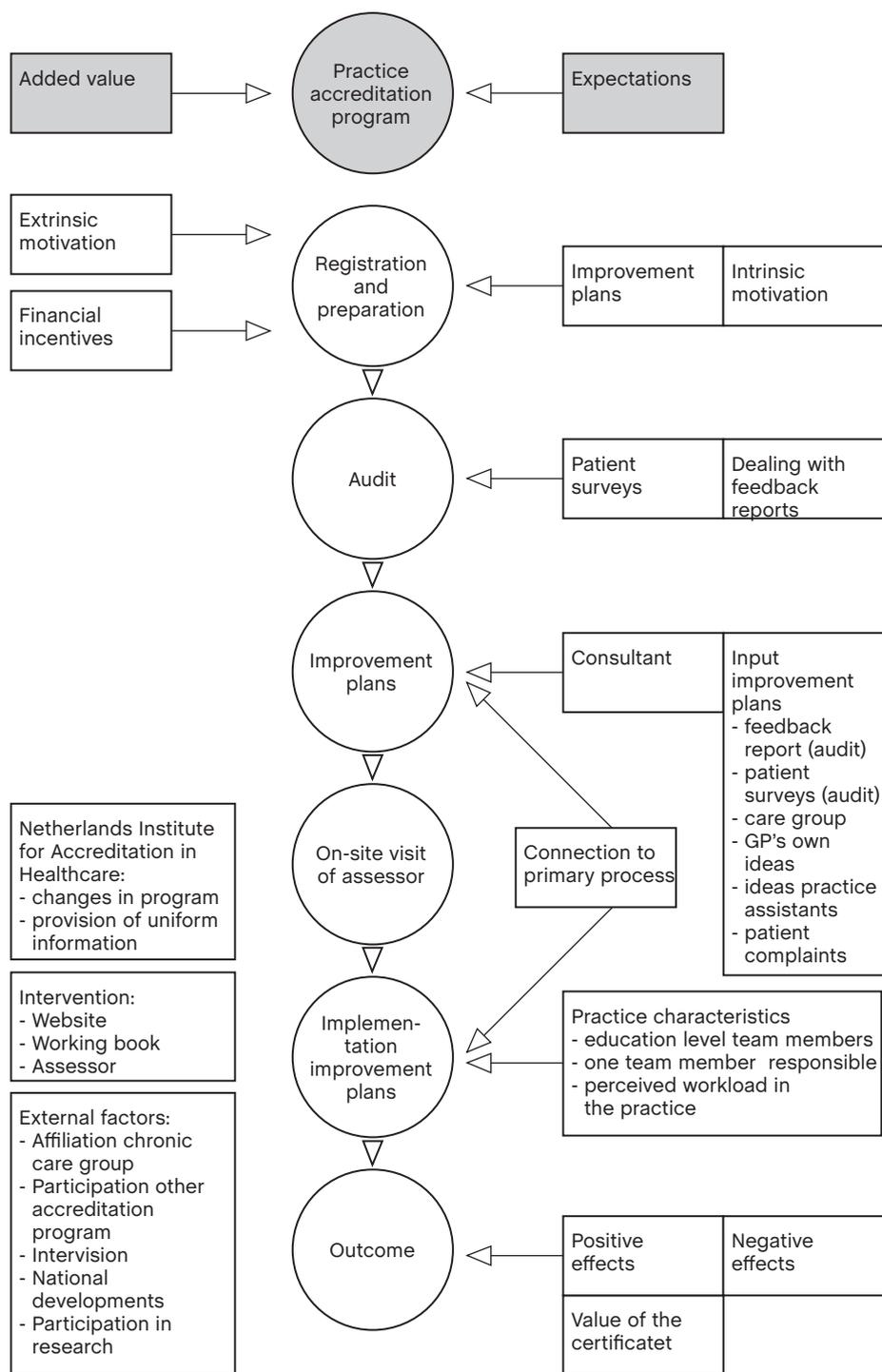
## RESULTS

All participating practices were invited for the interview study. Eight practices declined to participate in the study due to lack of time or sickness among staff. Interviews were done with 33 individuals in the year 2012. Interviews lasted from 17 minutes until 46 minutes. Table 1 shows characteristics of the interviewed participants. After analyzing data of 23 interviews, saturation was reached. Eight interviews were analyzed and coded by all three authors, 15 interviews were coded by two of the authors (JvL, EN). The findings were reported regarding the five domains of CFIR and were supported by verbatim quotations from interviews.

Table 1 Characteristics of interview participants

Team member	22 (96%) GP 1 (4%) Practice assistant
Type of practice	10 (44%) Solo practices 7 (30%) Duo practices 6 (26%) Group practices
Female	10 (44%)
GP training practices	20 (87%)
Participating in care group concerning CVRM	3 (13%)

Figure 1 Steps in the practice accreditation program



PRACTICE ACCREDITATION TO IMPROVE CARDIOVASCULAR RISK MANAGEMENT IN GENERAL PRACTICE

**Views on intervention characteristics**

*Intervention source*

The practice accreditation program was externally developed by the DCGP.<sup>14</sup> Elements of the program corresponded with existing work processes, which was perceived as beneficial for implementation of the program.

*Adaptability*

The adaptability of an intervention is the degree to which the intervention can be tailored to the needs of the organization. A core component in the practice accreditation program is developing improvement plans on four chronic conditions mostly treated in general practice. These plans are tailor-made, using the feedback reports to guide their focus, and therefore should be consistent with the needs of the practice. The program did provide additional support for developing and implementing improvement plans, which is important in applying elements of quality improvement. However, some participants experienced there was no possibility to implement their own priorities using improvement plans. *'What we disliked was that we were obliged to make a plan on the four most common chronic diseases, you have to do this, you have to do that. When you indicate you have other priorities for the improvement plans, you still have to implement a plan on topics they have made mandatory. That felt annoying sometimes.'* (respondent 13)

*Complexity*

The first step in the practice accreditation program is collecting patient related data on four chronic diseases. Many participants experienced this as the most time-consuming and difficult step of the program. Furthermore, other elements of the program such as developing improvement plans and implementing these plans were experienced as a heavy burden as these are supplementary tasks in addition to daily practice.

*Design quality and packaging*

The intervention consisted of a workbook, a supporting website and practices were obliged to contract a trained consultant to assist the practice through all steps of the program. Another component is the practice visit of an assessor to assess improvement plans and minimum standards. Practices in this study were in general not content with the supporting website which was found unclear and slow. Experiences with the assistance of the consultant varied. Furthermore there was a lack of consistency in assessment methods of assessors which caused confusion on how to interpret and execute the program.

### Cost

All respondents expressed their dissatisfaction with the high costs of the intervention. Furthermore they questioned the benefits of the program, in particular in relation to the costs.

### Views on the outer setting

#### *Patient needs and resources*

In the practice accreditation program participants are obliged to conduct a patient satisfaction survey. Based on these outcomes several participants defined an aim for their improvement plans so needs of patients can be met. *'We used results from the patient survey to inspire us in choosing a topic for the improvement plans for this year. There were especially complaints regarding privacy.'* (respondent 26)

However, participants perceived that patient care was not directly influenced by the accreditation program as the program had no direct influence on patient-caregiver interactions.

#### *Cosmopolitanism*

All practices in the study were affiliated with a chronic care group. In addition to the practice accreditation program, participants in the study mentioned participation in a chronic care group as a contextual factor that positively influenced the quality of the care they provided. Some of the practices were, as training practices, connected to an institute for vocational training of GPs. Peer review meetings for GPs working in training practices appeared to be of a positive influence on their attitude towards quality improvement.

#### *External policy and incentives*

The most important extrinsic reasons to participate in the program were a financial stimulus for GP training practices and the requirement of insurance companies to demonstrate how quality is managed within the practice. Participation in research projects, nationally organized projects (on registration behavior) and participation in other certifications programs all provided a positive influence on implementation of the program.

### Views on the inner setting

#### *Structural characteristics*

In small practice organizations, lines of communication are clear which is beneficial for the implementation of the practice accreditation program. However in solo-practices all tasks concerning the program have to be performed by one person. Furthermore, when a practice loses

staff members due to illness or resignation, there is no priority for the program and it also implies the loss of knowledge about the program. *'Well, when you lose staff members because of resignation or illness, it causes major problems. First priority is to keep the practice running and then there is no time left to spend on tasks concerning the practice accreditation program.'* (respondent 46)

The age of general practitioners was mentioned as a factor associated with the enthusiasm with which the program was accepted for implementation. *'I think it's a generational thing. I have the feeling older GPs consider it more difficult to work according to the practice accreditation program than younger GPs.'* (respondent 15)

#### *Networks and communication*

The practice accreditation program requires the involvement of the whole team. Therefore it is advised to organize structural team meetings to evaluate the progress of improvement plans. Participants experienced implementation of the program as more effective when indeed all members of the team were involved and processes were structurally evaluated in team meetings.

#### *Culture*

The majority of participants in this study had affinity with improving the quality of care they provide, prior to participating in the program, which benefits implementation. Furthermore participants mentioned that the motivation and education level of team members was of influence in the implementation of the program. *'I think we have team members with a critical attitude. All our assistants have a bachelors degree, which is uncommon.'* (respondent 34)

#### *Implementation climate*

The degree of motivation regarding implementation of the program may be dependent on the function of the staff members. Some GP assistants experienced the program as a burden while practice nurses had no difficulties implementing the program. Furthermore, in some practices not all GPs found the program beneficial and were therefore less motivated to implement the program.

### Views on the characteristics of individuals

#### *Knowledge and beliefs about the intervention*

Participants started with the program while it provides support when improving quality of care in the practice: *'We wanted to be more conscious of the quality of care we provide and we wanted to reveal our*

blind spots. The most important reason to participate in the program was to improve the quality of care we provide.' (respondent 24)

Self-efficacy

The program provided tools to work systematically: 'I often started new things (new procedures) without completing them. The advantage of the accreditation program is that it forces me to complement the circles to implement new approaches in a constructive manner.' (respondent 22)

Individual stage of change

In the initial stages of the program participants required more assistance from the consultant than in later stages of the program. They then became more accustomed to working according to a quality cycle and the program was more integrated in daily practice.

Other personal attributes

Some participants were motivated to participate in the practice accreditation program because they were also employed in another function relating to quality of care.

Views on the process of change

Planning

Most participants made no preparations before they volunteered to participate in the program. The practice accreditation program consists of various elements (Figure 1). Practices in the program started with collecting patient related data to four chronic diseases (COPD, DM, CVRM, Asthma). Particularly this element was very time-consuming and led to barriers for some participants due to computer related problems. 'I'm no computer expert, I need help with that and I think that also applies to some of my colleagues'. (Respondent 38)

Based on the data on four chronic diseases practices receive a feedback report with benchmarks which provides insight into their medical practice. This information was considered to be important however it had little influence on improvement plans. A possible reason is it is difficult to adequately reflect on the outcomes. 'It (the feedback report) shows the benefits of my efforts and indicates in what areas I should plan improvements. It is very difficult to reflect on the feedback reports sufficiently. I have to spend time to study it, to think about it and reflect on it. You should be able to discuss it with your team. The rush of daily practice leaves no time for this and that is very unfortunate.' (Respondent 44)

However, some participants considered the feedback report of minor importance. 'No, we do not look into it that much. This is our practice and we manage it our own way.' (Respondent 29)

Another element of the practice accreditation program was the formulation of improvement plans. These plans were in general drafted and implemented by all team members. The practice consultant provided useful feedback on the plans in the first year of the program. However, only to a certain extent the subject of improvement plans can be determined. 'I have to come up with three new plans for this year. You have to be careful you don't make up things only because the auditor is coming.'(Respondent 45)

Visitation of an assessor is the next element of the practice accreditation program. During this visit the assessor audits the practice. Results of the audit seem to depend on which assessor visits the practice. 'I have noticed over time that the assessors all have different backgrounds. They assess the practice in a non-similar manner. The things that are important differ for various assessors.' (Respondent 34)

Engaging

Some of the partners of the GPs were member of the practice team. This appeared to be a highly stimulating factor in implementation of the program. 'As the manager I have the time to perform accreditation-related tasks. So I took the initiative, otherwise it would not have been a success. We talk about it over dinner, so to speak, so the reflection process is already started. And then at one point I nag that he really has to write those plans, and then he picks up the voice recorder and begins.' (Respondent 29)

When starting with the program some participants expanded responsibilities of other team members for the purpose of guiding the implementation of the program. 'One of our assistants had just finished a management training, that was our benefit. We appointed her as coordinator of the practice accreditation program.' (Respondent 40)

Executing

Every year the practice is audited by an auditor who assesses the objectives of implemented improvement plans and approves new improvement plans. This annual visit is for most participants an important motivator for continuous quality improvement and to keep implementation of improvement plans on the practice agenda.

### Reflecting and Evaluating

Quantitative feedback about the progress of implementation of the program was provided by feedback reports at the start of the program. It is required for practices to define their improvement plans with a measurable goal. After a year they have to provide evidence that goals have been achieved. Furthermore team meetings were regularly held, as required by the practice accreditation program, to monitor progress of implementation.

As a result of participation in the program, team members were more motivated in performing their work and their responsibility increased as a consequence of participation in the program. Overall a better team spirit emerged. *'Very often issues are not mentioned because it is difficult to give one another feedback. Now we succeeded in establishing a safe work environment where we can provide each other feedback in a constructive manner.'* (respondent 40)

## DISCUSSION

The aim of this study was to identify determinants of change related to the practice accreditation program, building on the experiences of primary care professionals who had participated in the accreditation program in primary care. The presence of a team member who has the specific responsibility for the program appeared to be a stimulating factor. The accreditation program had positive effects on team climate and caused more sense of responsibility for quality of care among all team members. The perception was that patient care was not directly influenced by the accreditation program. Audit and feedback is a crucial element of the accreditation program, however choices for improvement plans were rarely based on feedback reports. Receiving a certificate for completing the accreditation program seemed to have little value to participants.

As shown in a Cochrane review<sup>15</sup> audit and feedback leads to variable and overall modest improvements in professional practice. The effectiveness seems to depend on baseline performance and on how feedback is exactly provided. Knowledge gaps remain regarding when audit and feedback will work best and why.<sup>16</sup> Feedback is more effective when accompanied by both explicit goals and an action plan. However, results in this study show that feedback is not necessarily used when making improvement plans, because practices have ideas in advance on what to improve regardless of the outcome of feedback. Furthermore,

external factors, such as participation in chronic care groups, appear to have a more important impact on the implementation of new or improved procedures in the practice than audit and feedback. As shown in this study, participants experienced that patient care was not directly influenced by the accreditation program, it is therefore recommended that improvement plans should be focussed more on improvement of outcome measures.

In this study staff responsibility for quality was identified as an important implementation facilitator, which was also demonstrated in a previous study.<sup>17</sup> Similar to previous studies in hospital-settings,<sup>18</sup> this study in primary care demonstrates contrasting professional attitudes towards accreditation programs; a possible explanation for this may be age of the professional.<sup>19</sup> The program results in better organizational performance and it provides a guide to external stakeholders illustrating how quality is managed within the practice. However critical perspectives are that the program is bureaucratic, time consuming and adds little value to patient care because of its focus on administrative processes. Furthermore there is a perceived lack of consistency among assessors.

As a response to this and other evaluations, the Netherlands Institute for Accreditation in Healthcare has adjusted the practice accreditation program to make implementation more feasible and flexible. Data collection has been spread over different years, improvement plans can be documented in a more flexible way, and the use of external advisors is optional. New evaluation is required to examine the impact of these changes on feasibility and outcomes.

### Strengths and limitations of the study

The strength of this study lies in the qualitative approach which gives us more information on the working elements of the practice accreditation program. The CFIR framework was used to organize the data in this study. All domains described in the CFIR were represented in the results. As the CFIR framework was only used in the last stage of coding, the risk of overlooking material that does not fit in the constructs, was small. General practices in this study all voluntarily applied for the practice accreditation program and subsequently they voluntarily participated in this study. This could imply that participants included in this study had a more than average affinity with quality of care and were motivated to change. Therefore it is recommended to conduct further research in the late majority population. In this study only the quality coordinators of the practices were approached for participation. A focus group

study with all team members of the practice could have resulted in additional outcomes to provide more understanding of mechanisms of action regarding implementation of the program. Furthermore, the data collection method we choose might have been inadequate as with face-to-face interviews more in-depth and nuanced data can be collected.

This study contributes to the body of knowledge on determinants of outcome of a practice accreditation program implemented in general practice. Perceived determinants in this study do not imply these are already proven and they have to be further explored in future research. However, the results of this study provide feasible, ready to use suggestions, like designating one responsible team member, to facilitate the implementation of a practice accreditation program and therefore can be relevant for general practice teams, practice managers and policymakers.

Consistent with results from this study, previous research has shown that accreditation results in improved teamwork, improved access to care, increased awareness of patient safety, improved practice systems and care processes and improved quality of care.<sup>19</sup> Nevertheless, not all planned elements of accreditation appeared to contribute to its outcomes, so there may be room for improving efficiency of the program. As shown in this study, elements that were perceived to facilitate implementation of the program were; designating one person responsible for the program, ensuring clear lines of communication within the whole practice team and having affinity with or stimulate enthusiasm for improving quality of care. Furthermore contextual factors such as participation in a care group and being connected to the GP educational institute were important for practice change. The importance of the elucidation of contextual factors has been shown in previous research. Reporting contextual information is a way to provide information needed to foster health care systems,<sup>20</sup> and it is therefore recommended to explore contextual information in future accreditation research.

Across the world, practice accreditation is an established strategy for assessing and improving healthcare practices. Nevertheless, there remains a need for better insight into the factors and processes related to its impact in order to optimize existing accreditation programs.

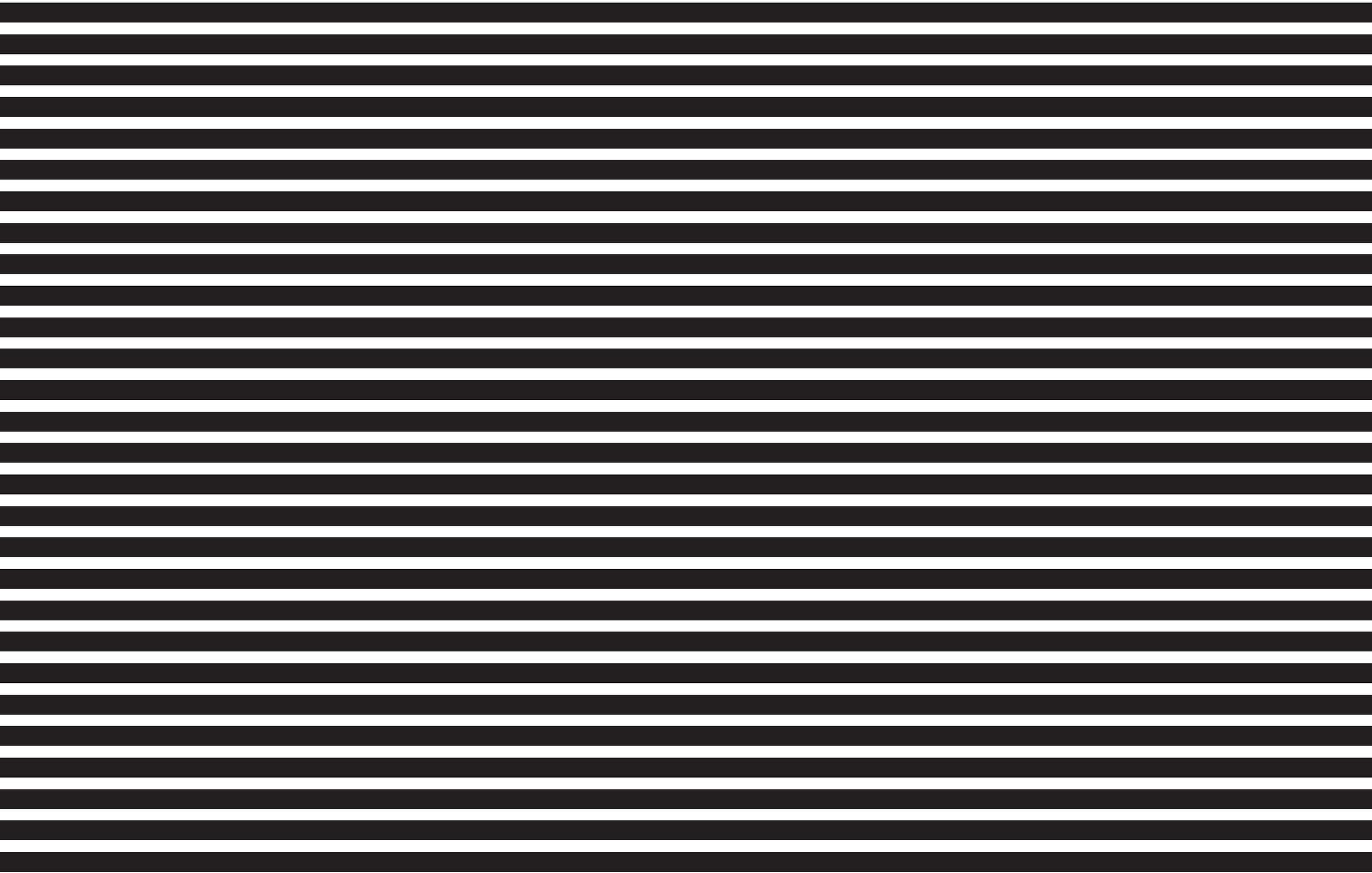
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Topic/Description	Short description
<b>I. INTERVENTION CHARACTERISTICS</b>	
A. Intervention source	Perception of key stakeholders about whether the intervention is externally or internally developed.
B. Evidence Strength & Quality	Stakeholders' perceptions of the quality and validity of evidence supporting the belief that the intervention will have desired outcomes.
C. Relative Advantage	Stakeholders' perception of the advantage of implementing the intervention versus an alternative solution.
D. Adaptability	The degree to which an intervention can be adapted, tailored, refined, or reinvented to meet local needs.
E. Trialability	The ability to test the intervention on a small scale in the organization, and to be able to reverse course (undo implementation) if warranted.
F. Complexity	Perceived difficulty of implementation, reflected by duration, scope, radicalness, disruptiveness, centrality, and intricacy and number of steps required to implement.
G. Design Quality and Packaging	Perceived excellence in how the intervention is bundled, presented, and assembled.
H. Cost	Costs of the intervention and costs associated with implementing that intervention including investment, supply, and opportunity costs.
<b>II. OUTER SETTING</b>	
A. Patient Needs & Resources	The extent to which patient needs, as well as barriers and facilitators to meet those needs are accurately known and prioritized by the organization.
B. Cosmopolitanism	The degree to which an organization is networked with other external organizations.
C. Peer Pressure	Mimetic or competitive pressure to implement an intervention; typically because most or other key peer or competing organizations have already implemented or in a bid for a competitive edge.
D. External Policy & Incentives	A broad construct that includes external strategies to spread interventions including policy and regulations (governmental or other central entity), external mandates, recommendations and guidelines, pay-for-performance, collaboratives, and public or benchmark reporting.

<b>III. INNER SETTING</b>	
A. Structural Characteristics	The social architecture, age, maturity, and size of an organization.
B. Networks & Communications	The nature and quality of webs of social networks and the nature and quality of formal and informal communications within an organization.
C. Culture	Norms, values, and basic assumptions of a given organization.
D. Implementation Climate	The absorptive capacity for change, shared receptivity of involved individuals to an intervention and the extent to which use of that intervention will be rewarded, supported, and expected within their organization.
1. Tension for Change	The degree to which stakeholders perceive the current situation as intolerable or needing change.
2. Compatibility	The degree of tangible fit between meaning and values attached to the intervention by involved individuals, how those align with individuals' own norms, values, and perceived risks and needs, and how the intervention fits with existing workflows and systems.
3. Relative Priority	Individuals' shared perception of the importance of the implementation within the organization.
4. Organizational Incentives & Rewards	Extrinsic incentives such as goal-sharing awards, performance reviews, promotions, and raises in salary and less tangible incentives such as increased stature or respect.
5. Goals and Feedback	The degree to which goals are clearly communicated, acted upon, and fed back to staff and alignment of that feedback with goals.
6. Learning Climate	A climate in which: a) leaders express their own fallibility and need for team members' assistance and input; b) team members feel that they are essential, valued, and knowledgeable partners in the change process; c) individuals feel psychologically safe to try new methods; and d) there is sufficient time and space for reflective thinking and evaluation.
E. Readiness for Implementation	Tangible and immediate indicators of organizational commitment to its decision to implement an intervention.
1. Leadership Engagement	Commitment, involvement, and accountability of leaders and managers with the implementation.
2. Available Resources	The level of resources dedicated for implementation and on-going operations including money, training, education, physical space, and time.
3. Access to knowledge and information	Ease of access to digestible information and knowledge about the intervention and how to incorporate it into work tasks.

IV. CHARACTERISTICS OF INDIVIDUALS	
A. Knowledge & Beliefs about the Intervention	Individuals' attitudes toward and value placed on the intervention as well as familiarity with facts, truths, and principles related to the intervention.
B. Self-efficacy	Individual belief in their own capabilities to execute courses of action to achieve implementation goals.
C. Individual Stage of Change	Characterization of the phase an individual is in, as he or she progresses toward skilled, enthusiastic, and sustained use of the intervention.
D. Individual Identification with Organization	A broad construct related to how individuals perceive the organization and their relationship and degree of commitment with that organization.
E. Other Personal Attributes	A broad construct to include other personal traits such as tolerance of ambiguity, intellectual ability, motivation, values, competence, capacity, and learning style.
V. PROCESS	
A. Planning	The degree to which a scheme or method of behavior and tasks for implementing an intervention are developed in advance and the quality of those schemes or methods.
B. Engaging	Attracting and involving appropriate individuals in the implementation and use of the intervention through a combined strategy of social marketing, education, role modeling, training, and other similar activities.
1. Opinion Leaders	Individuals in an organization who have formal or informal influence on the attitudes and beliefs of their colleagues with respect to implementing the intervention.
2. Formally appointed internal implementation leaders	Individuals from within the organization who have been formally appointed with responsibility for implementing an intervention as coordinator, project manager, team leader, or other similar role.
3. Champions	"Individuals who dedicate themselves to supporting, marketing, and 'driving through' an [implementation]", overcoming indifference or resistance that the intervention may provoke in an organization.
4. External Change Agents	Individuals who are affiliated with an outside entity who formally influence or facilitate intervention decisions in a desirable direction.
C. Executing	Carrying out or accomplishing the implementation according to plan.
D. Reflecting & Evaluating	Quantitative and qualitative feedback about the progress and quality of implementation accompanied with regular personal and team debriefing about progress and experience.



**SECTION 2  
CONTEXTUAL FACTORS OF INFLUENCE ON  
CARDIOVASCULAR RISK MANAGEMENT IN  
GENERAL PRACTICE**

## Chapter 5

# Comorbidity complicates cardiovascular treatment: is diabetes the exception?

E. Nouwens  
J. van Lieshout  
M. Wensing

**ABSTRACT****Background**

Many patients with cardiovascular disease do not attain the targets for health-related lifestyle and preventive treatment recommended in practice guidelines. The aim of this study was to assess the impact of diabetes (DM) and chronic obstructive pulmonary disease (COPD) on the quality of cardiovascular risk management in patients with established cardiovascular diseases (CVD).

**Methods and Results**

Patients with established CVD were randomly selected in primary care practices using recorded diagnoses. Structured case forms were used to review data on 20 performance indicators concerning CVD from medical records. Descriptive and multilevel regression analyses were conducted. In 45 primary care practices with 106 physicians in the Netherlands, 1614 medical records of patients with CVD (37.9% women) were reviewed. A total of 1076 (66.7%) patients had recorded CVD only (reference group); 7.8% had CVD and COPD; 22.4% had CVD and DM; 3.1% patients had CVD, COPD and DM. Compared with the reference group, patients with CVD and DM yielded higher scores on 17 of 20 indicators; patients with CVD, DM and COPD on 14 indicators; and patients with CVD and COPD on three indicators. Of the patients with CVD and DM, fewer patients had LDL-cholesterol levels over 2.5 mmol/l (OR=0.36; 95% CI 0.26-0.50), more had antiplatelet drugs prescribed (OR=1.72; 95% CI 1.17-2.54), and more had systolic blood pressure measurement (OR=4.12; 95% CI 2.80-6.06).

**Conclusions**

This study showed that DM but not COPD was associated with more comprehensive cardiovascular risk management. This finding adds to cumulating evidence that presence of DM is associated with better preventive treatment of cardiovascular risk.

## INTRODUCTION

Cardiovascular disease (CVD) remains an important cause of death and disability in the world. In the United States, 33.6% of all deaths are caused by CVD.<sup>1</sup> Similar numbers were found in the Netherlands where one in three individuals dies of CVD (Netherlands Heart Foundation).<sup>2</sup> Many activities have been developed to prevent CVD in public health and in primary care.<sup>3,4</sup> Despite these activities and a range of practice guidelines,<sup>5,6</sup> many individuals receive suboptimal cardiovascular risk management. Many cardiovascular disease patients do not attain the lifestyle, risk factor and therapeutic targets that are recommended.<sup>6,7</sup> One reason may be the presence of comorbidity in CVD patients, which can complicate treatment.<sup>8-10</sup> The prevalence of comorbidity in patients with cardiovascular risk is high, especially in patients over the age of 65 years.<sup>11</sup> Practice guidelines tend to ignore comorbidity, although adherence to a guideline for one disease may have a negative effect in treatment of a co-existing disease.<sup>10</sup> Nevertheless, studies on guideline adherence concerning patients with comorbidity have remained inconclusive and whether higher guideline adherence results in better health outcomes in patients with comorbidity is as yet unclear. On the one hand, many multi-morbid patients receive multiple drugs which may compromise adherence and safety of treatment.<sup>12</sup> Research has also suggested that these patients have a poorer functional status or quality of life, a higher mortality risk and greater use of health services.<sup>13</sup> On the other hand, some studies have in fact shown a positive association between the number of medical conditions and guideline adherence.<sup>14-17</sup> For instance, a Dutch survey demonstrated that patients with chronic heart failure and diabetes mellitus (DM) received treatment that was more consistent with guideline recommendations than patients with chronic heart failure but no DM.<sup>18</sup> Furthermore, type of comorbid conditions may also be of influence on guideline adherence.<sup>9,19</sup> The aim of this study was to assess the impact of DM and chronic obstructive pulmonary disease (COPD) on measures of cardiovascular risk management in patients with established CVD. Given the commonalities in the preventive treatment of the three conditions, which is illustrated by overlapping quality indicators, we expected comorbidity to be associated with higher scores on these measures.

## MATERIALS AND METHODS

### Design

This study was based on the baseline measurement in a cluster randomised trial no. NCT00791362, which was executed from September 2008 until February 2011. The trial aimed to determine the effectiveness and efficiency of a national accreditation and improvement program (NHG-Praktijkaccreditering®) for primary care practice, focusing on patients with established CVD. The national accreditation and improvement program was a new strategy for quality improvement in Dutch primary care. It consists of a set of implementation interventions including: audit and feedback, outreach visits by trained facilitators and planning improvements according to the quality management principles. The Arnhem-Nijmegen ethics committee waived approval for this trial. Data were collected by audit of electronic medical records of primary care patients in the Netherlands.

### Study population

We recruited patients with established CVD, namely angina pectoris, acute myocardial infarction, transient ischaemic attack (TIA), ischaemic stroke, peripheral arterial disease, aortic aneurysm and other chronic ischaemic heart diseases. Selection of patients with these conditions was based on corresponding diagnostic codes (ICPC K74, K75, K89, K90.3, K92.1, K99.1 and K76). Patients were classified as having DM or COPD if the corresponding diagnostic codes (T90 for DM, R95 for COPD) were recorded in their medical record. Patients were recruited from 45 primary care practices involving 106 family physicians in the Netherlands who agreed to participate in the study. All primary care practices which voluntarily enrolled in the Dutch national accreditation program (NHG-Praktijkaccreditering®) from December 2008 until March 2010 were invited by letter to participate in the study. All primary care practices used electronic medical records, which is common in the Netherlands, and International Classification of Primary Care codes (ICPC codes), a worldwide system to label conditions in primary care.<sup>20</sup>

### Measurements

In each practice 40 patients with established CVD were randomly sampled from the practice register. Data collection, related to the last 12 months, was based on quality indicators for established CVD<sup>21</sup> (developed by the Dutch College of Family Physicians), which included: systolic blood pressure in mmHg measured in the practice, LDL cholesterol in mmol/l, prescription of statin and antiplatelet drugs,

smoking status, stop smoking advice, body mass index in kg/m<sup>2</sup>, waist circumference ever measured, fasting glucose measurement measured in the past five years, influenza vaccination, registration of alcohol intake and control and advice on exercise and diet. This set of 20 indicators was complemented by information on age, sex and the presence of comorbidity (COPD and DM). Paper-based abstraction forms were used to collect data. Data were manually abstracted out of electronic medical records from January 2009 until May 2010. The starting point in this study was indicators related to established CVD<sup>21</sup> but when considering indicators for all three chronic illnesses,<sup>21-23</sup> seven indicators were commonly shared. These indicators were: exercise control, influenza vaccination, measurement of BMI, BMI <25 kg/m<sup>2</sup>, smoking status, patient is a smoker and stop smoking advice. Eight indicators concerned both established CVD and DM. These indicators were: systolic blood pressure measurement, systolic blood pressure <140 mmHg, LDL-cholesterol measurement, LDL cholesterol <2.5 mmol/l, advice on physical activity, diet control, counselling about diet and registration of alcohol intake. Five indicators related to established CVD only (measurement of waist circumference, prescription of antiplatelet drugs, fasting glucose measurement, patients with LDL cholesterol ≥2.5 mmol/l with statin prescription and comprehensive risk assessment).

### Statistical analysis

Data were analysed using the SPSS 16.0 software package (Chicago, Illinois, USA). Outcome measures were all indicators as described above. All indicators (all dichotomous outcomes) were included in a two-level logistic regression, taking into account the hierarchical structure of our study (patients nested within practices). Multilevel analysis was performed in the SAS 9.2 package with procedure PROC GLIMMIX. We performed a logistic model (with a binomial distribution and a logit link function) with a random intercept and all other variables (group, age and sex) fixed. Only patient variables were included in the model. In the multilevel regression analysis four groups were taken into account. The first group, the reference group, consisted of patients with CVD only, the second group were patients with CVD and COPD, the third group were patients with CVD and DM, the fourth group were patients with CVD, DM and COPD.

## RESULTS

Of the 336 practices invited to participate in this study, 45 entered the study, representing 106 family physicians. In 45 practices a random sample of 1614 patients with established CVD and possibly DM and/or COPD as comorbidity was recruited.

Table 1 presents characteristics of the study population. More men (62.1%) were included in the sample. The mean age was 69.5 years (SD 11.8). A total of 1076 (66.7%) patients had CVD only; 126 (7.8%) had CVD and COPD; 362 (22.4%) had CVD and DM; and 50 (3.1%) patients had CVD, COPD and DM.

Table 1. Characteristics of the study population (N=1614)

	CVD (%)	CVD+COPD (%)	CVD+DM (%)	CVD+DM +COPD (%)	Total scores (%)
Men	665 (61.8)	90 (71.4)	212 (58.6)	36 (72)	1003 (62.1)
Women	411 (38.2)	36 (28.6)	150 (41.4)	14 (28)	611 (37.9)
Total	1076 (66.7)	126 (7.8)	362 (22.4)	50 (3.1)	1614
Mean age in years (SD)	68.7 (12.2)	71.3 (9.6)	70.9 (10.9)	70.1 (11.4)	69.5 (11.8)

Table 2 describes the cardiovascular diseases. The most common cardiovascular history was angina pectoris (37.4% of patients) followed by myocardial infarction (30%). Of patients with multiple cardiovascular disorders (n=247) 37.2% had coronary heart disease only (K74, K75, K76), 31.6% had coronary heart disease and peripheral arterial disease or aortic aneurysm (K92.1, K99.1) and 22.3% had coronary heart disease and TIA or ischaemic stroke (K89, K90.3). Table 3 shows that in audited records, recording was best for blood pressure measurement (75.9%), influenza vaccination (76.3%) and prescription of antiplatelet drugs (84.8%) and worst for risk assessment (4.8%). Goals for outcome measurement BMI (<25 kg/m<sup>2</sup>) were achieved in 16.9% of patients whose BMI was measured. Systolic blood pressure was <140 mmHg in 60.2% of patients with a record of BP, and LDL-cholesterol levels were below 2.5 mmol/l in 46.8% of patients with a record of LDL cholesterol.

**Table 2. Type of cardiovascular disease**

	ICPC	CVD (%)	CVD+COPD (%)	CVD+DM (%)	CVD+DM+COPD (%)	Total scores (%)
Angina Pectoris	K74	401 (37.5)	51 (40.8)	123 (34.5)	23 (46)	598 (37.4)
Myocardial Infarction	K75	324 (30.3)	44 (35.2)	98 (27.5)	15 (30)	481 (30)
Other chronic ischemic heart diseases	K76	108 (10.1)	8 (6.4)	47 (13.2)	6 (12)	169 (10.6)
TIA	K89	175 (16.4)	17 (13.6)	48 (13.4)	2 (4)	242 (15.1)
Ischemic stroke	K90.3	77 (7.2)	4 (3.2)	23 (6.4)	3 (6)	107 (6.7)
Peripheral arterial disease, claudicatio intermittens	K92.1	104 (9.7)	17 (13.6)	68 (19)	9 (18)	198 (12.4)
Aneurysma Aortae	K99.1	56 (5.2)	13 (10.4)	10 (2.8)	3 (6)	82 (5.1)

TIA = transient ischaemic attack.

**Table 3. Record of indicators for cardiovascular risk management in electronic medical records**

Type of indicator		CVD (%)	CVD+COPD (%)	CVD+DM (%)	CVD+DM+COPD (%)	Total (%)
	<b>Indicators commonly shared across CVD/COPD/DM</b>					
Process	Smoking status	359 (33.4)	62 (49.2)	212 (58.6)	35 (70)	668 (41.5)
Outcome	Patient is a smoker	110 (30.6)	36 (58.1)	43 (20.2)	18 (51.4)	207 (41.6)
Process	Stop smoking advice	60 (54.5)	22 (61.1)	26 (60.5)	12 (66.7)	119 (54.8)
Process	BMI measured	191 (17.8)	29 (23)	189 (52.2)	29 (58)	438 (27.2)
Outcome	BMI <25 kg/m <sup>2</sup>	38 (19.9)	6 (20.7)	26 (13.8)	4 (13.8)	74 (16.9)
Process	Influenza vaccination	784 (72.9)	106 (84.1)	301 (83.1)	39 (78)	1230 (76.3)
Process	Exercise control	209 (19.4)	25 (19.8)	191 (52.8)	25 (50)	450 (27.9)

Type of indicator		CVD (%)	CVD+COPD (%)	CVD+DM (%)	CVD+DM+COPD (%)	Total (%)
	<b>Indicators shared across CVD/DM</b>					
Process	Systolic blood pressure measured	755 (70.2)	90 (71.4)	329 (90.9)	48 (96)	1222 (75.9)
Outcome	Systolic blood pressure <140 mmHg	464 (61.5)	50 (55.6)	196 (59.6)	26 (54.2)	736 (60.2)
Process	LDL cholesterol measured	446 (41.4)	54 (42.9)	267 (73.8)	38 (76)	805 (50)
Outcome	LDL cholesterol <2.5 mmol/l	170 (38.1)	20 (37.0)	166 (62.2)	21 (55.3)	377 (46.8)
Process	Advice physical activity	150 (13.9)	19 (15.1)	142 (39.2)	16 (32)	327 (20.3)
Process	Diet control	137 (12.7)	17 (13.5)	216 (59.7)	28 (56)	398 (24.7)
Process	Counseling about diet	158 (14.7)	14 (11.1)	197 (54.4)	26 (52)	395 (24.5)
Process	Registration of alcohol intake	245 (22.8)	31 (24.6)	183 (50.6)	27 (54)	486 (30.2)
	<b>Indicators CVD only</b>					
Process	Patients with LDL cholesterol ≥2.5 mmol/l with statin prescription	170 (61.6)	23 (67.6)	73 (72.3)	7 (41.2)	273 (63.8)
Process	Waist circumference measured	103 (9.6)	12 (9.5)	87 (24)	16 (32)	218 (13.7)
Process	Prescription antiplatelet drugs	896 (83.6)	101 (80.2)	325 (89.8)	44 (88)	1366 (84.8)
Process	Fasting glucose measured	644 (59.9)	76 (60.3)	328 (90.6)	46 (92)	1094 (68)
Process	Comprehensive risk assessment*	27 (2.5)	2 (1.6)	41 (11.3)	7 (14)	77 (4.8)

\* positive score when there is a record of: blood pressure, BMI, waist circumference, fasting glucose measurement, LDL cholesterol measurement, smoking behavior, alcohol intake, advice and control of diet and physical exercise in the past 12 months.

### Indicator scores

#### Indicators shared across conditions

Of the seven indicators that are relevant for each of the conditions, three to five yielded higher scores in patients with DM and/or COPD in addition to CVD (Table 4). Smoking status was better registered for all patients with comorbidity compared with patients with CVD only. In the group of patients with CVD and COPD and in patients with CVD, DM and COPD more smokers were present (odds ratio (OR)=4.13; 95% confidence interval (CI) 2.26-7.54; OR=2.61; 95% CI 1.23-5.54). Patients with CVD and DM and patients with CVD, DM and COPD had more recordings of BMI (OR=7.09; 95% CI 5.24-9.60; OR=7.97; 95% CI 4.16-15.30) and control of exercise (OR=6.26; 95% CI 4.69-8.35; OR=5.72; 95% CI 3.06-10.68). More patients with CVD and DM and patients with CVD and COPD received influenza vaccinations (OR=1.84; 95% CI 1.30-2.59; OR=1.99; 95% CI 1.15-3.44) than patients with CVD only. No differences between groups were identified regarding the process measurement 'stop smoking advice'.

More patients with CVD and DM had a BMI over 25 kg/m<sup>2</sup> (OR=2.05; 95% CI 1.15-3.65). On the practice level, intra-class coefficient (ICC) scores ranged from 0.038 for 'patient is a smoker' to 0.261 for 'BMI measured'.

#### Indicators shared across CVD and DM

Of eight indicators shared across CVD and DM all but one (systolic blood pressure <140 mmHg) yielded higher scores in patients with DM (with or without COPD). In patients with CVD and COPD, indicator scores were the same as in patients with CVD only. Patients with CVD and DM and patients with CVD, DM and COPD were more likely to have blood pressure measurement (OR=4.12; 95% CI 2.80-6.06; OR=10.56; 95% CI 2.53-44.09), LDL-cholesterol measurement (OR=4.03; 95% CI 3.08-5.28; OR=4.82; 95% CI 2.47-9.39), advice (OR=8.26; 95% CI 6.20-11.00; OR=7.32; 95% CI 3.96-13.56) and control (OR=12.04; 95% CI 8.94-16.21; OR=10.92; 95% CI 5.86-20.35) on diet, advice about physical activity (OR=4.38; 95% CI, 3.29-5.84; OR=3.21; 95% CI 1.68-6.14) and registration of alcohol intake (OR=4.18; 95% CI 3.17-5.51; OR=5.32; 95% CI 2.85-9.93) compared with patients with CVD only. No differences were found between groups regarding systolic blood pressure <140 mmHg. Patients with CVD and DM and patients with CVD, DM and COPD were less likely to have a LDL-cholesterol level ≥2.5 mmol/l (OR=0.36; 95% CI 0.26-0.50; OR=0.49; 95% CI 0.25-0.96). On the practice level, ICC scores ranged from 0.021 for 'systolic blood pressure <140 mmHg' to 0.159 for 'registration of alcohol intake'.

Table 4. Impact of recorded diseases on scores for CVD indicators (odds ratio's with 95% confidence intervals and CVD only as reference group)

Indicators commonly shared across CVD/COPD/DM	Smoking status	Patient is a smoker	Stop smoking advice	BMI measured	BMI ≥25 kg/m <sup>2</sup>	Influenza vaccination	Exercise control
<b>Fixed effect</b>							
CVD & COPD	2.58* (1.73-3.85)	4.13* (2.26-7.54)	1.48 (0.65-3.39)	1.46 (0.90-2.37)	1.18 (0.44-3.20)	1.99* (1.15-3.44)	1.35 (0.83-2.21)
CVD & DM	3.64* (2.78-4.75)	0.67 (0.44-1.03)	1.09 (0.52-2.28)	7.09* (5.24-9.60)	2.05* (1.15-3.65)	1.84* (1.30-2.59)	6.26* (4.69-8.35)
CVD & DM & COPD	6.31* (3.29-12.10)	2.61* (1.23-5.54)	2.18 (0.71-6.69)	7.97* (4.16-15.30)	1.87 (0.59-5.95)	1.50 (0.70-3.20)	5.72* (3.06-10.68)
CVD (reference group)							
age <sup>1</sup>	0.97* (0.96-0.98)	0.95* (0.93-0.96)	0.99 (0.97-1.02)	1.01 (0.99-1.02)	0.94* (0.91-0.96)	1.05* (1.04-1.06)	1.00 (0.99-1.01)
sex <sup>2</sup>	1.15 (0.92-1.44)	0.97 (0.66-1.42)	0.75 (0.41-1.38)	1.31 (0.99-1.72)	1.13 (0.66-1.95)	1.01 (0.77-1.32)	1.05 (0.81-1.35)
<b>Random effect</b>	Variance component (S.E.)						
Level-two variance (practice)	0.47 (0.13)	0.13 (0.11)	0.45 (0.31)	1.16 (0.31)	0	0.84 (0.24)	0.74 (0.20)
ICC	0.125	0.038	0.120	0.261	0	0.203	0.184

Indicators shared across CVD/DM	Systolic blood pressure measured	Systolic blood pressure < 140 mmHg	LDL cholesterol measured	LDL cholesterol ≥2.5 mmol/l	Advice physical activity	Diet control	Counseling about diet	Registration of alcohol intake
<b>Fixed effect</b>								
CVD & COPD	0.97 (0.63-1.47)	1.22 (0.78-1.92)	1.10 (0.76-1.62)	1.06 (0.58-1.92)	1.22 (0.72-2.09)	1.27 (0.72-2.21)	0.81 (0.45-1.47)	1.35 (0.86-2.13)
CVD & DM	4.12* (2.80-6.06)	1.02 (0.77-1.34)	4.03* (3.08-5.28)	0.36* (0.26-0.50)	4.38* (3.29-5.84)	12.04* (8.94-16.21)	8.26* (6.20-11.00)	4.18* (3.17-5.51)
CVD & DM & COPD (reference group)	10.56* (2.53-44.09)	1.36 (0.74-2.49)	4.82* (2.47-9.39)	0.49* (0.25-0.96)	3.21* (1.68-6.14)	10.92* (5.86-20.35)	7.32* (3.96-13.56)	5.32* (2.85-9.93)
age <sup>1</sup>	1.02* (1.01-1.03)	1.03* (1.02-1.04)	0.99 (0.98-1.00)	1.00 (0.99-1.01)	0.99* (0.97-1.00)	0.99* (0.98-1.00)	0.98* (0.97-0.99)	0.99 (0.98-1.00)
sex <sup>2</sup>	0.92 (0.72-1.18)	0.83 (0.65-1.06)	0.93 (0.75-1.15)	0.80 (0.59-1.08)	1.02 (0.78-1.34)	1.01 (0.77-1.33)	1.11 (0.85-1.45)	1.49* (1.16-1.90)
<b>Random Effect</b>								
Variance component (S.E.)								
Level-two variance (practice)	0.16 (0.07)	0.07 (0.05)	0.09 (0.05)	0.09 (0.07)	0.35 (0.12)	0.39 (0.13)	0.31 (0.11)	0.62 (0.17)
ICC	0.046	0.021	0.027	0.027	0.096	0.106	0.086	0.159

Indicators CVD only	Patients with LDL ≥2.5 mmol/l with statin prescription	Waist circumference measured	Prescription antiplatelet drugs	Fasting glucose measured	Comprehensive risk assessment
<b>Fixed effect</b>					
CVD & COPD	1.54 (0.70-3.43)	1.14 (0.57-2.26)	0.68 (0.42-1.11)	1.12 (0.75-1.66)	0.77 (0.17-3.44)
CVD & DM	2.13* (1.24-3.67)	4.83* (3.33-7.02)	1.72* (1.17-2.54)	7.40* (4.99-10.98)	6.99* (3.98-12.27)
CVD & DM & COPD (reference group)	0.50 (0.18-1.43)	6.07* (2.93-12.56)	1.37 (0.56-3.34)	9.41* (3.30-26.84)	7.15* (2.56-20.02)
age <sup>1</sup>	0.96* (0.94-0.98)	0.98* (0.96-0.99)	1.03* (1.01-1.04)	1.00 (0.99-1.01)	0.98 (0.96-1.00)
sex <sup>2</sup>	1.44 (0.94-2.21)	1.39 (0.99-1.96)	1.99* (1.49-2.64)	1.04 (0.82-1.31)	1.31 (0.76-2.27)
<b>Random Effect</b>					
Variance component (S.E.)					
Level-two variance (practice)	0.20 (0.16)	1.67 (0.47)	0.19 (0.09)	0.37 (0.12)	1.95 (0.62)
ICC	0.057	0.337	0.055	0.101	0.372

\* p<0.05 <sup>1</sup>Age increasing in 1-year steps; <sup>2</sup>Reference group is men

*Indicators for CVD only*

Of five indicators that are only relevant for CVD, three to five yielded higher scores in patients with DM (with or without COPD). No such differences were found in patients with CVD and COPD. Patients with CVD and DM and patients with CVD, DM and COPD were more likely to have a record of waist circumference (OR=4.83; 95% CI 3.33-7.02; OR=6.07; 95% CI 2.93-12.56), fasting glucose measurement (OR=7.40; 95% CI 4.99-10.98; OR=9.41; 95% CI 3.30-26.84) and a comprehensive risk assessment (OR=6.99; 95% CI 3.98-12.27; OR=7.15; 95% CI 2.56-20.02) than patients with CVD only. Antiplatelet drugs were more often prescribed to patients with CVD and DM (OR=1.72; 95% CI 1.17-2.54) than to patients with CVD only. Patients with CVD and DM with LDL-cholesterol levels above 2.5 mmol/l were more likely to receive a statin (OR=2.13; 95% CI 1.24-3.67). Increasing patient age was positively correlated with prescribing antiplatelet drugs (OR=1.03; 95% CI 1.01-1.04) and receiving influenza vaccination (OR=1.05; 95% CI 1.04-1.06). Recording of blood pressure measurement was positively correlated with increasing age as well (OR=1.02; 95% CI 1.01-1.03); however, with increasing age blood pressure targets were less often achieved. Increasing age was negatively correlated with a record of smoking behaviour (OR=0.97; 95% CI 0.96-0.98), advice on physical activity (OR=0.99; 95% CI 0.97-1.00), dietary advice (OR=0.98; 95% CI 0.97-0.99) and control (OR=0.99; 95% CI 0.98-1.00), record of waist circumference (OR=0.98; 95% CI 0.96-0.99) and statin prescription for patients with an LDL-cholesterol level  $\geq 2.5$  mmol/l (OR=0.96; 95% CI 0.94-0.98). With increasing age, more patients had a BMI below 25 kg/m<sup>2</sup> (OR=0.94; 95% CI 0.91-0.96) and of the patients whose smoking behaviour was registered, less patients smoked (OR=0.95; 95% CI 0.93-0.96). On the practice level, ICC scores ranged from 0.055 for 'prescription of antiplatelet drugs' to 0.372 for 'comprehensive risk assessment'. Female gender was positively correlated with prescription of antiplatelet drugs (OR=1.99; 95% CI 1.49-2.64) and the registration of alcohol intake (OR=1.49; 95% CI 1.16-1.90).

No differences regarding gender were found for the remaining indicators.

**DISCUSSION**

In line with our expectations, we found evidence that comorbidity was associated with more comprehensive cardiovascular risk management. However, this only applied to DM and not to COPD. This trend applied to indicators that were shared across the conditions, but remarkably also to indicators that were only related to CVD. This study adds to the cumulating research evidence that the presence of DM is associated with better preventive treatment for other diseases.<sup>17,18,24</sup> Our findings should be interpreted in the context of the sample of primary care practices, which may be the early majority with respect to quality improvement as they had voluntarily joined an accreditation program.

A plausible explanation for our findings seems to be that disease management programs for diabetes care have been well established on a nationwide basis in Dutch primary care in recent years. Evidence found that these programs have positive effects on the quality of care.<sup>25</sup> We suggest that similar programs might explain similar findings from studies in other countries.<sup>17,24</sup> In the Netherlands, disease management programs are governed by so-called 'care groups'. This is an organization of 50 to 100 primary care practices which is responsible for the coordination and provision of contracted care in a particular region. Since 2010 all care groups in the Netherlands have a bundled payment contract for the diabetes care program; so 100% national coverage has been achieved.<sup>26</sup> So far, few care groups have focused on COPD or CVD in the Netherlands. The impact of disease management is based on a number of mechanisms. One component of care in disease management programs is that clinical activities and clinical parameters are registered in electronic medical records, which use this information to provide computer generated reminders. This implies that more such activities can be found in a chart audit.

DM and CVD are concordant conditions while they represent parts of the same pathophysiological risk profile and are more likely to be the focus of the same disease management plan. Discordant conditions, in contrast, are not directly related in management or pathogenesis.<sup>27</sup> COPD and CVD are less concordant conditions than DM and CVD.<sup>19,28</sup> Our findings illustrate that the management of DM and CVD has more in common than the management of COPD and CVD. This could even apply to the indicators concerning CVD only. For instance, better prescription of antiplatelet drugs might be explained by the fact that the recommendation for antiplatelet drugs for diabetes patients with established CVD is mentioned in the diabetes guideline. This is not recommended for diabetes patients without established CVD.<sup>29,30</sup>

A third determinant of our findings is that CVD patients visiting the practice because of their structured DM care are being considered not just DM related but more broadly as cardiometabolic risk, which can be seen as an integral primary care approach. For instance, waist circumference and risk for developing DM are related.<sup>29</sup> Although not an indicator for DM in the Dutch national accreditation program (NHG-Praktijkaccreditering®), in many DM care groups in the Netherlands waist circumference is measured routinely. The same applies to fasting glucose measurement, which is not defined as a quality indicator for DM, but is used to diagnose DM and to monitor glucose levels in patients with DM.<sup>29</sup> When considering comprehensive risk assessment, all items are recommended preventive care in diabetes patients.

While most performance indicators yielded higher scores in patients with comorbidity, no differences were found between patient groups for 'systolic blood pressure <140 mmHg', which is a proxy health outcome. More smokers were represented in the group of patients with CVD and COPD and patients with CVD, DM and COPD. While smoking is the most important cause of COPD, most COPD patients smoke or have a history of smoking.<sup>31</sup> The decreasing numbers of patients who smoke with increasing age could be the consequence of the fatal effects of smoking.

For the proxy outcome indicator 'LDL cholesterol <2.5 mmol/l' targets were more often attained in patients with CVD and DM and patients with CVD, DM and COPD than in patients with CVD only. Previous research shows that many patients with CVD do not attain therapeutic targets set in guidelines for CVD.<sup>6,32,33</sup> Higher target attainment for LDL-cholesterol levels in patients with CVD and DM may be related to better prescription of statins in this group of patients, which may be related to the sample of primary care practices included in this study.

Overall, the results of this study showed room for improvement in preventive care in patients with established CVD, even in this sample of primary care practices. This is in line with results from other studies.<sup>6,7,34</sup> Improvements can be made especially on lifestyle counseling in patients with established CVD with or without COPD, while results on these items are disappointing. Primary care has an important role to play in effective health promotion and disease prevention.<sup>35</sup>

This study had some limitations. Primary care practices participating in this study were enrolled in a national implementation and accreditation program. It seems likely that they were better organized and staffed than average. Primary care practices with a clear preference for a

specific improvement plan could not participate in the study while participating practices were randomized to a group which started with an improvement plan on cardiovascular risk management or to a group that did not. This also accounted for practices that participated in ongoing improvement programs due to regional developments in disease management, which makes the assessment of the true participation rate of practices in this study unattainable. The sampling of patients in this study was based on ICPC codes allocated to patients by family physicians. However, some cardiovascular diseases, for example TIA, are more difficult to diagnose, while diagnosis is made based on the anamnesis.<sup>36</sup> This does not seem to be a large problem as 12% of the patients had only TIA as cardiovascular diagnosis. In this study we only assessed COPD and DM as comorbidities of influence on preventive cardiovascular care while these are common in patients with established CVD.<sup>37,38</sup> Furthermore we only considered patient characteristics in this study while practice characteristics could also be of influence on the outcomes. Further research should consider the influence of other concordant and discordant comorbidities and practice characteristics on cardiovascular risk management.

At the time of the study, disease management programs for DM were well established in primary care practices, unlike disease management programs for CVD and COPD. The results of this study illustrate the influence of these programs on the quality of care. Currently ongoing initiatives aim to implement disease management programs for CVD and COPD in primary care. It would be relevant to repeat this study when disease management programs for CVD and COPD are well established. As many components of preventive care for patients with CVD and DM are shared, it may be efficient to integrate these components in a comprehensive care program. This would reduce the burden for both caregivers and patients and open up time for other important clinical tasks.

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## Chapter 6

# Shifting cardiovascular care to nurses results in structured chronic care

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American Journal of Managed Care 2014;20(7): 278-84.

**ABSTRACT****Objective**

To explore nurse involvement in cardiovascular risk management (CVRM) in primary care and how this involvement was associated with the degree of structured chronic illness care.

**Study design**

A cross-sectional observational study in seven European countries.

**Methods**

Five aspects of nurse involvement in CVRM and 35 specific components of structured chronic illness care were documented in 202 primary care practices from Austria, Belgium, Germany, the Netherlands, Slovenia, Spain and Switzerland. An overall measure for chronic care management with a range from 0 to 5 was constructed derived from elements of the Chronic Care Model (CCM). Random coefficient regression modelling was used to explore associations.

**Results**

A majority of practices involved nurses for organization of CVRM in administrative tasks (82.2 %), risk factor monitoring (78.5%) and patient education (57.1%). Fewer practices involved nurses in defining protocol and the organization for CVRM (45%) or diagnosis and treatment (34.6%). With an increasing number of tasks taken up by nurses, overall median adoption of CCM increased from 2.7 (95% CI 1.5-3.6) to 4.2 (95% CI 3.8-4.1). When the number of nurse tasks increased by one, the adoption of CCM increased with 0.13 ( $p < 0.05$ ; 95% CI 0.03-0.22). Some practices with low nurse involvement had high adoption of CCM, while variation of adoption of CCM across practices reduced substantially with an increasing level of nurse involvement.

**Conclusions**

Nurses were involved in the delivery of CVRM at varying degree. Higher involvement of nurses was associated with higher degree of structured chronic illness care with less variation.

**INTRODUCTION**

In primary care across the world clinical tasks have been shifted from physicians to nurses at varying degree. Re-allocation of such tasks from family physicians (FP's) to nurses has been found to be associated with improved, or at least equivalent, quality and outcomes of chronic disease care.<sup>1-5</sup> The degree of re-allocation of tasks varies across countries as a result of policy and organizational and legal factors.<sup>6</sup> In addition, the absence of robust evidence on the impact in natural settings (as opposed to controlled trials and demonstration projects) is an issue in re-allocation of clinical tasks to non-physicians.

Better structuring of (primary) health care for patients with chronic diseases is expected to result in better outcomes for patients and societies,<sup>7</sup> if it integrates all domains (Box 1) specified by the Chronic Care Model (CCM).<sup>8</sup> Allocation of tasks to nurses may contribute to implementation of structured chronic care by increasing capacity and competence in specific areas, such as coordination and patient education, compared to healthcare delivered by physicians only.<sup>2, 9</sup>

Cardiovascular disease (CVD) remains an important cause of death and disability in the world. Many activities have been developed to prevent CVD in public health and in primary care.<sup>10, 11</sup> Substitution of tasks from physicians to nurses can be applied in cardiovascular risk management (CVRM).<sup>12, 13</sup> Nurse managed disease management programs concerning CVD improved lifestyle, risk factor control, use of medications and quality of life.<sup>13</sup> These positive effects are based on the clinical knowledge and skills of nurses,<sup>14</sup> but potentially also on their contribution to teamwork and practice organization.

This study aimed to explore the potential contribution of task allocation to nurses in primary care on the implementation of structured chronic care in primary care for patients with cardiovascular conditions. The study focused on primary care practices in a number of countries in order to get robust estimates in real clinical practice settings across various health care systems.

**Box 1. Elements of the Chronic Care Model <sup>8</sup>**

<b>Community resources and policies</b>
<ul style="list-style-type: none"> <li>- Provider organizations are linked to community-based resources, for example, exercise programmes, self-help groups, and senior centers.</li> </ul>
<b>Healthcare Organization</b>
<ul style="list-style-type: none"> <li>- Chronic care is seen as a priority, otherwise innovation will not take place.</li> <li>- Reimbursement of the healthcare organization has a major impact on chronic care improvements.</li> <li>- Chronic care quality needs to be rewarded by purchasers and insurers to sustain improvements.</li> </ul>
<b>Self-management support</b>
<ul style="list-style-type: none"> <li>- Patients themselves become the principal caregivers. They learn to manage their illnesses and they control lifestyle issues themselves.</li> <li>- Self-management support involves collaboratively helping patients and their families acquire the skills and confidence to manage their chronic illness, providing self-management tools, and routinely assessing problems and accomplishments.</li> </ul>
<b>Delivery system design</b>
<ul style="list-style-type: none"> <li>- Planned management of chronic conditions is separated from acute care.</li> <li>- Non-physicians support patient self-management, arrange for routine periodic tasks, and ensure appropriate follow-up.</li> <li>- Planned visits are an important feature of practice redesign.</li> </ul>
<b>Decision support</b>
<ul style="list-style-type: none"> <li>- Evidence-based clinical practice guidelines provide standards for optimal chronic care and should be integrated into daily practice through reminders.</li> <li>- Specialist expertise is available and does not always require full specialty referral.</li> <li>- Guidelines are reinforced by educational sessions for practice teams.</li> </ul>
<b>Clinical information systems</b>
<ul style="list-style-type: none"> <li>- Registries, a central feature of the chronic care model, are lists of all patients with a particular chronic condition on an organization's or physician's panel.</li> <li>- Reminder systems help primary care teams comply with practice guidelines.</li> <li>- The system provides feedback to physicians to show how each professional is performing on chronic illness measures.</li> <li>- Registries are used to plan individual patient care and the population-based care.</li> </ul>

## METHODS

### Design and study population

This study was based on secondary analysis of data from the European Practice Assessment of Cardiovascular risk management project (EPA Cardio project), an observational study on CVRM in 315 primary care practices in 10 countries in 2008-2009.<sup>15</sup> Briefly, EPA Cardio focused on coronary heart disease patients, high risk patients, and healthy adults. Multiple measurement instruments were used, including chart reviews, patient surveys, and validated questionnaires on practice characteristics<sup>16</sup> completed by FP's in the practices. For the present study, we included data from 202 practices in 7 countries: Austria, Belgium, Germany, the Netherlands, Slovenia, Spain and Switzerland. Data from the remaining three countries were excluded from this analysis because the required data on involvement on tasks concerning CVRM was missing.

### Measures

For this study we used data from the FP questionnaires. Specifically, data on practice characteristics (practice size, full time equivalent FP, full time equivalent nurse) and diversity of tasks of FP's and nurses. In this paper, 'nurses' included nurse practitioners and (advanced) practice nurses. The nurses included in this study all performed clinical tasks in primary care practices. Nurse and FP involvement on five specific tasks concerning CVRM was measured; 1. administrative tasks, recalls and recording (enrolling and selecting patients for periodic checkups, managing patient records, archiving laboratory results and mail); 2. monitoring risk factors (periodic monitoring of blood pressure, smoking status, weight, cholesterol etc); 3. patient education and counselling (counselling and control of diet and physical activity); 4. defining protocol and organization of cardiovascular care (drafting protocols based on guidelines for CVD care, coordination of CVD consulting hours); and 5. diagnosis, risk assessment and medical treatment (determining risk profile, periodic check up for CVD patients, discussing medication). These five tasks are based on a list of tasks of practice nurses<sup>17</sup> modified by the EPA core group on the basis of consensus. These items were measured on a dichotomous answering scale (yes/no). In addition, for each practice adoption of CCM was calculated using 35 items (Box 2).<sup>18</sup> This is a score based on the five practice related domains derived from the CCM<sup>19</sup>: 1. health care organization (7 items); 2. delivery system design (15 items); 3. decision support (3 items); 4. clinical information systems (6 items); and 5. self-management support (4 items). This score was measured on a scale of 0 to 5 with equal weight for each domain. A higher score means more structured chronic illness care.

Practice size was based on patient list size when available, otherwise on yearly attending patient numbers. While our definition of 'nurse' in this study included nurse practitioners and (advanced) practice nurses, results of these professionals on the five specific CVRM tasks were combined.

**Box 2. Items of adoption of Chronic Care Model based on five domains of Chronic Care Model**

<b>Health care organization</b>
<ol style="list-style-type: none"><li>1. Does the practice have a procedure for the management of patient information in relation to detailed examination results and the documentation of measures that were taken (for example, blood examinations)?</li><li>2. Does the practice have a procedure for the management of patient information in relation to the review of detailed examination results by the doctor (in terms of outgoing needs)?</li><li>3. Does the practice use a system for reviewing medication prescribed to individual patients on a regular basis?</li><li>4. Does the practice produce an annual report?</li><li>5. Does the practice produce a quality report?</li><li>6. Has the practice undertaken at least one clinical audit in the last 12 months?</li><li>7. Does the practice have a critical incident register?</li></ol>
<b>Delivery system design</b>
<p><i>Practice-led contact for patient groups</i></p> <ol style="list-style-type: none"><li>1. Does the practice use a system for recalling patients with cardiovascular diseases?</li><li>2. Does the practice use a system for recalling patients with diabetes?</li><li>3. Does the practice use a system for recalling patients with asthma/chronic obstructive pulmonary disease?</li><li>4. Does the practice use a system for recalling patients with hypertension?</li></ol> <p><i>Practice-led contact for prevention</i></p> <ol style="list-style-type: none"><li>1. Does the practice use a system for recalling populations at risk for preventive care regarding cardiovascular diseases?</li><li>2. Does the practice use a system for recalling populations at risk for preventive care regarding influenza?</li><li>3. Does the practice use a system for recalling populations at risk for preventive care regarding cervical screening?</li><li>4. Does the practice use a system for recalling populations at risk for preventive care regarding breast cancer screening?</li></ol> <p><i>Attendance rates for preventive activities</i></p> <ol style="list-style-type: none"><li>1. Does the practice have the attendance rate for cervical screening?</li><li>2. Does the practice have the attendance rate for influenza vaccination?</li><li>3. Does the practice have the attendance rate for breast cancer screening?</li></ol> <p><i>Preventive procedures</i></p> <ol style="list-style-type: none"><li>1. Does the practice have a procedure for prevention of pressure sores?</li><li>2. Does the practice have a procedure for prevention of osteoporosis?</li><li>3. Does the practice have a procedure for using folic acid by women who are pregnant or want to get pregnant?</li><li>4. Does the practice have a procedure for smoking cessation (for example, with the minimal intervention strategy)?</li></ol>

<b>Decision support</b>
<ol style="list-style-type: none"> <li>1. Do the practice doctors have direct access to medical guidelines (either on paper or electronic) in their treatment rooms?</li> <li>2. Do the practice doctors have direct access to (peer-reviewed) medical journals (either on paper or electronic)?</li> <li>3. Do the practice doctors have direct access to literature data banks such as Medline/ Pubmed or Cochrane?</li> </ol>
<b>Clinical information systems</b>
<ol style="list-style-type: none"> <li>1. Do you have internet access?</li> <li>2. Do you have e-mail access in the practice?</li> <li>3. Are the computers with internet access outfitted with anti-virus software?</li> <li>4. Is the access to the practice computers protected, in that a user name and password have to be entered?</li> <li>5. Does the practice use a computer-supported patient file system?</li> <li>6. Is the computer used for creating medication prescriptions?</li> </ol>
<b>Self-management support</b>
<ol style="list-style-type: none"> <li>1. Are there information leaflets about cardiovascular disease (for example, coronary heart disease [CHD], stroke, hypertension, and stop smoking) available at the practice for patients to take home or read in the practice?</li> <li>2. Does the practice have an up-to-date directory of prevention activities/organizations available locally (for example, gyms, walking group, and weight-watchers)?</li> <li>3. Do you offer regularly written information on lifestyle?</li> <li>4. Do you regularly offer advice about websites for education on health risks or healthy lifestyle?</li> </ol>

### Data-analysis

Data analysis consisted of both descriptive and analytical methods. Random coefficient linear regression modelling was used to explore the effect of nurse involvement on structured illness care (adoption of CCM). The influence of number of FP tasks and nurse tasks, nurse/FP ratio and practice size on the adoption of CCM was also explored in the regression model. Two-level models were specified with practices nested in countries. Data analysis was performed using the SPSS 16.0 software package (Chicago, Illinois, USA).

## RESULTS

### Study population

Table 1 shows practice characteristics of practices in the seven countries. The number of included primary care practices ranged from 21 in Switzerland and Germany to 36 in Spain. Spain had the largest practice size and Slovenia had the smallest practice size. In Austria, Germany, the Netherlands and Spain, all practices had a nurse employed. In Slovenia

94.1% of practices employed a nurse, Switzerland 85.7% and Belgium 33.3%. Overall, 89.6% (N=177) of practices employed a nurse. The number of FP tasks varied from 3.9 in Slovenia to 4.9 in Spain. Number of nurse tasks varied from 1.5 in Belgium to 4.8 in Spain. The nurse/FP ratio was 1.4 (SD 0.7) on average with the least nurses per FP in Belgium (mean 0.4, SD 0.7) and the most in Germany (mean 1.9, SD 1.0). The adoption of CCM was highest for practices in Spain and lowest for practices in Switzerland.

**Table 1. Characteristics of participating practices (N=202)**

	Practice size in number of patients	Nurse/Family physician ratio	Practices with nurse	Number of family physician tasks (range 0-5)	Number of nurse tasks (range 0-5)	Adoption of Chronic Care Model (range 0-5)
Austria (n=31)	2943 (1307)	1.8 (0.5)	100%	4.5 (0.8)	1.9 (0.6)	2.8 (0.6)
Belgium (n=24)	2884 (2192)	0.4 (0.7)	33.3%	4.7 (0.6)	1.5 (1.8)	3.3 (0.6)
Germany (n=21)	4060 (1772)	1.9 (1.0)	100%	4.2 (1.1)	3.6 (1.1)	3.2 (0.6)
Netherlands (n=35)	3169 (1200)	1.2 (0.6)	100%	4.1 (1.1)	3.9 (1.1)	3.7 (0.5)
Slovenia (n=34)	2075 (813)	1.4 (0.6)	94.1%	3.9 (0.7)	2.9 (1.1)	2.8 (0.8)
Spain (n=36)	23761 (11619)	1.4 (0.3)	100%	4.9 (0.5)	4.8 (0.5)	4.2 (0.2)
Switzerland (n=21)	3514 (2462)	1.4 (0.6)	85.7%	4.2 (0.7)	1.7 (1.3)	2.3 (0.7)
Total (n=202)	6906 (9695)	1.4 (0.7)	89.6%	4.4 (0.9)	3.2 (1.5)	3.3 (0.8)

Mean figures per practice with standard deviation between brackets.

### Nurse involvement

Considering nurse involvement in specific tasks, table 2 shows nurses were mostly involved in CVRM-related administrative tasks, recalls and recording (82.2%) and least involved in diagnosis, risk assessment and medical treatment (34.6%). FP involvement was highest in diagnosis, risk assessment and medical treatment (99%) and lowest in administrative tasks, recalls and recording (68%). For administrative tasks, recalls and recording; monitoring risk factors; and patient education and counselling, most percentages of nurse involvement were above 50%.

**Table 2. Nurse and family physician involvement in specific tasks related to cardiovascular risk management (% of all nurses/family physicians)**

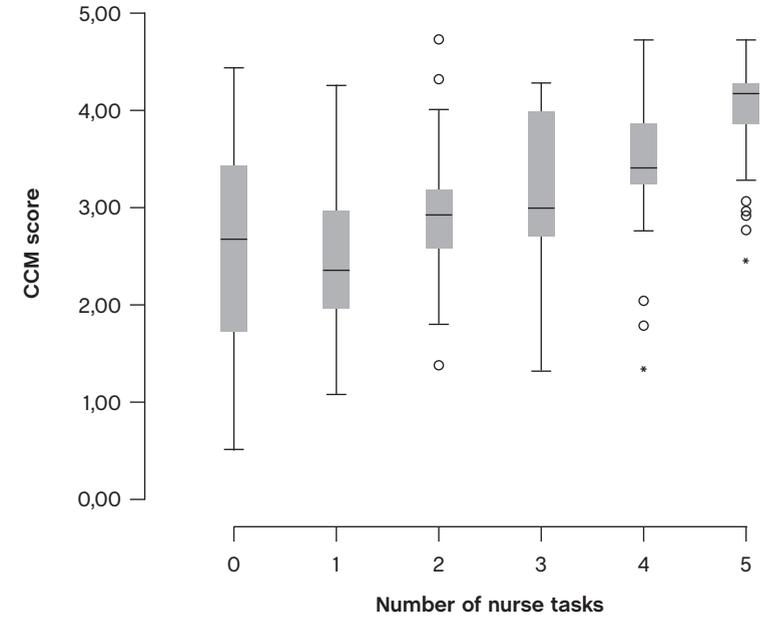
	Administrative tasks, recalls and recording		Monitoring risk factors		Patient education and counselling		Defining protocol and organization of cardiovascular care		Diagnosis, risk assessment and medical treatment	
	Family physician	Nurse	Family physician	Nurse	Family physician	Nurse	Family physician	Nurse	Family physician	Nurse
Austria (n=31)	71.0	100	77.4	77.4	100	0	100	9.7	100	0
Belgium (n=24)	86.4	18.2	100	13.6	100	13.6	87	0	100	9.1
Germany (n=21)	63.2	89.5	78.9	94.7	84.2	78.9	89.5	73.7	100	26.3
Netherlands (n=35)	71.4	85.7	77.1	97.1	68.6	85.7	97.1	54.3	97.1	65.7
Slovenia (n=34)	39.4	86.7	87.9	86.7	90.9	63.3	78.8	40	97	16.7
Spain (n=36)	88.9	100	100	100	97.2	100	100	97.2	100	86.1
Switzerland (n=21)	50.0	72.2	94.4	50.0	77.8	33.3	100	16.7	100	0
Total mean (SD)	68.0 (18.1)	<b>82.2 (28.4)</b>	87.7 (10.4)	<b>78.5 (31.7)</b>	88.7 (12.1)	<b>57.1 (38.3)</b>	93.3 (8.3)	<b>45.0 (35.7)</b>	99.0 (1.4)	<b>34.6 (33.8)</b>

For the tasks defining protocol and organization of cardiovascular care and diagnosis, risk assessment and medical treatment most percentages of nurse involvement were below 50%. Considerable variation between countries was found on involvement in specific tasks of both nurses and FP's.

**Relation nurse involvement with structured chronic illness care**

Figure 1 illustrates the number of nurse tasks related to the adoption of CCM. When more tasks were allocated to nurses the mean adoption of CCM was higher.

**Figure 1. Adoption of Chronic Care Model related to the number of nurse tasks**



\*, extreme value; , outlier; end of the upper tail, 95th percentile value; end of the lower tail, 5th percentile value; upper limit of the box, 75th percentile value; lower limit of the box, 25th percentile value; horizontal line through box, median value.

Table 3 shows that the mean adoption of CCM in practices without nurse involvement was 2.6 (SD 1.3, 95% CI 1.5-3.6) and in practices with nurse involvement on all tasks the mean adoption of CCM was 4.0 (SD 0.5, 95% CI 3.8-4.1). Practices without nurse involvement on CVRM related tasks showed a minimum adoption of CCM of 0.5 and a maximum adoption of CCM of 4.4. For practices with nurse involvement on all CVRM related tasks this was 2.4 and 4.7 respectively. Of nurses with only one CVRM related task the vast majority had administrative tasks (Appendix 1). Nurses with two tasks mostly had administrative tasks combined with monitoring risk factors. When nurses had three or four tasks, combination of tasks varied more. The mean adoption of CCM was lowest for administrative tasks (3.3, SD 0.9) and highest for diagnosis, risk assessment and medical treatment (mean 4.0, SD 0.7). For further explanation see Appendix 1.

Visual inspection of figure 1 suggests that with increasing involvement of nurses, the variation on the adoption of CCM decreased. Low scores on the adoption of CCM were absent when nurses had more tasks. However, some practices without nurse involvement had high adoption of CCM.

**Table 3. Association between number of nurse tasks and adoption of Chronic Care Model**

Number of nurse tasks (N)	Adoption of Chronic Care Model				
	min	max	Median	Mean (SD)	95% CI
0 (8)	0.5	4.4	2.7	2.6 (1.3)	1.5-3.6
1 (15)	1.1	4.3	2.3	2.5 (0.8)	2.0-2.9
2 (42)	1.4	4.7	2.9	2.9 (0.7)	2.7-3.1
3 (30)	1.3	4.3	3.0	3.1 (0.8)	2.8-3.4
4 (31)	1.3	4.7	3.4	3.4 (0.7)	3.2-3.7
5 (51)	2.4	4.7	4.2	4.0 (0.5)	3.8-4.1

Adoption of Chronic Care Model score 0 to 5, higher score equals more chronic care management; N is number of family practices

Table 4 shows the results of the regression model. Number of tasks of FP and nurse, nurse/FP ratio and practice size were taken into account. Practice size showed no effect on the adoption of CCM (P=0.19). In the analysis 155 cases were included. The degree of skewness was explored

for the adoption of CCM. This variable was normally distributed. Results show that the number of nurse tasks had a positive effect on the adoption of CCM. When the number of nurse tasks increased with one, the adoption of CCM increased with 0.13 (p<0.05; 95% CI 0.03-0.22). The regression model used in this analysis explained 19% of the variance on the adoption of CCM.

**Table 4. Impact of nurse and physician involvement on adoption of Chronic Care Model**

	Adoption of Chronic Care Model		
	B <sup>a</sup>	95% CI	
<b>Fixed Effects</b>			
Number of family physician tasks	-0.06	-0.17	0.05
Number of nurse tasks	0.13 <sup>b</sup>	0.03	0.22
Nurse/family physician ratio	0.12	-0.03	0.27
<b>Random Effects</b>			
Level-two variance (country)	0.26 (S.E. 0.04)	0.07	0.95
Level-one variance (practice)	0.34 (S.E. 0.17)	0.27	0.43

<sup>a</sup> unstandardized b-weight

<sup>b</sup> p<0.05

**DISCUSSION**

Nurses were involved in the delivery of CVRM in this sample of European primary care practices, but at varying degree. In a vast majority of practices nurses were involved in administrative tasks, recalls and recording and they were least involved in diagnosis, risk assessment and medical treatment of cardiovascular care. Involvement of nurses in more aspects of CVRM was associated with better structured chronic illness care, but some practices with limited nurse involvement, related to administrative tasks only, also provided well structured chronic illness care.

The variation of nurse involvement in the delivery of CVRM in this study may have several determinants. Re-allocation of tasks concerning CVRM could differ between types of nurses although previous research has shown that mid-level providers, with different educational backgrounds, perform similar tasks.<sup>20</sup> Level of training could influence the outcomes, as well as level of experience of nurses,<sup>21</sup> which were not

taken into account in this study. The definition of nurse which is applied in this study could also be of influence on the outcomes. 'Nurses' in this study included nurse practitioners and (advanced) practice nurses. Nurses responsibility for chronic disease management may vary from practice to practice, dependent on the willingness of FP's to delegate tasks.<sup>22</sup> Of the practices in our study with low nurse involvement (less than 2 tasks on CVRM; N=23) and with high adoption of CCM (>3.5) none employed other nonclinical staff members performing administrative tasks or other CVRM-related tasks. Overall, nurse involvement in CVRM was mixed, but limited in the sample of practices.

The results of our study showed that well structured chronic care is possible in practices with little nurse involvement. With maximum nurse involvement there is on average better chronic care with less variation in the adoption of CCM. Successfully organizing chronic illness care may well be dependent on elements of care not accounted for in this study. Practice characteristics like team size and workload could affect the organization of chronic illness care.<sup>18</sup> Furthermore, it could also be that better organized practices are more likely to employ and retain nurses to manage chronic patients as the working climate for nurses is expected to be better in these practices thus providing higher job satisfaction for nurses. Practice size could be of influence on the organization of chronic illness care while evidence shows that in larger patient populations more clinical tasks are substituted by other health care providers.<sup>23</sup> However, our study suggests practice size has no significant influence on the adoption of CCM.

Countries with strong primary care systems are expected to manage chronic conditions more effectively.<sup>24, 25</sup> Initiatives for improving the management of chronic conditions are in different stages of development in the participating countries. Austria and Belgium are in an early stage of development.<sup>24</sup> Furthermore, in some countries initiatives to improve management of chronic conditions are introduced nationally (for instance in Germany), in other countries (as in the Netherlands) this is handled through local or regional projects. This may imply that the location of practices entered in this study can be of influence. All German practices included in this study employed nurses with clinical tasks (monitoring risk factors, for example periodic monitoring of blood pressure, smoking status, weight, cholesterol etc). This indicates selection bias while previous research indicates that German nurses were mainly involved in administrative tasks like arranging appointments for patients, answering telephone calls and preparing and providing the patient files.<sup>26</sup>

Our findings should be interpreted with caution as our study had a number of limitations. Practices have volunteered to participate in this study. This convenience sample may cause bias while it is possible that

participating practices are better organized concerning cardiovascular care management. Participating countries have differences in the health care organization which may have caused bias as well as differences in interpretation of the questionnaire. In this study, only tasks concerning CVRM were considered. An inventory of tasks considering other chronic conditions such as diabetes mellitus or COPD could have changed the picture.

The effect of nurse involvement related to CVRM on the organization of chronic illness care is positive but modest. Tasks of nurses on CVRM are predominantly administrative or contain the monitoring of risk factors and are less focused on organizational tasks. A meta analyses related to diabetes care shows that team change is a key ingredient for improving chronic disease management on patient outcomes, providing larger reductions in HbA1c values than other quality improvement strategies evaluated.<sup>27</sup> Furthermore, extending the role of nurses in the organization of chronic illness care could result in cost-effectiveness<sup>28</sup> and higher patient satisfaction.<sup>29</sup> Another study investigating the clinical effectiveness of practice nurses acting as substitutes for FP's in CVRM found that practice nurses achieved equal or better results than FP's.<sup>30</sup> When nurses would be more responsible for the organization of chronic illness care in general on top of the tasks that are directly patient related, the adoption of CCM could generally become higher.

This study quantified the role of nurses in the organization of CVRM in primary care practices across Europe. More nurse involvement in CVRM was associated with better structured chronic illness care in primary health care. To optimally utilize the added value of nurses in primary care, nurses should be engaged in all aspects of CVRM related care, provided that their level of education is adequate. In general more responsibility for the organization of chronic illness care might eventuate in higher job satisfaction for all staff members.

While our study has an observational design it is not possible to determine effectiveness regarding patient outcomes. Nevertheless our results are of importance for decision makers because of two main reasons: firstly, the study is focused on a natural setting (rather than a controlled trial or demonstration project) and secondly, the inclusion of various health systems provides a degree of control of confounding contextual factors, thus contributing to more robust results. Our main finding is that the level of nurse involvement in CVRM matters for implementation of structured chronic care rather than the mere presence of a nurse.

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**Appendix 1. Impact of nurse involvement on adoption of the Chronic Care Model**

Number of nurse tasks (N)	Adoption of Chronic Care Model				
	min	max	Mean (SD)	95% CI	Median
0 (8)	0.5	4.4	2.6 (1.3)	1.5-3.6	2.7
1 (15)	1.1	4.3	2.5 (0.8)	2.0-2.9	2.3
Defining protocol and organization of cardiovascular care (1)	3.45				
Administrative tasks, recalls and recording (14)	1.1	4.3	2.4 (0.8)	1.9-2.8	2.4
2 (42)	1.4	4.7	2.9 (0.7)	2.7-3.1	2.9
Defining protocol and organization of cardiovascular care (4)	2.6	4.7	3.5 (1.0)	1.9-5.1	3.3
Monitoring risk factors (39)	1.4	4.7	3.0 (0.7)	2.7-3.2	3.0
Patient education and counselling (4)	1.9	3.8	2.7 (0.9)	1.3-4.0	2.5
Administrative tasks, recalls and recording (37)	1.4	4.3	2.8 (0.6)	2.6-3.0	2.9
3 (30)	1.3	4.3	3.1 (0.8)	2.8-3.4	3.0
Defining protocol and organization of cardiovascular care (9)	1.3	4.2	3.2 (0.9)	2.5-3.9	2.9
Diagnosis, risk assessment and medical treatment (3)	2.7	4.0	3.4 (0.6)	1.8-5.0	3.4
Monitoring risk factors (29)	1.8	4.3	3.2 (0.8)	2.9-3.5	3.0
Patient education and counselling (23)	1.3	4.3	3.0 (0.9)	2.7-3.4	3.0
Administrative tasks, recalls and recording (26)	1.3	4.3	3.0 (0.8)	2.7-3.4	3.0
4 (31)	1.3	4.7	3.4 (0.7)	3.2-3.7	3.4
Defining protocol and organization of cardiovascular care (21)	1.8	4.7	3.5 (0.7)	3.1-3.8	3.4
Diagnosis, risk assessment and medical treatment (12)	1.3	4.2	3.3 (0.9)	2.7-3.9	3.5
Monitoring risk factors (31)	1.3	4.7	3.4 (0.7)	3.2-3.7	3.4
Patient education and counselling (31)	1.3	4.7	3.4 (0.7)	3.2-3.7	3.4
Administrative tasks, recalls and recording (29)	1.3	4.7	3.5 (0.7)	3.2-3.7	3.4
5 (51)	2.4	4.7	4.0 (0.5)	3.8-4.1	4.2
Specific tasks (number of practices with nurses with specific tasks)					
Administrative tasks, recalls and recording (157)	1.1	4.7	3.3 (0.9)	3.2-3.4	3.3
Monitoring risk factors (150)	1.3	4.7	3.4 (0.8)	3.3-3.6	3.5
Patient education and counselling (109)	1.3	4.7	3.6 (0.8)	3.4-3.7	3.8
Defining protocol and organization of cardiovascular care (86)	1.3	4.7	3.7 (0.7)	3.6-3.9	4.0
Diagnosis, risk assessment and medical treatment (66)	1.3	4.7	3.8 (0.7)	3.7-4.0	4.0

## Chapter 7

# Consistency of performance indicators for cardiovascular risk management across procedures and panels

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**ABSTRACT****Introduction**

Delphi procedures are frequently used to develop performance indicators, but little is known about the validity of this method. We aimed to examine the consistency of indicator selection across different procedures and across different panels.

**Methods**

Analysis of three indicator set development procedures: the EPA Cardio project, which used international GP panels; the UniRap project, a Dutch GP indicator project; and the Vitale Vaten project, which used a national multidisciplinary health professional panel and a stakeholder panel.

**Results**

With respect to clinical indicators, consistency between procedures varied according to the origin of the indicators. In Vitale Vaten the multidisciplinary panel of health professionals validated 63% from the international EPA Cardio indicators again. From the UniRap GP set only 13% was rated valid again. Considering organizational indicators, 27 indicators were rated in both EPA Cardio and Vitale Vaten. In the Vitale Vaten project 17 indicators (63%) were validated, including eight of the nine indicators validated in EPA Cardio. Consistency between panels was moderate, giving a decisive role to the health professional panel, being the most critical.

**Conclusion**

The consistency of selected performance indicators varied across procedures and panels. Further research is needed to identify underlying determinants of this variation.

## INTRODUCTION

Indicators for assessing quality and outcomes of healthcare delivery have been developed in many healthcare systems and countries. Indicators provide healthcare professionals formative feedback to enhance learning and improvement of clinical practice.<sup>1</sup> They can also be used to create transparency on quality of care. Indicators should be valid and reliable, feasible, and effective with respect to their aims.<sup>2</sup> This implies that indicators should be developed and evaluated systematically. Some methods for indicator development, such as the Delphi-procedure, have been adopted across the world.<sup>3</sup>

Nevertheless, many questions remain concerning indicator quality and appropriate development methods. This paper addresses the consistency of panel evaluations of indicators, using data from three indicator development projects in cardiovascular risk management (CVRM).

The importance of the quality of care for patients with cardiovascular diseases (CVD) and those at high risk remains undisputed: the incidence of CVD is high worldwide with high morbidity, mortality, and costs. Many countries have launched large programmes to improve CVRM.<sup>4</sup> In The Netherlands, a multidisciplinary clinical guideline for CVRM was published in 2006.<sup>5</sup> In 2009 a platform of stakeholder organizations (Platform Vitale Vaten) issued a multidisciplinary guideline with recommendations on the organization, delivery and process of care ('care standard'),<sup>6</sup> largely based on Wagner's chronic care model.<sup>7</sup> Simultaneously, a set of multidisciplinary quality indicators covering clinical and organizational aspects was developed, using a Delphi procedure with two panels: healthcare professionals and other stakeholders.

Consistency and confirmability are criteria mentioned to add to the reliability of indicator development procedures.<sup>8</sup> Though widely used in medical science, the Delphi procedure itself is still being studied and compared with other methods of indicator development.<sup>9-12</sup> Previously published Delphi procedures with different panels show variable effects and amounts of agreement between panels, challenging consistency.<sup>13-16</sup> It has been shown that healthcare providers especially have a decisive role in multidisciplinary procedures, depending on the influence of a single panel in a multipanel procedure. In a procedure with different panels, an indicator is usually validated when validated by all panels. This methodology leads to a core set of generally supported indicators but may be too rigid.

We aimed to examine the consistency of indicator selection across different procedures. We assessed the results of consecutive validation ratings and compared the results of two Delphi procedures with different panels. Furthermore, we examined consistency across health professional and a stakeholder panels.

## METHOD

This paper is based on the analysis of the Vitale Vaten project, partly in relation to Epa Cardio and UniRap, projects in which performance indicators for CVRM were selected. The relationship between the projects and the comparisons made in this study is illustrated in the figure supplement.

Figure supplement. The EPA Cardio and Vitale Vaten procedures.

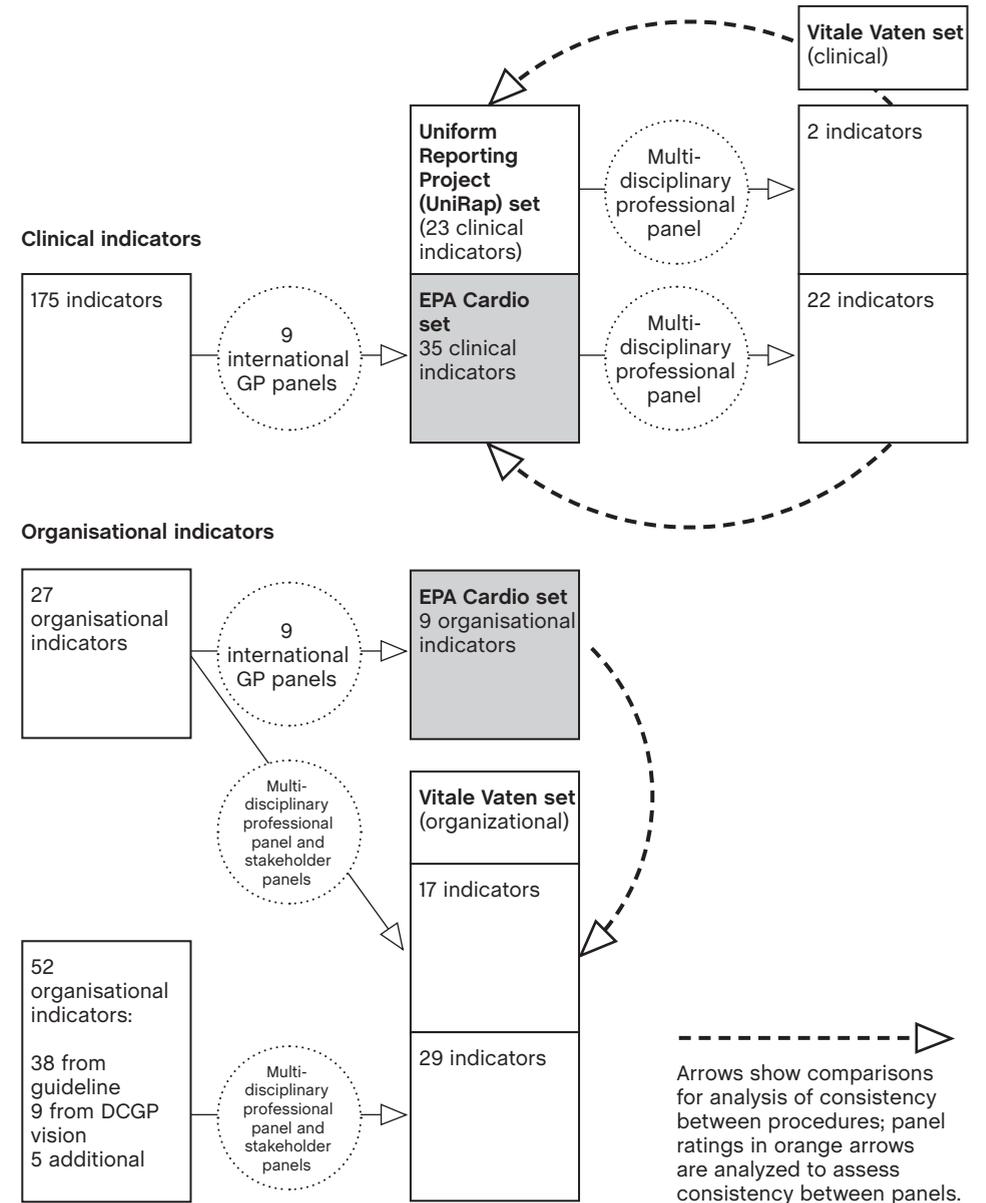


Table 1 presents some project features.

**Table 1. Characteristics of the EPA Cardio, Vitale Vaten and UniRap project**

	EPA Cardio	Vitale Vaten	UniRap
Procedure	Two-round Delphi procedure	Clinical indicators: One-round scoring Organizational indicators: Two-round Delphi procedure	Successive discussion rounds
Number of panels and composition	9 GP panels	A multidisciplinary health professional panel and a stakeholder panel	Experts, representatives of GP information technology user organizations, final approval by professional GP organizations
Setting	9 countries in Europe (Austria, Belgium, Finland, France, Germany, The Netherlands, Slovenia, UK, Switzerland)	The Netherlands	The Netherlands

**EPA cardio project**

The EPA Cardio project is described elsewhere.<sup>17</sup> In summary, GP panels from nine European countries (total n=101) rated 202 indicators for CVRM in primary care in two Delphi rounds. This resulted in a set of 35 clinical and nine organizational indicators, including primary prevention and risk management in patients with established CVD or diabetes.

**UniRap project**

A Dutch College of General Practitioners (DCGP) working group developed indicators for the Uniform Reporting Project (UniRap), as part of a project to create one national indicator set for GP care.<sup>18</sup> The UniRap indicator set consisted of 17 indicators on established CVD and six concept indicators on primary prevention of CVD. The goal of UniRap was to provide indicators that met the criteria of content validity based on the CVRM guideline, and were feasible: GPs should be able to deliver the data from their medical record system for internal and external use. A set of indicators was discussed in an expert group and, in order to make them feasible, with representatives of GP information technology user organizations. Consequently, these indicators had little room for

nuances. Various stakeholder organizations provided comments on draft sets, leading to revisions and a final set that was approved by the Dutch professional GP organizations.

**Vitale Vaten project**

In the Vitale Vaten project, indicators for CVRM were selected in a two-round Delphi procedure, involving multidisciplinary panels of health professionals and stakeholders from The Netherlands. Table 2 presents the panel’s composition. As this project has not been published elsewhere, it will be described in more detail.

**Table 2. Panel composition in the Vitale Vaten procedure**

Health care professional panel	Stakeholder panel
3 General practitioners	3 Members of patient organizations
2 Internists	2 Representatives of health Insurance companies
2 Cardiologists	2 Platform members
1 Neurologist	1 Dutch Heart Foundation
1 Vascular surgeon	1 Dutch diabetes federation
1 Pharmacist	1 Health department
1 Medical psychologist	1 Health inspectorate
1 Nurse practitioner vascular care	1 DCGP, prevention specialist
1 Dietician	1 Expertise centre on quality review in healthcare and welfare
1 Manager primary care centre	1 The Netherland Organization for Health Research and Development
1 Physiotherapist	1 Director integrated Care department

All participants were related to the Platform Vitale Vaten, an initiative of the Dutch Heart Association and many national stakeholders to improve CVRM. A major activity of the Platform was the development of a so-called ‘care standard,’ recommendations on the organization of CVRM, complementary to the multidisciplinary clinical guideline of which key elements were included in the care standard. Simultaneously, performance indicators were developed. The board of the Platform recruited and motivated participants for the indicator selection procedure. All correspondence was via email.



Table 5 presents the clinical indicators selected in Vitale Vaten.

**Table 5. Vitale Vaten set of clinical indicators**

	Clinical indicators	Origin
1	Percentage of patients with established CVD with a record of smoking status.	UniRap
2	Percentage of patients with established CVD with anticoagulant or anti-platelet drugs prescribed.	UniRap
3	Percentage of patients with established CVD in the practice population at the end of the reporting period (denominator is the practice population)	UniRap
4	For patients with CVD (chd, stroke, TIA, or PVD) there is a record of smoking status in the past 15 months except those who never smoked.	EPA Cardio
5	For patients with diabetes there is a record of blood pressure at least once in the last 15 months.	EPA Cardio
6	For patients prescribed antihypertensive medication for diagnosed hypertension there is a record of blood pressure at least once in the last 15 months.	EPA Cardio
7	For patients with established CVD (CHD, stroke, TIA, or PVD) there is a record of blood pressure at least once in the last 15 months.	EPA Cardio
8	For patients with diabetes there is a record of their cholesterol (general/total, HDL and LDL) at least once in the last 15 months.	EPA Cardio
9	For patients with CVD (CHD, stroke, TIA, or PVD), there is a record that anti-platelet therapy (aspirin, clopidogrel or equivalent) at least 75 mg daily has been offered unless contraindicated.	EPA Cardio
10	CVD risk assessment includes smoking status.	EPA Cardio
11	CVD risk assessment includes blood pressure.	EPA Cardio
12	CVD risk assessment includes personal history of diabetes.	EPA Cardio
13	For patients with CVD Blood Plasma Glucose is tested at diagnosis.	EPA Cardio
14	For patients with diabetes there is a record of smoking status in the past 15 months except for those who have never smoked whose smoking status should be recorded at least once.	EPA Cardio
15	For patients with diabetes there is a record of their weight or Body Mass Index at least once in the last 15 months.	EPA Cardio
16	For patients with CVD (chd, stroke, TIA, or pvd) there is a record of their weight or Body Mass Index at least once in the last 15 months.	EPA Cardio
17	For patients with diabetes there is a record that diet advice has been offered at least once in the last 15 months.	EPA Cardio

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	Clinical indicators	Origin
18	For patients with CVD (CHD, stroke, TIA, or PVD) there is a record of their cholesterol (general/total, HDL and LDL) at least once in the last 15 months.	EPA Cardio
19	All patients with CVD (CHD, stroke, TIA, or PVD) should have their systolic blood pressure controlled to < 140.	EPA Cardio
20	All patients with CVD (CHD, stroke, TIA, or PVD) are offered a statin.	EPA Cardio
21	For patients who have had an Myocardial Infarction there is a record that a beta blocker has been offered (unless a contraindication or side-effects is recorded).	EPA Cardio
22	CVD risk assessment includes age.	EPA Cardio
23	CVD risk assessment includes gender.	EPA Cardio
24	CVD risk assessment includes diabetes status.	EPA Cardio
25	For patients with diabetes there is a record that specific advice about lifestyle was offered at least once in the last 5 years.	EPA Cardio

CHD: coronary heart disease; CVD: cardiovascular disease; PVD: peripheral vascular disease; TIA: transient ischaemic attack.

Table 6 focuses on the Vitale Vaten set of organizational indicators. In general, 46 out of 79 indicators were selected. From the list of 27 indicators also presented in EPA Cardio, the Vitale Vaten panels validated 17 indicators (63%). In EPA Cardio, nine indicators from this list were selected; eight indicators were validated in both procedures.

**Table 6. Organizational indicators selected by panels of healthcare professionals and stakeholders by origin of the indicators**

	Number	Number (%) of indicators rated valid		
		Health care professional panel	Stakeholder panel	Both panels
Indicators formulated on the basis of the care standard	38	22 (58)	32 (84)	22 (58)
International EPA Cardio set	27	17 (63)	18 (67)	17 (63)
Indicators formulated on the basis of the DCGP's vision on care	9	5 (56)	7 (78)	5 (56)
Added after round 1	5	2 (40)	2 (40)	2 (40)
Total	79	46 (58)	59 (75)	46 (58)

Table 7 shows these indicators with the results from EPA Cardio and Vitale Vaten. On the web, we present all organizational indicators validated in Vitale Vaten, ordered by origin.

**Table 7. Results of EPA Cardio and Vitale Vaten considering the list of 27 organizational indicators presented in both procedures.**

	EPA set	Vitale Vaten set
<b>Infrastructure</b>		
1. The practice should have a system for offering all patients with chronic illness (e.g. established CVD: CHD, stroke, TIA, or PVD – see glossary), a check-up/review at least once in the last 15 months		V
2. Patients who smoke and are recorded as being motivated to stop should be offered at least one follow-up consultation within 3 months	V	V
3. For all patients who are obese (Body Mass Index >30kg/m <sup>2</sup> ) there should be a record that they have been offered at least one follow-up consultation within the last 15 months		V
4. All practices should use an electronic disease classification system that can be used to create registers of patients with established CVD (CHD, stroke, TIA or PVD: see glossary) e.g. International classification of Primary Care, READ Codes		V
5. All practices should use an electronic disease classification system that can be used to create registers of patients at risk of CVD (hypertensives, etc) e.g. International classification of Primary Care, READ Codes		V
6. All patients at high risk (eg. chronic respiratory disease, established CVD (CHD, stroke, TIA, or PVD – see glossary), chronic heart disease, chronic renal failure, diabetes, immunosuppression of any cause, residents of nursing homes etc, anyone aged >65) should be offered flu vaccination in the preceding flu season (e.g. 1 September to 31 March or 1 September to 31 December)	V	
<b>People</b>		
1. All GPs should attend at least one training/continuing medical education event on CVD within the last 5 years		
2. At least one general practitioner per practice should attend ≥ one training/continuing medical education event on CVD within the last 15 months		
3. All nurses should attend at least one training/continuing medical education event on CVD within the last 5 years		
4. At least one nurse per practice should attend at least one training/continuing medical education event on CVD within the last 15 months		V
5. General practitioners should take part in education about CVD risk factors (e.g. diet, exercise, smoking) in schools		

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6. Nurses should take part in education about CVD risk factors (e.g. diet, exercise, smoking) in schools		
7. General practitioners should take part in local/community campaigns or actions on CVD risk prevention (e.g. stop smoking campaigns, fun-runs etc)		
8. Nurses should take part in local/community campaigns or actions on CVD risk prevention (e.g. stop smoking campaigns, fun runs etc)		
<b>Information</b>		
1. The medical record should contain a summary list of major medical problems	V	V
2. The medical record should contain details of current actual prescribed medication	V	V
3. The medical record should contain information about intolerances and contraindications to medication	V	V
4. Information leaflets about CVD (e.g. CHD, stroke, hypertension, stopping smoking etc) should be available at the practice for patients to take home or read in the practice		V
5. Advice to patients about CVD risk factors/lifestyle should be based on using validated assessment tools (e.g. food frequency questionnaire, international physical activity questionnaire, etc)		
6. A CVD risk assessment tool should be integrated with the patient medical record system (e.g. so that the CVD event risk score is entered directly in to the patient's medical record)		V
7. CVD risk advice (e.g. about modifiable risk factors such as diet and exercise) should be integrated with the patient medical record system		V
8. Smoking status should be clearly identifiable on the paper and/or electronic record	V	V
9. The diagnosis of hypertension should be clearly identifiable on the paper and / or electronic record	V	V
10. The diagnosis of diabetes should be clearly identifiable on the paper and / or electronic record	V	V
11. The diagnosis of CVD should be clearly identifiable on the paper and / or electronic record	V	V
12. The practice has an up-to-date directory of prevention activities/ organizations available locally (e.g. gyms, walking group, weight-watchers etc)		V
<b>Quality and safety</b>		
1. The practice should have a team meeting about quality improvement relating to CVD at least once in the last 15 months		

CHD: coronary heart disease; CVD: cardiovascular disease; PVD: peripheral vascular disease; TIA: transient ischaemic attack; v = rated valid.

## Consistency across health professionals and stakeholders

Table 6 also shows the results of the two Vitale Vaten panels separately. The stakeholder panel selected 59 out of the 79 indicators (75%), while the health professional panel selected 46 indicators (58%), all included in the stakeholder set.

## DISCUSSION

### Main findings

This study showed, first, that clinical and organizational indicators for CVRM, selected by international panels of general practitioners (EPA Cardio), were reasonably well validated by a multidisciplinary panel of health professionals in one country (Vitale Vaten). Conversely, indicators previously selected by a national GP working group (UniRap) were not validated.

Second, the study showed high consistency between health professionals and stakeholders (Vitale Vaten) regarding organizational indicators. Health professionals were most critical in their selection.

### Interpretation

Several studies compared different consensus procedures showing consistency;<sup>19-22</sup> other studies focused on quantifying the results of Delphi rounds, for instance assessing the result of each round.<sup>23-25</sup> Research on Delphi procedures with different panels shows variable results depending on the validation criteria. Hardy et al accepted indicators when validated by at least one panel.<sup>13</sup> In EPA Cardio, nine national GP panels validated 30-61% of the indicators.<sup>17</sup> In a procedure with 11 different stakeholders panels rating indicators on primary mental healthcare services, agreement within panels was very high but low between panels.<sup>14</sup> Indicators had to be validated by all panels, effectively giving physicians most influence. Comparing the results of healthcare managers and family physicians rating indicators of quality of primary care in the UK managers gave significantly higher ratings.<sup>16</sup> In summary, the inclusion criteria in a multipanel Delphi procedure determine the final set, often giving a decisive role to the most critical panel.

We can only speculate on the factors underlying the variable consistency of Delphi procedures regarding clinical indicators. Considering the EPA Cardio indicators, low consistency might be expected, due to the international perspective on general practice only. On the other hand, EPA Cardio was rigorous, because the procedure

ensured that indicators were excluded if not assessed highly necessary in all countries. The reasonable consistency between EPA Cardio and Vitale Vaten may also reflect the fact that CVRM mostly is a primary care activity, so the perspectives of health professionals from other backgrounds may not have changed much, compared with GPs only.

UniRap indicators were not very successful in Vitale Vaten, showing little consistency between procedures. Explanations may be that they were specifically for general practice or that development was very much driven by the possibility of registering the indicators in GP information systems with computerized extraction. Additionally, EPA Cardio indicators were formulated with nuances in contrast to the UniRap indicators, formulated in terms of measurability in electronic patient records. Furthermore, new insights in the prevailing guideline, reflected in the UniRap clinical indicators, may not be well known or accepted yet. Finally, UniRap indicators focus more on (proxy) outcome, a choice that is always debatable.

Regarding the organizational indicators rated in EPA Cardio and Vitale Vaten, consistency between procedures was high. Eight out of 17 indicators validated in Vitale Vaten were in the EPA Cardio set of nine indicators. As expected, the two-panel procedure was more liberal: it is of course more difficult to have understanding in nine country panels. Surprisingly, the one indicator from the EPA Cardio set not validated in Vitale Vaten was about offering flu vaccination to high-risk patients, a longexisting practice. The health professional panel did not agree on necessity.

The high consistency between health professionals and stakeholders regarding their selection of organizational indicators may reflect active involvement of all participants in the Platform Vitale Vaten. Consistency varied noticeably with the origin of the indicators. Many indicators validated by stakeholders, but not by health professionals, were derived directly from the care standard text. These indicators considered innovations such as an individual treatment dossier, and an explicitly appointed central care giver. The stakeholders validated all these seven indicators about the dossier. This gave the health professionals a decisive role, in agreement with previous studies.<sup>14,16</sup> Probably, results would have changed with a central question about concordance between indicators and recommendations instead of necessity.

There are several explanations for the results concerning innovative issues. We assume that the presence of supportive evidence may be an important motivation for the necessity rating. As opposed to the enormous amount of clinical evidence in CVRM, evidence on

organizational aspects is sparse, and new concepts obviously lack evidence, as developments and opinions precede research evidence. This may be a reason for panelists to reject these indicators. On the other hand, similar concepts used in diabetes care are evaluated positively.<sup>26,27</sup> Our results show that healthcare professionals are yet not willing to accept indicators on important elements of the chronic care model as the basis for patient empowerment, supporting self management and clarifying central care givers' tasks in CVRM. Competition between indicators cannot explain the results: all indicators were rated separately without a maximum. Anyhow, results suggest that a Delphi procedure with health professionals is less suitable to select indicators concerning innovative organizational concepts. Other methods may be more appropriate, like expert meetings. On the other hand, as the Vitale Vaten projects show, stakeholders seem less suitable to rate clinical indicators.

### Strengths and weaknesses

Clinical indicators presented in Vitale Vaten were the result of former selection procedures (EPA Cardio and UniRap), and a list of organization indicators was presented identically formulated in identical procedures (Vitale Vaten and EPA Cardio). These are the strengths of this study. Nevertheless, the study should be regarded explorative and further research into underlying factors for consistency of Delphi procedures is needed. A limitation was that the response rates were not maximal, in particular of the stakeholders.

The stakeholders were selected because they represented different organizations. However, some panelists were also healthcare professionals. This 'cross over' may have increased consistency between panels.

### CONCLUSION

The consistency of Delphi procedures to select indicators was mixed. Several factors related to the procedures and the panel's composition could influence this. Regarding CVRM, a large number of international indicators (EPA Cardio) were validated again. This finding supports the view that rigorous international indicator selection procedures are valuable. A limitation, however, seems to be that these tend to exclude indicators reflecting healthcare delivery innovations. Another challenge is to involve stakeholders meaningfully, as we found that they did not assess clinical indicators and that their assessments of organizational indicators largely reflected those of health professionals.

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## Chapter 8

### General discussion

In this chapter we firstly present an overview of the main findings of the studies described in this thesis. We will secondly discuss the results and then discuss implications for practice and future research.

## MAIN FINDINGS

### Section 1

#### Accreditation in general practice

Practices who implemented improvement plans with a focus on cardiovascular risk management (CVRM) improved some aspects of professional performance concerning CVRM, but not on the primary outcomes. Data from the randomized clinical trial presented in this thesis showed that none of our primary outcomes showed significant improvements. These primary outcome measures were: systolic blood pressure <140 mmHg, LDL cholesterol <2.5 mmol/l, and prescription of antiplatelet drugs. Of the 17 secondary outcomes, six showed significant improvements as a result of the intervention. These were: patients with known smoking status; registration of physical exercise; registration of diet control; registration of alcohol intake; measurement of waist circumference and measurement of fasting glucose. Practices in the control arm also showed improvements on the measures of CVRM quality at follow up. Participants in both intervention and control group largely perceived to achieve chosen goals of their improvement projects. The process evaluation linked to this trial showed that the presence of a team member who has the specific responsibility for the program appeared to be a stimulating factor. Furthermore the practice accreditation program had positive effects on team climate and caused more sense of responsibility for quality of care among all team members. The perception was that patient care was not directly influenced by the accreditation program. Audit and feedback is a crucial element of the accreditation program, however choices for improvement plans were rarely based on feedback reports. Receiving a certificate for completing the accreditation program seemed to have little added value to participants.

### Section 2

#### Contextual factors of influence on cardiovascular risk management in general practice

Comorbidity was associated with more comprehensive CVRM. However, this only applied to DM and not to COPD. This trend applied to quality of care indicators that were shared across the conditions, but remarkably

also to indicators that were only related to CVD. The presence of DM is associated with better preventive treatment for other diseases. Secondary analysis of data from an international study showed that nurses were involved in the delivery of CVRM at varying degree. In a vast majority of practices nurses were involved in administrative tasks, recalls and recording and they were least involved in diagnosis, risk assessment and medical treatment of cardiovascular care. Involvement of nurses in more aspects of CVRM was associated with better structured chronic illness care. The degree of nurse involvement matters for implementation of structured care, rather than the mere presence of a nurse.

A study on performance indicators for CVRM showed that indicator development partly depends on the panel composition. There was high consistency between health professionals and stakeholders regarding organizational indicators. However, health professionals were most critical in their selection.

## DISCUSSION OF THE MAIN FINDINGS

### Section 1

#### Accreditation in general practice

Although accreditation schemes have been evaluated in observational studies, this is one of the first controlled evaluations of this method to enhance quality of healthcare. The results of our study can be compared to a large observational study in European primary care (EPA Cardio), which provided data on coronary heart diseases on the basis of validated quality indicators in eight European countries, including the Netherlands.<sup>1</sup> In Dutch practices in EPA Cardio 28.9% of patients had a systolic blood pressure below 140 mmHg, which is lower than in our study at both baseline and follow-up measurement. In addition, 43.0% of patients in EPA cardio had a LDL cholesterol level below 2.5 mmol/l which was comparable to our sample. Antiplatelet drugs were prescribed in 82.8% of patients which was also comparable to the results of our study. So, the practices in our study are largely comparable to other practices in the Netherlands.

A controlled study in German general practices<sup>2</sup> also reported positive effects, however, this German accreditation program focused on organizational factors rather than clinical processes. As shown in a Cochrane review<sup>3</sup> audit and feedback (a key component of the Dutch practice accreditation) leads to variable and overall modest improvements in professional practice. It leads to a median 4.3% absolute improvement, a quarter of interventions in this review had

large positive effects and a quarter had negative or no effect. If we compare our primary outcomes with the results of this review, we found effects at lower end of the range of effect sizes. The effects on a few of our secondary outcomes were only slightly higher than those found in other studies of audit and feedback combined with target setting and action planning.

Financial incentives may have the ability to enhance implementation of the practice accreditation program. In the Netherlands, a pay-for-performance study was performed, to assess changes in performance. This study showed that clinical care indicators, concerning diabetes, COPD, asthma and cardiovascular risk management improved, as well as patient experience.<sup>4</sup> In the United Kingdom, in 2004 the NHS implemented the Quality and Outcomes Framework, in which financial incentives, linked to achievements on a comprehensive set of indicators, are aimed to improve primary care. This large pay-for-performance-program brings about high costs, a quarter of the income of general practitioners (GPs) are tied to measures of their performance.<sup>5</sup> Research on pay for performance shows it can be effective, however effects are sometimes short-term.<sup>6</sup> Furthermore, quality of care may decline when an incentive is removed.<sup>7</sup> Consistent with results from our process evaluation, previous research has shown that accreditation results in improved teamwork, increased awareness of patient safety, improved practice systems and care processes and improved quality of care.<sup>8</sup> A qualitative study in Australia also identified factors that contribute to effective implementation of accreditation programs. This study shows that effective programs were more likely to be collaborative and valid and to use relevant standards; with healthcare professionals and organizations embracing accreditation as a legitimate quality and safety tool; and accreditation appropriately aligned with other regulatory initiatives and supported by relevant incentives.<sup>9</sup> Our process evaluation confirmed this last item as it showed contextual factors such as participation in a care group and being connected to the GP educational institute were also important for practice change. We can only speculate what element has been more important. Therefore, it is important in future research to gain better insight into the factors and processes related to the impact of accreditation programs in order to optimize existing programs.

## Section 2

### Contextual factors of influence on cardiovascular risk management in general practice

Adherence to clinical practice guidelines, which aim to improve the quality of cardiovascular prevention is often suboptimal.<sup>10,11</sup> Many cardiovascular disease patients do not attain the lifestyle, risk factor and therapeutic targets that are recommended in these guidelines.<sup>12,13</sup> As outlined in this thesis, contextual factors can be of influence on guideline adherence.

In addition to other studies,<sup>14-16</sup> our observational study on how comorbidity complicates treatment showed that comorbidity was associated with more comprehensive cardiovascular risk management for patient with DM as comorbidity. However, the degree of concordance of the comorbid conditions influences the guideline adherence.<sup>17</sup> Our study also showed there was room for improvement in preventive care in patients with established CVD. This is in line with results from other studies<sup>12,13,18</sup> which also showed that many patients with CVD do not achieve the lifestyle, risk factor and therapeutic targets for cardiovascular disease prevention. Improvements can be made especially on lifestyle counseling in patients with established CVD with or without COPD.

Other patient-related factors can influence guideline adherence. A study among GPs in Austria showed patients' lack of awareness accounted for about 70% of non-adherence to guidelines. In about 30% of the quality indicators not fulfilled, non-adherence was due to other reasons like adverse drug events or patients not willing to take a recommended drug. This indicates the necessity to improve patient involvement in their treatment.<sup>19</sup> Additionally, a study in the Netherlands showed that according to GPs mostly patient related barriers obstruct guideline adherence. The involvement of patients in the process of guideline development as well as in the actual decision making process could improve the applicability of guideline recommendations in daily practice.<sup>20</sup>

The organization of care is another contextual factor that can influence health care delivery. A specific model to organize chronic illness care is by disease management programs. At the time of our study, disease management programs for diabetes mellitus (DM) were well established in general practices, unlike disease management programs for CVD and COPD. The results of this study illustrate the influence of these programs on the quality of care. Currently ongoing initiatives aim to implement disease management programs for CVD and COPD in general practice.

In our study on task shift of CVRM related care to nurses the effects on the organization of chronic illness care were positive but modest. Substitution of physicians by nurses is an appealing strategy due to its potential to address workforce shortages, to reduce cost and decrease workload.<sup>21,22</sup> Furthermore, extending the role of nurses in the organization of chronic illness care could result in higher patients satisfaction,<sup>23</sup> lowered overall mortality and lowered hospital admissions.<sup>24</sup>

Substitution of care to nurses can result in good quality of provided healthcare. Trained nurses appeared to be better than physicians at lowering systolic blood pressure, however there is insufficient evidence to conclude that nurse-led care leads to better outcomes of other clinical parameters than physician-led care.<sup>25</sup> Another study investigating the clinical effectiveness of practice nurses acting as substitutes for GPs in CVRM found that practice nurses achieved equal or better results than GPs.<sup>26</sup> Patients' perspectives on their care are highly associated with factors related to nurses and GPs employed in the practice. Moreover, nurses can contribute to clinical processes and outcomes in general practice.<sup>27</sup>

In our study, the effect of nurse involvement related to CVRM on the organization of chronic illness care was positive but modest. In the Netherlands at the time of the study, clinical tasks of nurses on CVRM were predominantly administrative or contain the monitoring of risk factors and are less focused on organizational tasks, however this is rapidly changing which is reflected by the competence profile of practice nurses.<sup>28</sup> To optimally utilize the added value of nurses in general practice, nurses should be engaged in all aspects of CVRM related care.

The contextual factors presented in this study are only a small representation of possible contextual factors that can be of influence on health care delivery in general practice. The importance of the elucidation of contextual factors has been shown in previous research. Reporting contextual information is a way to provide information needed to foster health care systems,<sup>29</sup> and it provides more insight in barriers and facilitators when implementing quality improvement initiatives. Contextual factors at the practice level including practice characteristics and factors related to experiences of patients and clinicians, at organizational level, at external environment level and motivation for implementation of interventions are important factors for practice change. It is recommended to further explore contextual factors in future research, using research methods designed to incorporate relevant context.

## METHODOLOGICAL ISSUES

General practices in this study all voluntarily applied for the practice accreditation program. This reflects current practice, in which practice accreditation is a voluntary activity. This could imply that practices included in this study have a relatively high affinity with quality of care. Furthermore the practice accreditation program was initiated in 2005, practices included in this study were the early adaptors<sup>30</sup> among general practices in the Netherlands and for that reason might be more eager to initiate quality improvement. A substantial number of practices in our study were training practices. Of these practices it is to be expected they are more open to innovations. Furthermore at time of the study there were incentives for training practices to apply to the program as it was stimulated by the GP educational institutes by means of staff support.

Additionally, a substantial part of practices in the intervention arm were single-handed practices. We did not stratify for solo or group practices. Group practices might have more defined processes to address quality issues.

The differences between various panels in their selection of performance indicators for CVRM suggested that chosen measures should be interpreted with care. Nevertheless, the primary outcomes of the trial are widely regarded as important.<sup>31</sup>

Practices in the control group in this study also showed improvements on CVRM related care. This could be the effect of contamination as practices in the control group also participated in the Dutch accreditation program and therefore were also working on quality improvement, which may have benefited CVRM related care. A different study design might have demonstrated a larger effect of practice accreditation, however an RCT where randomization would determine which practices should start with the practice accreditation program was not feasible.

## IMPLICATIONS FOR PRACTICE AND FUTURE RESEARCH

The practice accreditation program for general practices encourages practice teams to use a planned and cyclic approach to learning and improving their performance. Our results on focusing improvement plans on CVRM showed no significant changes to the primary outcomes of care, however, a large number of indicators on lifestyle advice showed improvement. Thus, audit and feedback in combination with improvement plans, which is the most important element of the practice

accreditation program has the ability to stimulate general practices to improve health care delivery. As a response to intermediate results of our study and other evaluations, the Netherlands Institute for Accreditation in Healthcare has adjusted the practice accreditation program in 2011 to make implementation more feasible and flexible. Data collection on chronic illness care has been spread over different years, improvement plans can be documented in a more flexible way, and the use of practice consultants to guide participants through the accreditation program is optional. New evaluations are required to examine the impact of these changes on feasibility and to assess whether outcomes do improve in the new program.

The practice accreditation program aims to enhance the quality of care provided to patients. However, participants in our study perceived that patient care was not directly influenced by the practice accreditation program. The patient-caregiver contact did not seem to change as a result of participation in the program. To improve patient outcomes we recommend that improvement plans focus more on improvement of outcome measures. Furthermore, for accreditation to be effective the minimum standards required have to challenge participants.<sup>32</sup> It can be noted that the Dutch College of General Practitioners will offer an individual certification program for GPs from 2015, which will complement the practice accreditation program. This individual certification program, which includes audits that overlap with those in the practice accreditation, may be perceived as closer to individual performance and outcomes of patient care.

Information technology can be supportive for the implementation of a quality improvement initiative like the practice accreditation program. In the Netherlands there are many different electronic medical record systems in general practice, which are tailored to the demands of the practice accreditation program at varying degree. Moreover, optimal use of these systems requires proper computer skills, which is often lacking in practice team members. When used efficiently, electronic medical record systems can be a very helpful tool in organizing chronic health care and support the quality of provided care.<sup>33</sup>

In this study we focused on patients with established cardiovascular diseases. Many of these patients visit a specialist once a year for an annual control consultation, in addition to the care provided in the general practice. There is often a lack of clarity who has primary responsibility of providing recommended care to the patient. To overcome this problem, enhanced collaboration and coordination between different health care professionals and their patients is needed.

It is expected that demands for (primary) healthcare increase more and more in the years to come due to workforce shortages, increasing numbers of patients with comorbidity, high age and more complex demands for care. Substitution of care from secondary care to primary care and from physicians to nurses may be a way to manage this burden. However, because GPs play a central role in access of care, the workload on general practice will increase. To meet the demands for care in general practice other primary healthcare professionals should be involved in the process of care. Pharmacists for example can provide ongoing care or health promotion for patients with chronic conditions, as effective as or more effective than provided by a GP.<sup>34</sup> Furthermore, it is important to stimulate self-management to enhance patients managing their own conditions. Through self-management patients are stimulated to participate in the decision making about their own treatment. This may lead to improved health outcomes. However, implementation requires a different role for both caregiver and patient, and may be hard to establish.

As many components of preventive care for patients with CVD and DM, and supposedly also other chronic conditions, are shared, it may be efficient to integrate these components in one disease management program. This would reduce the burden for both caregivers and patients and open up time for other important clinical tasks.

From the results in this thesis the practice accreditation program appears to be a helpful tool in managing chronic illness care in general practice as it has the ability, when applied effectively, to improve practice organization, and the provision of recommended health care. Nevertheless, not all planned elements of accreditation appeared to contribute to its outcomes, so there may be room for improving efficiency of the program. We therefore recommend that improvement plans should focus more on improvement of outcome measures to enhance patient outcomes. Moreover, additional interventions may be required, such as financial incentives for practices with high performance or public reporting on quality scores and furthermore other quality improvement strategies may also be effective. Interventions to improve healthcare should be tailored to relevant enablers and barriers for change.<sup>35</sup> Determinants of clinical practice and contextual factors are of great importance for practice change. It is important to elucidate these enablers and barriers and contextual factors in future accreditation research.

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# Summary

### Chapter 1

In the first chapter we present the outline of this thesis which concerns the effectiveness of a practice accreditation program on the quality of care in general practice with respect to patients with established cardiovascular diseases. Accreditation is a widely used method to assess and improve the quality of healthcare organizations. We explore the effectiveness of practice accreditation in general practice and its influence on quality of care and we explore which contextual factors contribute to its impact. We focus on patients with established cardiovascular diseases, which remains high on the professional and societal agenda.

### Chapter 2

In this chapter the study protocol on a cluster randomized trial on the effectiveness and efficiency of a practice accreditation program on cardiovascular risk management in general practice is described. Accreditation of healthcare organizations has been introduced across the world with a range of aims, including the improvement of clinical processes and outcomes. The Dutch College of General Practitioners has launched a program for accreditation of primary care practices, which focuses on chronic illness care. A two-arm cluster randomized trial with a block design was planned. Seventy primary care practices from the Netherlands were to be recruited from those who volunteer to participate in the practice accreditation program. The intervention group (n=35 practices) was instructed to focus improvement on cardiovascular risk management. The control group was instructed to focus improvement on other domains in the first year of the program. Baseline and follow-up measurements at 12 months after receiving the accreditation certificate are based on a standardized version of the audit in the practice accreditation program. Primary outcomes were selected from the 20 quality indicators for established cardiovascular diseases and included controlled blood pressure, serum cholesterol, and prescription of recommended preventive medication. Secondary outcomes are 15 process indicators and two outcome indicators of established cardiovascular diseases, self-reported achievement of improvement goals and perceived unintended consequences.

### Chapter 3

In chapter 3 we present the results of the two-arm cluster randomized trial on the effectiveness and efficiency of a practice accreditation program on cardiovascular risk management (CVRM) in general practice. Our aim was to determine the effectiveness of improvement plans in a

practice accreditation program of general practices, focusing on CVRM. Primary care practices allocated to the intervention group (n=22) were instructed to focus improvement plans during the intervention period on CVRM, while practices in the control group (n=23) could focus on any domain except on CVRM and diabetes mellitus. Primary outcomes were systolic blood pressure <140 mmHg, LDL cholesterol <2.5 mmol/l and prescription of antiplatelet drugs. Secondary outcomes were 17 indicators of CVRM and physician's perceived goal attainment for the chosen improvement project. There were measurements at baseline and follow-up in independent samples of patients.

No effect was found on the primary outcomes. Blood pressure targets were reached in 39.8% of patients in the intervention and 38.7% of patients in the control group; cholesterol target levels were reached in 44.5% and 49.0% respectively; antiplatelet drugs were prescribed in 82.7% in both groups. Six secondary outcomes improved: smoking status, exercise control, diet control, registration of alcohol intake, measurement of waist circumference, and fasting glucose. Participants' perceived goal attainment was high in both arms: mean scores of 7.9 and 8.2 on the 10-point scale.

We found that this program improved some aspects of professional performance concerning CVRM in the practices who focused their improvement plans on CVRM, but not on the primary outcomes. The participants largely perceived to achieve chosen goals of their improvement projects .

### Chapter 4

The aim of the study presented in this chapter was to identify determinants of change related to the practice accreditation program, building on the experiences of primary care professionals who had participated in the accreditation program. We performed an interview study to document the experiences of 33 participating primary care professionals and used to identify determinants of outcomes. The Consolidated Framework for Implementation Research (CFIR) was used as framework for the qualitative analysis.

We reached saturation after analyzing 23 interviews. The practice accreditation program is based on structured quality improvement, but only some of its elements were identified as determinants of change. Factors that were perceived to facilitate implementation of the program were: designating one person responsible for the program, ensuring clear lines of communication within the whole practice team and having affinity with or stimulate enthusiasm for improving quality of care. Contextual factors such as participation in a care group and

being connected to the GP educational institute were important for actual change. The accreditation program was perceived to have positive effects on team climate and commitment to quality of care in the practice team. The perception was that patient care was not directly influenced by the accreditation program. Receiving a certificate for completing the accreditation program seemed to have little added value to participants. The practice accreditation program may have positive outcomes on quality of care, but not all planned elements may contribute to its outcomes. Both factors in the accreditation process and in the context were perceived as determinants of quality improvement. The challenge is to build on facilitating factors, while reducing the elements of accreditation that do not contribute to its impact.

**Chapter 5**

Many patients with cardiovascular disease do not attain the targets for health-related lifestyle and preventive treatment recommended in practice guidelines. In chapter 5 the results of a study with the aim to assess the impact of diabetes mellitus (DM) and chronic obstructive pulmonary disease (COPD) on the quality of cardiovascular risk management in patients with established cardiovascular diseases (CVD) were presented.

Patients with established CVD were randomly selected in primary care practices using recorded diagnoses. Structured case forms were used to review data on 20 performance indicators concerning CVD from medical records. Descriptive and multilevel regression analyses were conducted.

In 45 primary care practices with 106 physicians in the Netherlands, 1614 medical records of patients with CVD (37.9% women) were reviewed. A total of 1076 (66.7%) patients had recorded CVD only (reference group); 7.8% had CVD and COPD; 22.4% had CVD and DM; 3.1% patients had CVD, COPD and DM. Compared with the reference group, patients with CVD and DM yielded higher scores on 17 of 20 indicators; patients with CVD, DM and COPD on 14 indicators; and patients with CVD and COPD on three indicators. Of the patients with CVD and DM, fewer patients had LDL-cholesterol levels over 2.5 mmol/l (OR=0.36; 95% CI 0.26-0.50), more had antiplatelet drugs prescribed (OR=1.72; 95% CI 1.17-2.54), and more had systolic blood pressure measurement (OR=4.12; 95% CI 2.80-6.06).

We found evidence that comorbidity was associated with more comprehensive cardiovascular risk management. However, this only applied to DM and not to COPD. This finding adds to cumulating evidence that presence of DM is associated with better preventive treatment of cardiovascular risk.

**Chapter 6**

In chapter 6 we describe a study based on secondary analysis of data from the European Practice Assessment of Cardiovascular risk management project (EPA Cardio project), an observational study on CVRM in 315 primary care practices in 10 countries in 2008-2009. We aimed to explore nurse involvement in cardiovascular risk management (CVRM) in primary care and how this involvement was associated with the degree of structured chronic illness care. Therefore we conducted a cross-sectional observational study in seven European countries.

Five aspects of nurse involvement in CVRM and 35 specific components of structured chronic illness care were documented in 202 primary care practices from Austria, Belgium, Germany, the Netherlands, Slovenia, Spain and Switzerland. An overall measure for chronic care management with a range from 0 to 5 was constructed derived from elements of the Chronic Care Model (CCM). Random coefficient regression modelling was used to explore associations.

A majority of practices involved nurses for organization of CVRM in administrative tasks (82.2 %), risk factor monitoring (78.5%) and patient education (57.1%). Fewer practices involved nurses in defining protocol and the organization for CVRM (45%) or diagnosis and treatment (34.6%). With an increasing number of tasks taken up by nurses, overall median adoption of CCM increased from 2.7 (95% CI 1.5-3.6) to 4.2 (95% CI 3.8-4.1). When the number of nurse tasks increased by one, the adoption of CCM increased with 0.13 (p<0.05; 95% CI 0.03-0.22). Some practices with low nurse involvement had high adoption of CCM, while variation of adoption of CCM across practices reduced substantially with an increasing level of nurse involvement.

We concluded that nurses were involved in the delivery of CVRM at varying degree. Higher involvement of nurses was associated with higher degree of structured chronic illness care with less variation.

**Chapter 7**

Chapter 7 describes a study which aims to examine the consistency of indicator selection across different procedures and across different panels. Delphi procedures are frequently used to develop performance indicators, but little is known about the validity of this method. Therefore three indicator set development procedures were analyzed related to CVRM: the EPA Cardio project, which used international GP panels; the UniRap project, a Dutch GP indicator project; and the Vitale Vaten project, which used a national multidisciplinary health professional panel and a stakeholder panel.

With respect to clinical indicators, consistency between procedures varied according to the origin of the indicators. In Vitale Vaten the multidisciplinary panel of health professionals validated 63% from the international EPA Cardio indicators again. From the UniRap GP set only 13% was rated valid again. Considering organizational indicators, 27 indicators were rated in both EPA Cardio and Vitale Vaten. In the Vitale Vaten project 17 indicators (63%) were validated, including eight of the nine indicators validated in EPA Cardio. Consistency between panels was moderate, giving a decisive role to the health professional panel, being the most critical.

The consistency of selected performance indicators varied across procedures and panels. Further research is needed to identify underlying determinants of this variation.

**Chapter 8**

In this chapter we present the general discussion of this thesis. We summarize and discuss the main findings of our studies, methodological issues, and implications for practice and future research.

The practice accreditation program for general practices encourages practice teams to use a planned and cyclic approach to learning and improving their performance. Nevertheless, not all planned elements of accreditation appeared to contribute to its outcomes, so there may be room for improving efficiency of the program. Furthermore, to improve patient outcomes it is recommended that improvement plans should focus more on improvement of outcome measures. Interventions to improve healthcare should be tailored to relevant enablers and barriers for change. It is important to elucidate these enablers and barriers and contextual factors, that can be of great importance for practice change, in future accreditation research.

# Samenvatting

## Hoofdstuk 1

In het eerste hoofdstuk geven we een overzicht van de inhoud van dit proefschrift dat de effectiviteit van een praktijkaccrediteringsprogramma voor de kwaliteit van zorg in de huisartsenpraktijk met betrekking tot patiënten met vastgestelde hart- en vaatziekten beschrijft.

Accreditatie is een veel gebruikte methode om de kwaliteit van gezondheidszorgorganisaties te toetsen en te verbeteren. We exploreren de effectiviteit van praktijkaccreditering in de huisartsenpraktijk en de invloed ervan op kwaliteit van zorg. Ook onderzoeken we de contextuele factoren die bijdragen aan de impact van praktijkaccreditering.

Onze focus ligt op patiënten met vastgestelde hart- en vaatziekten, wat een belangrijk punt van aandacht blijft op de professionele en maatschappelijke agenda.

## Hoofdstuk 2

In dit hoofdstuk wordt het studieprotocol van een cluster gerandomiseerde trial beschreven welke de effectiviteit en efficiëntie van een praktijkaccrediteringsprogramma met betrekking tot cardiovasculair risicomanagement (CVRM) onderzoekt. Accreditatie van gezondheidszorgorganisaties is wereldwijd ingevoerd met een scala aan doelstellingen, waaronder de verbetering van klinische processen en uitkomsten. Het Nederlands Huisartsen Genootschap heeft een programma voor de accreditatie van huisartsenpraktijken geïntroduceerd, dat zich richt op zorg omtrent chronische ziekten. Een twee-armige cluster gerandomiseerde trial met een blok ontwerp werd gepland.

Zeventig huisartsenpraktijken uit Nederland zouden worden gerekruteerd uit praktijken die zich vrijwillig aanmeldden voor het praktijkaccrediteringsprogramma. De interventiegroep (n=35 praktijken) kreeg de opdracht om zich te richten op verbetering van CVRM. De controlegroep kreeg de opdracht zich in het eerste jaar van het programma te richten op verbetering van andere domeinen. De voormeting en nameting, 12 maanden na ontvangst van het accreditatie-certificaat, waren gebaseerd op een gestandaardiseerde versie van de audit in het praktijkaccrediteringsprogramma. Primaire uitkomsten werden geselecteerd uit de 20 kwaliteitsindicatoren voor vastgestelde hart- en vaatziekten, te weten bloeddrukcontrole, het meten van het cholesterolgehalte en het voorschrijven van aanbevolen preventieve medicatie. Secundaire uitkomsten waren 15 procesindicatoren en twee uitkomstindicatoren voor vastgestelde hart- en vaatziekten, daarnaast de mate van het behalen van verbeterdoelen en de door de deelnemers ervaren onbedoelde consequenties.

## Hoofdstuk 3

In hoofdstuk 3 presenteren we de resultaten van de twee-armige cluster gerandomiseerde trial naar de effectiviteit en efficiëntie van een praktijkaccrediteringsprogramma betreffende CVRM in de huisartsenpraktijk. Ons doel was het bepalen van de effectiviteit van verbeterplannen als onderdeel van het praktijkaccrediteringsprogramma voor huisartsenpraktijken, gericht op CVRM. Huisartsenpraktijken in de interventiegroep (n=22) kregen de opdracht om verbeterplannen tijdens de interventieperiode op CVRM te richten, terwijl praktijken in de controlegroep (n= 23) zich konden richten op elk domein behalve op CVRM en diabetes mellitus. De primaire uitkomsten waren systolische bloeddruk <140 mmHg, LDL-cholesterol <2,5 mmol/l en het voorschrijven van trombocytenaggregatieremmers. Secundaire uitkomsten waren 17 indicatoren betreffende CVRM en het door de deelnemers ervaren bereiken van de doelen van het gekozen verbeterproject. De voor- en nameting werden verricht in onafhankelijke groepen patiënten.

Er werd geen effect gevonden op de primaire uitkomsten. Streefdoelen voor bloeddruk werden bij 39,8% van de patiënten in de interventiegroep en bij 38,7% van de patiënten in de controlegroep bereikt; bij 44,5% respectievelijk 49,0% werden cholesterol streefniveaus bereikt; trombocytenaggregatieremmers werden in beide groepen bij 82,7% van de patiënten voorgeschreven. Zes secundaire uitkomsten verbeterden: rookstatus, controle van bewegen, dieet controle, registratie van alcoholgebruik, het meten van de middelomtrek, en het meten van de nuchtere glucose. Het door de deelnemers ervaren bereiken van de doelen was hoog in beide groepen: gemiddelde scores van 7,9 en 8,2 op een 10-puntsschaal.

We hebben ondervonden dat door dit programma een aantal aspecten van professionele prestaties met betrekking tot CVRM verbeterden in de praktijken die hun verbeterplannen op CVRM richtten, maar de primaire uitkomsten verbeterden niet. De deelnemers bereikten in ruime mate de doelstellingen van hun verbeterprojecten.

## Hoofdstuk 4

Het doel van het onderzoek beschreven in dit hoofdstuk was het identificeren van determinanten van verandering betreffende het praktijkaccrediteringsprogramma, gebaseerd op de ervaringen van de eerstelijns gezondheidszorg professionals die deelnamen aan het programma. We voerden een interviewstudie uit naar de ervaringen van 33 deelnemende eerstelijns gezondheidszorg professionals om determinanten van uitkomsten te identificeren. Het Consolidated Framework for Implementation Research (CFIR) werd gebruikt als

kader voor de kwalitatieve analyse. We bereikten verzadiging na het analyseren van 23 interviews. Het praktijkaccrediteringsprogramma is gebaseerd op structurele kwaliteitsverbetering, maar slechts enkele van de elementen uit het programma werden geïdentificeerd als determinanten voor verandering. Factoren die de uitvoering van het programma zouden faciliteren waren: het aanwijzen van een persoon die verantwoordelijk is voor het programma, zorgen voor duidelijke communicatielijnen binnen het gehele praktijk team en het hebben van affiniteit met of het stimuleren van enthousiasme voor het verbeteren van kwaliteit van de zorg. Contextuele factoren, zoals deelname aan een zorggroep en verbonden zijn aan de huisartsopleiding waren belangrijk voor feitelijke verandering. Het praktijkaccrediteringsprogramma werd als positief ervaren voor het teamklimaat en de betrokkenheid bij kwaliteit van zorg van het praktijkteam. De perceptie was dat de patiëntenzorg niet direct beïnvloed werd door het praktijkaccrediteringsprogramma. Het ontvangen van een certificaat voor het voltooiën van het praktijkaccrediteringsprogramma leek weinig meerwaarde voor de deelnemers hebben.

Het praktijkaccrediteringsprogramma kan positieve gevolgen hebben op de kwaliteit van zorg, maar niet alle geplande elementen zouden bijdragen aan de resultaten. Zowel factoren in het accreditatieproces als factoren in de context werden gezien als determinanten van kwaliteitsverbetering. De uitdaging is voort te bouwen op de faciliterende factoren van accreditatie, en de accreditatie-elementen die niet bijdragen aan het effect ervan te verminderen.

### Hoofdstuk 5

Veel patiënten met hart- en vaatziekten bereiken niet de leefstijldoelen en doelen voor preventieve behandeling die worden aanbevolen in praktijkrichtlijnen. In hoofdstuk 5 worden de resultaten gepresenteerd van een onderzoek met als doel het onderzoeken van de invloed van diabetes mellitus (DM) en chronische obstructieve longziekte (COPD) op de kwaliteit van CVRM bij patiënten met vastgestelde hart- en vaatziekten (HVZ).

Patiënten met vastgestelde HVZ werden willekeurig geselecteerd in huisartsenpraktijken door middel van geregistreerde diagnoses. Gestructureerde formulieren werden gebruikt om gegevens voor 20 prestatie indicatoren betreffende HVZ uit medische dossiers te beoordelen. Beschrijvende en multilevel regressie analyses werden uitgevoerd.

In 45 huisartsenpraktijken in Nederland met 106 artsen, werden 1614 medische dossiers van patiënten met HVZ (37,9% vrouwen) beoordeeld. Een totaal van 1076 (66,7%) patiënten had alleen een registratie van HVZ (referentiegroep); 7,8% had HVZ en COPD; 22,4% had HVZ en DM; 3,1% van de patiënten had HVZ, COPD en DM. In vergelijking met de referentiegroep, hadden patiënten met HVZ en DM betere scores op 17 van de 20 indicatoren; voor patiënten met HVZ, DM en COPD gold dat voor 14 indicatoren; en voor patiënten met HVZ en COPD voor drie indicatoren. Van de patiënten met HVZ en DM, hadden minder patiënten een LDL-cholesterol waarde boven de 2,5 mmol/l (OR=0,36; 95% BI 0,26-0,50), meer patiënten kregen trombocytenaggregatieremmers voorgeschreven (OR=1,72; 95% BI 1,17-2,54) en bij meer patiënten was de systolische bloeddruk gemeten (OR=4,12; 95% BI 2,80-6,06). We hebben bewijs gevonden dat comorbiditeit gepaard ging met uitgebreider cardiovasculair risicomanagement. Echter, dit was alleen van toepassing bij DM en niet bij COPD. Deze bevinding geeft een aanvulling aan het groeiende bewijs dat de aanwezigheid van DM wordt geassocieerd met een betere preventieve behandeling van cardiovasculair risico.

### Hoofdstuk 6

In hoofdstuk 6 beschrijven we een studie op basis van secundaire analyse van gegevens uit het European Practice Assessment of Cardiovascular risk management project (EPA Cardio project), een observationele studie betreffende CVRM in 315 huisartsenpraktijken in 10 landen in 2008-2009. Ons doel was om de verpleegkundige betrokkenheid bij CVRM in de huisartsenpraktijk te onderzoeken alsmede hoe deze betrokkenheid verband houdt met de mate van gestructureerde chronische zorg. Derhalve hebben we een cross-sectionele observationele studie in zeven Europese landen uitgevoerd. Vijf aspecten van verpleegkundige betrokkenheid bij CVRM en 35 specifieke onderdelen van gestructureerde chronische zorg werden vastgelegd in 202 huisartsenpraktijken uit Oostenrijk, België, Duitsland, Nederland, Slovenië, Spanje en Zwitserland. Een algemene maat voor management van chronische zorg werd geconstrueerd uit elementen van het Chronic Care Model (CCM) met een bereik van 0 tot 5. Random coëfficiënt regressie modellering werd gebruikt om verbanden te onderzoeken.

In een meerderheid van de praktijken werd verpleegkundigen betrokken bij de organisatie van administratieve taken betreffende CVRM (82,2%), bij het monitoren van risicofactoren (78,5%) en patiëntenvoorlichting (57,1%). Minder praktijken betrokken

verpleegkundigen bij het definiëren van het protocol en de organisatie voor CVRM (45%) en diagnose en behandeling (34,6%). Bij een toenemend aantal taken voor verpleegkundigen, steeg de mediaan van CCM van 2,7 (95% BI 1,5-3,6) tot 4,2 (95% BI 3,8-4,1). Wanneer het aantal verpleegkundige taken met één werd verhoogd, verhoogde de CCM met 0,13 ( $p < 0,05$ ; 95% BI 0,03-0,22). Sommige praktijken met een lage betrokkenheid van verpleegkundigen hadden een hoge score voor CCM, terwijl de variatie van de score op CCM aanzienlijk verminderde bij een hogere mate van verpleegkundige betrokkenheid.

We concludeerden dat verpleegkundigen in wisselende mate betrokken werden bij het leveren van CVRM. Hogere betrokkenheid van verpleegkundigen werd geassocieerd met beter gestructureerde chronische zorg met minder variatie.

### Hoofdstuk 7

In hoofdstuk 7 beschrijven we een onderzoek met als doel het bepalen van de consistentie van verschillende procedures en verschillende panels bij indicatorontwikkeling. Delphi procedures worden vaak gebruikt om kwaliteitsindicatoren te ontwikkelen, maar er is weinig bekend over de validiteit van deze methode. Hiervoor zijn drie procedures voor de ontwikkeling van een set indicatoren gerelateerd aan CVRM geanalyseerd: het EPA Cardio project, waarin gewerkt werd met internationale huisartsenpanels; het Unirap project, een Nederlands indicatorproject in de huisartsenzorg; en het Vitale Vaten project, waarin gebruik werd gemaakt van een nationaal multidisciplinair panel van zorgverleners en een stakeholderpanel.

Met betrekking tot klinische indicatoren was de consistentie tussen de procedures verschillend. In het Vitale Vaten project valideerden de zorgverleners uit het multidisciplinaire panel 63% van de indicatoren van het internationale EPA Cardio project opnieuw. Slechts 13% van de Unirap indicatoren werd opnieuw gevalideerd. Met betrekking tot organisatorische indicatoren, werden 27 indicatoren beoordeeld in zowel EPA Cardio als Vitale Vaten. In het Vitale Vaten project werden 17 indicatoren (63%) gevalideerd, waaronder 8 van de 9 indicatoren gevalideerd in EPA Cardio. Consistentie tussen de panels was matig, waardoor aan zorgprofessionals een beslissende rol werd toebedeeld, het meest kritische panel.

De consistentie van geselecteerde prestatie indicatoren varieerde tussen procedures en panels. Verder onderzoek is noodzakelijk om determinanten te identificeren die ten grondslag liggen aan deze verschillen.

### Hoofdstuk 8

In dit hoofdstuk presenteren we de discussie van dit proefschrift. We vatten de belangrijkste bevindingen van onze studies samen en bediscussiëren deze, en we bespreken methodologische aspecten en implicaties voor de praktijk en toekomstig onderzoek.

Het praktijkaccrediteringsprogramma voor huisartsenpraktijken stimuleert praktijkteams om een planmatige en cyclische aanpak te gebruiken voor het verbeteren van hun prestaties. Desondanks bleken niet alle geplande elementen van het accreditatieprogramma bij te dragen aan de resultaten ervan, dus is er wellicht ruimte voor verbetering van de efficiëntie van het programma. Bovendien is het aan te bevelen om verbeterplannen meer te richten op verbetering van uitkomstmaten teneinde patiëntuitkomsten te verbeteren. Interventies om de gezondheidszorg te verbeteren, zouden moeten worden afgestemd op relevante bevorderende factoren en barrières voor verandering. Het is belangrijk om deze bevorderende factoren, barrières en contextuele factoren, die van groot belang kunnen zijn voor praktijkverandering, in toekomstig accreditatie onderzoek te belichten.

# Dankwoord

Vandaag is het een grote dag en iedereen moet het horen, vandaag is het de mooiste dag want mijn proefschrift is geboren. Dus Emiel, maak die Kopke 1977 maar open.

Bij deze blijde gebeurtenis, zijn woorden van dank wel op zijn plaats.

Michel, ik wil je bedanken voor jouw structurele, heldere en concrete manier van begeleiden. Ik heb veel van je mogen leren en heb bewondering voor je manier van denken. Jan, bedankt voor je kritische toevoegingen maar met name ook voor je humor. Jullie samen vormen wat mij betreft een dynamic duo. Jozé, ook jij hartelijk bedankt voor je bijdrage aan dit proefschrift.

Woorden van dank voor de mensen die hebben geholpen bij de uitvoering van mijn onderzoek. Hans Witmer en Suzanne Jongert van het NPA, Marianne Meulepas, Daniëlle en Camiel van Meetpunt Kwaliteit, Marjan Knippenberg, Frederique Brouwer, Irma Maassen en Reinier Akkermans bedankt voor de fijne ondersteuning. Hans van den Hoogen en Margot Tacken bedankt voor de discussies over de manier van data verzamelen. Het bleek toch nog een hele klus.

Ook mijn mede-auteurs die de artikelen uit dit proefschrift tot stand hebben gebracht wil ik bedanken voor hun kritische input, Eddy Adang, Margriet Bouma, Pieter van den Hombergh, Miranda Laurant en Cor Spreeuwenberg.

Ria, ik heb veel van je geleerd tijdens onze samenwerking voor het klinische fysiotherapie project, je weet me altijd weer te enthousiasmeren en bovenal waren de autoritjes erg gezellig! Samen met Raoul, Jaap, André, Ellen en Linda hebben we een mooi project neergezet. Hartelijk dank voor deze ervaring.

Jolanda, bedankt voor je medewerking aan de totstandkoming van dit proefschrift. Grappig dat we erachter kwamen dat ik vroeger altijd bij jouw tantes eitjes ging halen.

Ook alle andere collega's van IQ healthcare en vooral mijn kamer-genootjes Irma, Annelies, Wytske, Karin, Caroline, Christantie en Anita, bedankt voor alle steun en gezelligheid de afgelopen jaren.

En niet te vergeten grote dank aan alle huisartsen, doktersassistenten en praktijkondersteuners patiënten die hebben deelgenomen aan mijn onderzoek. Zonder jullie was dit proefschrift niet tot stand gekomen.

Lieve collega's van MCNO-Fysio De Wedren, bedankt voor jullie interesse in mij en mijn bezigheden, de fijne samenwerking tot nu toe en vooral het vertrouwen dat jullie in mij tonen. Lambert, je kruiste mijn pad als stagebegeleider en hebt me in die rol de boost gegeven die ik op dat moment zo nodig had. Bedankt voor de kansen en vooral ook de ruimte die jij en Fem me geven in mijn professionele ontwikkeling. Fem, tegen alle verwachtingen in...geniet ik van onze zangsessies. Je bent een topper!

Astrid, we hebben een bijzondere vriendschap met de daarbij behorende ups-and-downs (maar wat mij betreft nu nog alleen maar in de up). Je hebt me enorm geholpen bij het zoeken en uiteindelijk vinden van mijn pad en ik kan je niet vertellen hoe dankbaar ik je daarvoor ben. Dat je me mee hebt genomen naar Curaçao vind ik een grote eer. Dennis, dushi, bijzonder mens, de inzichten die je me hebt gegeven zijn me ontzettend waardevol en hebben gezorgd dat ik een aantal grote hobbels heb kunnen nemen. Zo ook de afronding van dit proefschrift, Curaçao heeft blijkaar een uitstekend werkklimaat. Ik dank jou en Jessica voor het openstellen van jullie huis.

Lieve Kim, we leerden elkaar kennen op de praktijk maar al snel was er op persoonlijk vlak nog een veel betere klik dan de professionele. Je bent er altijd voor me en met je ruimdenkende, wereldse blik, weet je me altijd weer met beide benen op de grond te krijgen. En hoe fantastisch was onze trip naar New York! Ik hoop nog veel avonturen met je te mogen beleven en nog veel meer mee te pikken van je wijsheid.

Aap, Eef en Broos...ik ga op zoek naar wie ik ben, verleg de grenzen die ik ken...in een korte tijd zijn jullie veel voor me gaan betekenen. Ik blijf genieten van jullie real-life-soap en ben blij dat ik daar deel van uit maak. Bedankt voor de inzichten die jullie me hebben gegeven, de gezelligheid in Gassel en natuurlijk de fantastische avonden in de JC-straat met als hoogtepunt (op meerdere vlakken) het jaarlijkse straatfeest. Door jullie wordt mijn wereld verrijkt met nieuwe mensen...Paul, there ain't no guarantee but I'll take a chance on we...

Nienke, tegelijkertijd zijn we begonnen bij IQ en er was een directe klik tussen ons. Bedankt voor alle fijne avondjes eten, kletsen over onze gemeenschappelijke interesse fysiotherapie en vooral over het leven in het algemeen. En uhh...Extase...need I say more?

Carla, mijn roomie van het eerste uur. Allebei geboren op 8 oktober en of het nou daaraan ligt of niet, de gemeenschappelijkheden die we hebben zijn treffend. Op het werk maar meer nog daarbuiten waardeer ik je (levens)wijsheid, reflecties, humor en warmte.

Christel, Miranda en Tonique, lieve moedermeiden, we kennen elkaar inmiddels al vele jaren en hebben het nodige meegemaakt met elkaar. Even een korte greep uit ons 'bestaan': gangfeest op de Onderwijsboulevard, carnaval in Winssen en in Oeteldonk, Guus Meeuwis, weekend Maastricht, weekend Bloemendaal, weekend Antwerpen, high tea-en, borrelen in de Cosmo, verhuizen, twee vrijgezellenfeesten, twee trouwerijen, ceremoniemeesters, vier baby's geboren, nieuwe vriendjes voorstellen, heel veel lachen en ook heel veel huilen. Ook al is de frequentie van onze dates wat afgenomen, de intensiteit is dat gelukkig niet. Bedankt voor jullie vriendschap.

Inge, Ilse, Patty en Sanne, lieve, gekke meiden. Bij Loeffen in de slagerij hebben we elkaar gevonden...memorabele avondjes uit, borrels in de tuin, vierdaagsefeesten vieren (volgend jaar gaan we echt lopen hè Pat), Lowlands, Bloemendaal, kamperen in Frankrijk en vooral veel Martini drinken. Ing, super wat je tot nu toe allemaal hebt bereikt met studioRUIG, dankzij jullie hangt mijn kast vol en hoef ik niet na te denken over wat ik tijdens mijn promotie aan moet. Ik waardeer je eerlijkheid en oprechtheid maar vooral hou ik van je gekke fratsen. Ils, beetje jammer dat je niet meer in Nijmegen woont maar de reden waarom vind ik plausibel. Bedankt voor je lieve berichtjes en kaartjes in tijden dat ik het zo nodig heb. Pat, met je heerlijke nuchterheid weet je me altijd weer rustig te krijgen. San, uit het oog is zeker niet uit het hart. Lieverds, ik kan niet vertellen hoezeer ik onze vriendschap waardeer. Ik word echt blij van jullie.

Femke...mag het een onsje meer zijn? Blijkbaar ontstaan tussen de kipfilets en verse worst de mooiste vriendschappen. Van slagereisjes naar internationaal gewaardeerd kunstenaars. Wat ben ik trots op jou en op het feit dat jij mijn boekje hebt vormgegeven. Ik kan je niet vaak genoeg bedanken daarvoor! Maar vooral bedankt voor je onvoorwaardelijke vriendschap, hoe gek en idioot mijn verhalen, belevenissen en hersenspinsels ook zijn, jij zal me nooit veroordelen om wat ik doe of wat ik zeg.

Lieve Kirs, we hebben al veel meegemaakt, middelbare school, samen op kamers, en uiteindelijk ook collega's bij IQ. Ongelooflijk om te zien hoe jij je in de loop der jaren ontwikkeld hebt. Ik heb het je al eens gezegd, je bent mijn rots in de branding en met jou naast me tijdens mijn promotie als paranimf heb ik het vertrouwen in mezelf dat ik zo nodig heb. Ik ben mega trots op jou.

Lieve Mel, sisters by chance, friends by choice. Je sprak de legendarische woorden 'nu zijn we eindelijk met zijn viertjes' toen ik werd geboren en gaf me mijn naam. Dat je blij bent dat ik er ben, laat je nog altijd blijken. Ik kan me geen betere grote zus wensen, en ben enorm vereerd dat je mijn paranimf wilt zijn op mijn grote dag.

Pap en mam, ik weet zeker dat zonder jullie stimulans dit proefschrift er niet was gekomen. Jullie hebben ervoor gezorgd dat Mel en ik zelfstandig, zelfvoorzienend en zelfbewust zijn. Ik hoor je nog zeggen mam: 'zorg dat je jezelf kan bedruipen'. Jullie zijn een bijzonder stel, yin & yang, zo verschillend maar vullen elkaar bijzonder goed aan. Een fantastisch voorbeeld voor ons. Bedankt dat jullie er zijn.

En dan tot slot...door de jaren heen is er inmiddels een groot aantal mensen mijn behandelkamer gepasseerd. Een aantal van hen wil ik in het bijzonder bedanken. Arjen, je maakt me altijd vrolijk met je scherpe blik en kritische opmerkingen. Arno, onze gesprekken gaan altijd binnen no time de diepte in, ik hoop ze nog vaak met je te mogen voeren. Cindy, af en toe leidt de lamme de blinde, fijn dat we zoveel in elkaar herkennen. Mary, je zou mijn oma kunnen zijn maar ook een hele goede vriendin, bedankt voor je wijze raad. Pieter, hoeveel life-events gaan we nog meemaken samen? Willem, geen wonder dat jij op mijn pad kwam...soulmate. Niet alleen jullie maar al mijn patiënten drukken op een of andere manier een stempel op mijn bestaan en zijn een bron van inspiratie. Bedankt dat ik jullie mag begeleiden. Ik hoop dat ik jullie iets kan leren en kan inspireren, dat het andersom zo werkt moge duidelijk zijn.

## Curriculum Vitae

Elvira Nouwens werd geboren op 8 oktober 1981 in Winssen. Zij groeide hier op met haar oudere zus Melanie. Ze rondde in 2000 het VWO af aan het Pax Christi College in Druten. Van 2000 tot 2005 studeerde zij Gezondheidswetenschappen aan de Universiteit Maastricht. Daar koos zij voor de afstudeerrichting Zorgwetenschappen en volgde keuzeblokken op het gebied van genderstudies en palliatieve zorg. Tijdens haar afstudeerstage richtte zij haar onderzoek op de voorkeuren van de plaats van bevallen voor zwangeren en hun partners. Na een kort uitstapje naar de opleiding Vroedkunde in Turnhout, startte zij in 2005 met de Verkorte Opleiding Fysiotherapie aan de Hogeschool Utrecht. Zij liep stage bij eerstelijns fysiotherapiepraktijken in Engelen en Nijmegen, en bij verpleeghuis Regina Pacis in Arnhem. Haar afstudeeronderzoek richtte zij op man/vrouwverschillen binnen de hartrevalidatie en ze behaalde in 2008 haar diploma.

In juli 2008 werd zij aangenomen als algemeen fysiotherapeut bij MCNO-Fysio De Wedren en in september van dat jaar startte zij haar promotieonderzoek 'Practice accreditation to improve cardiovascular risk management in general practice' bij de afdeling IQ healthcare aan de Radboud Universiteit Nijmegen. Daarnaast was zij betrokken bij het project 'De klinische fysiotherapie bij thorax- en abdominale chirurgie in beeld' in opdracht van het Wetenschappelijk College voor Fysiotherapie.

Momenteel werkt ze als fysiotherapeut en kwaliteitsmedewerker bij MCNO-Fysio De Wedren met de geriatrische patiënt als aandachtsgebied.





