Self-management of vascular riskfactors

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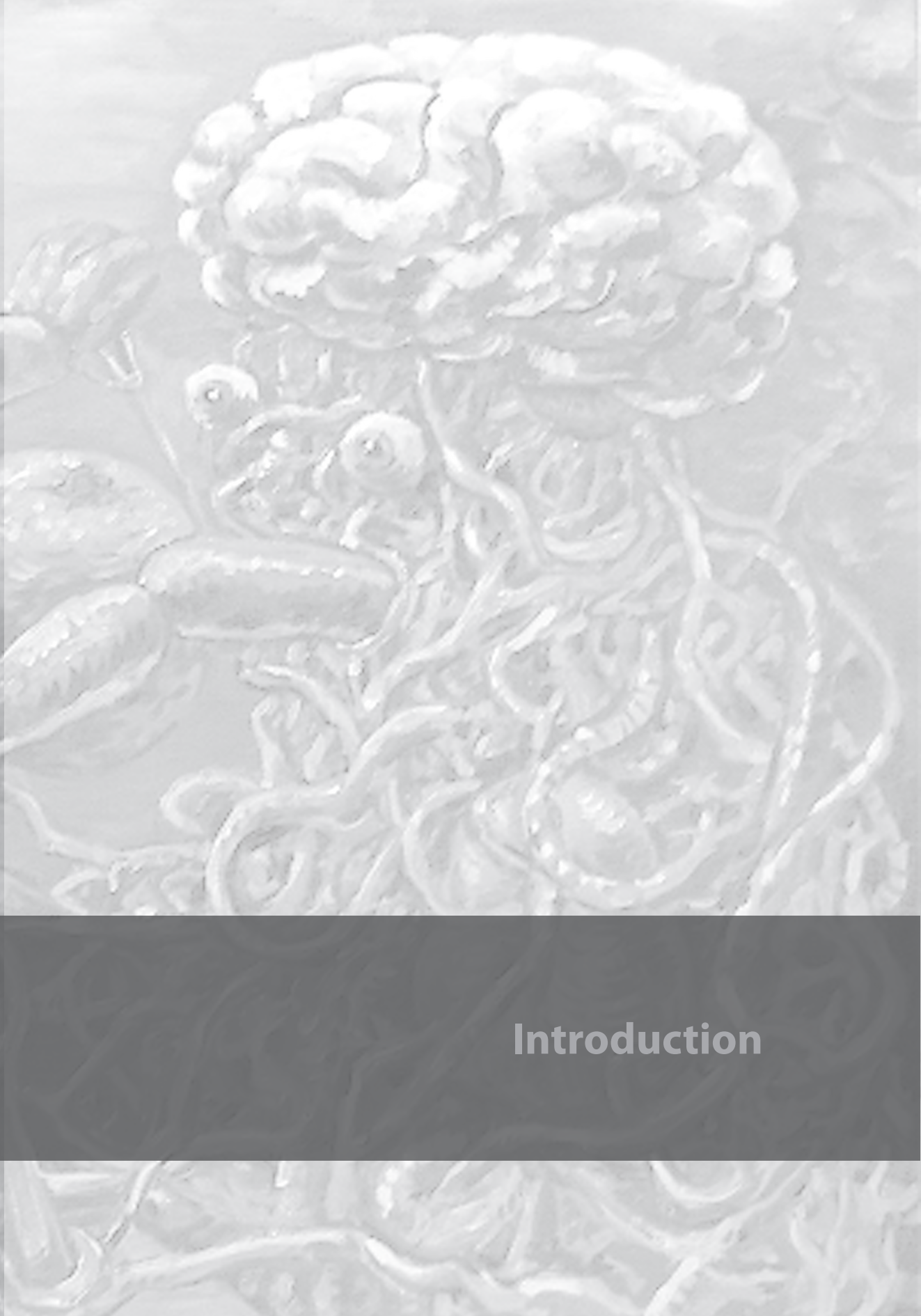

Introduction

Introduction

Despite improvements in the treatment of vascular disease achieved in the last decade[1], ischaemic heart attack and stroke are still leading causes of death worldwide[2]. Moreover, the number of patients diagnosed with a vascular disease is still increasing[3]. Although riskfactors for vascular disease differ by disease location, its manifestations, such as coronary arterial diseases, cerebrovascular disease, peripheral arterial disease, or abdominal aortic aneurysm, are caused by the same general process of atherosclerosis, which affects the endothelial surface of arteries. Patients with symptomatic vascular disease are at high risk of experiencing new vascular events. This risk is strongly influenced by riskfactors such as hypertension, hyperlipidaemia, diabetes mellitus, smoking, obesity, unhealthy food choices, and physical inactivity[4]. Modification of these vascular riskfactors can lower morbidity and mortality in vascular patients[5]. In the last decade, several trials have demonstrated that treatment of vascular riskfactors reduces the risk of future vascular events, but in clinical practice a large proportion of patients do not meet the targets for blood pressure, body weight, and lipids[6,7]. The risk of new vascular events is also influenced by patients' behaviour, such as lack of compliance with prescribed medication[8], unhealthy food choices, inability to stop smoking, and lack of physical activity[4,9]. Although increasingly more patients are compliant with prescribed medication, their cardiovascular lifestyle is far from ideal. The number of patients younger than 50 years with coronary heart disease (CHD) who are smokers has progressively increased since 2001, and more individuals with CHD are obese, which has resulted in an increase, from 28% to 43%, in the incidence of diabetes in this population[10]. We have to develop effective interventions to manage this growing problem of cardiovascular risk in patients with vascular disease. The successful reduction of vascular riskfactors ultimately depends on patients' ability to actively manage their health in daily life.

Self-management

This thesis addresses the issue of self-management in patients recently diagnosed with vascular disease. In particular, we were interested in the potential of an intervention to promote self-management in assisting patients to manage their vascular riskfactors. Self-management refers to the ability to manage the symptoms and physical and psychological consequences of disease and the consequences and side effects of treatment, and to achieve lifestyle changes inherent to living with a chronic condition[11]. Efficacious self-management is

the ability to monitor one's condition and effect the cognitive, behavioural, and emotional responses necessary to maintain a satisfactory quality of life[11]. Each day patients make decisions about what they eat, whether they will exercise, and to what extent they will take the prescribed medication. For adequate self-management, patients need to be actively involved, to have or develop an adequate level of self-efficacy about daily management of the illness, and to have support from a social network[12,13].

This thesis describes the development of a self-management intervention for vascular riskfactors to encourage and support the involvement and self-efficacy of participants in their treatment. Besides adequate drug treatment of hypertension, hyperlipidaemia, and hyperglycaemia, such an intervention should have an educational element and provide feedback on individual vascular riskfactors. Patients need to be encouraged to set goals for lifestyle change, such as making healthy food choices, taking enough physical exercise, stopping smoking, and/or monitoring body weight. They also need to be encouraged to set themselves realistic goals according to their individual priorities and self-efficacy and need to receive regular feedback about the progress they are making[14]. Results from other patient groups indicate that improved self-management has a positive effect on medication adherence[8], self-care and well-being[15]. Because adherence to medication and lifestyle changes can decrease over time[16], a self-management intervention can offer new opportunities to reduce vascular risk in the long term in patients with vascular diseases.

Background

The research presented in this thesis is part of the Secondary Manifestations of ARTerial disease (SMART) study[17], a single-centre prospective cohort study among patients referred to the University Medical Centre Utrecht with recently diagnosed manifestations of vascular disease, such as cerebrovascular disease, coronary heart disease, peripheral arterial disease, or abdominal aortic aneurysm. All these manifestations of vascular disease are caused by the same general process of atherosclerosis. Patients suffering from these different manifestations of vascular disease have a comparable high risk of developing a new vascular event at the same or another site. One of the aims of the SMART study is to determine the prevalence of vascular riskfactors and other undiagnosed vascular disease in this population, using a protocol-based, multidisciplinary screening programme[18]. In addition to this screening programme, interventions for the reduction of vascular riskfactors have been developed, as are described in this thesis.

Outline of this thesis

The objective of this thesis is to study the effect of a self-management intervention on vascular risk reduction in patients with clinically manifest vascular diseases. In **chapter 2**, the theoretical background and potential of self-efficacy, as a precondition for self-management, are presented[19,20]. Self-efficacy is defined as a person's confidence to carry out self-management behaviour[12], such as taking prescribed medication, making healthy food choices, stopping smoking, and taking enough exercise. In social cognitive theory, self-efficacy is modifiable[12], and interventions to influence self-efficacy have been developed and tested based on that theory. In the study described in **chapter 3**, self-efficacy in different vascular self-management tasks was measured and related to different vascular riskfactors. In the study described in **chapter 4**, the influence of self-efficacy on achieving vascular risk reduction in patients with vascular diseases was investigated.

In clinical practice, we observed that social support could have both a positive and a negative influence. Social support is associated with morbidity and mortality in CHD[21,22], and its presence is an important precondition for successful self-management[23-26]. This concept is discussed in **chapter 5**, in which the association between social support and the change in vascular risk reduction is presented in a population with different vascular diseases is presented. In **chapter 6**, is introduced a self-management intervention for vascular risk reduction. This intervention is based on guidelines for the treatment of vascular risk factors[27] in combination with a social cognitive approach to health behavioural change, with as aim to support patient self-management and promote patient self-efficacy[19]. The effect of the intervention was assessed in terms of vascular riskfactor reduction and change in quality of life by comparing the self-management group with a usual care control group. To further clarify self-efficacy in the self-management of patients with different vascular diseases, we analysed self-efficacy in association with change in cardiovascular lifestyle in the study described in **chapter 7**. In **chapter 8**, we discuss the implications of a self-management intervention and the use of self-efficacy in patients with different vascular diseases and riskfactors.

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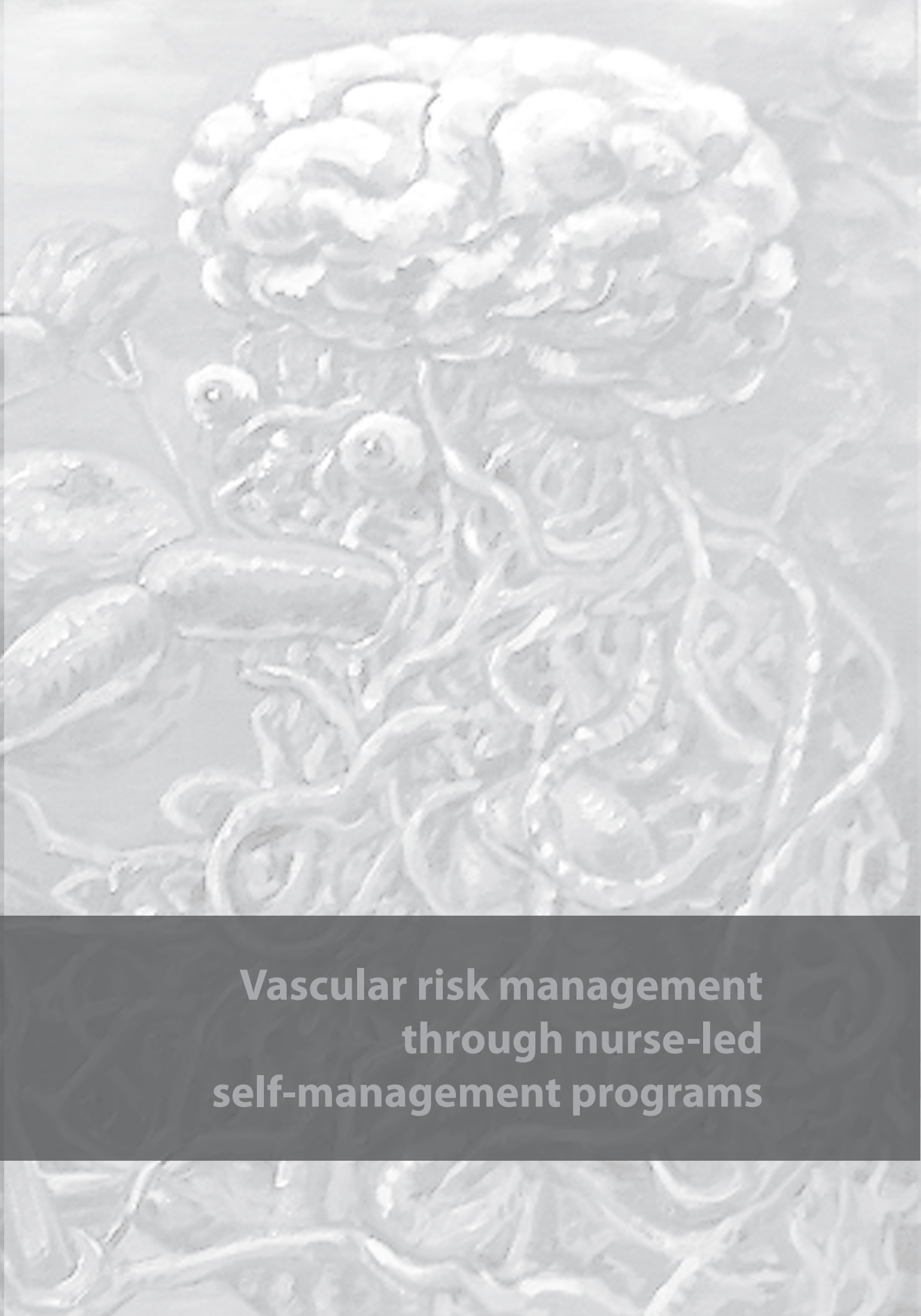

Vascular risk management through nurse-led self-management programs

Abstract

In current clinical practice, adequate cardiovascular risk reduction is difficult to achieve. Treatment is primarily focused on clinical vascular disease and not on long-term risk reduction. Pertinent to success in vascular risk reduction are proper medication use, weight control, healthy food choices, smoking cessation, and physical exercise. Atherosclerotic vascular disease and its' risk constitute a chronic condition, which poses specific requirements on affected patients and on caregivers who should be aware of the chronicity. In patients with vascular diseases, there is lack of awareness of their chronic condition because of the invisibility of most riskfactors. In other patient groups with chronic illness, self-management programs were successful in achieving behavioural change. This strategy can also be useful for patients with vascular diseases to adapt and adhere to an improved lifestyle. Self-management refers to the individual's ability to manage both physical and psychosocial consequences including lifestyle changes inherent to living with a chronic condition. Interventions that promote self-management are based on enhancing self-efficacy. In self-management attention can be given to what is important and motivational to the individual patient. In this article the challenge of nursing care promoting self-management for patients with vascular risk and how this care can be applied will be explained. Nurses can play a central role in vascular risk management with a self-management approach for patients with chronic vascular disease. In vascular prevention clinics, nursing care can be delivered that includes medical treatment of vascular risks (hypertension, hypercholesterolemia, hyperglycemia, hyperhomocysteinemia) and counselling on promoting self-management (changes on diet, bodyweight, smoking, and level of exercise). Nursing interventions based on self-management promotion can provide a new and promising approach to actually achieve vascular risk reduction.

Background

Cardiovascular disease is the primary cause of illness and death in Western societies[1]. Diagnosis and treatment modalities have improved and life expectancy has increased. As a result survival rates after a first heart attack or stroke have increased[2,3]. With this, the burden of chronic vascular disease is accumulating. Moreover, patients with established cardiovascular disease constitute a group at high risk of developing new vascular events, or death[4].

Traditional riskfactors such as hypertension, hypercholesterolemia, diabetes mellitus, obesity, and smoking account for more than 80% of all cardiovascular incidents[5]. In the setting of randomized trials, risk reduction by treatment of individual factors such as hypercholesterolemia or hypertension has proven its merits[6]. Guidelines for risk reduction are based on this evidence. In everyday clinical practice, treatment goals are not reached for substantial numbers of patients with coronary artery disease[7], diabetes[8] and hypertension[9]. In addition to treatment of individual vascular riskfactors it is shown that multifactoral treatment of riskfactors also reduces the incidence of new vascular events and mortality[10]. An explanation for the inadequacy in current risk reduction practice may be that medical specialists primarily treat a clinical manifestation of vascular disease and pay little attention to integrated care of the cardiovascular risk profile, neglecting counselling for behavioural changes. In this article the challenge of developing nursing care for this growing group of patients will be explained and how this care can be applied to the patient at increased vascular risk.

Atherosclerotic vascular disease and its risks constitute a chronic condition, with consequences for life-long attention to vascular risks. Chronic illness poses specific requirements on affected patients and on caregivers who should be aware of the chronicity of the condition. The nursing discipline is more oriented towards the individual who is chronically coping with illness, whereas the medical discipline is primarily oriented toward diagnosing and curing the disease manifestation in the acute period of the disease[11-13]. These 2 orientations make a perfect match. The doctor treats acute vascular problems and the nurse treats riskfactors, initiates behavioural change and assists in daily coping with the illness and vascular risks. Vascular prevention programs may become more effective when specific knowledge and skills from the nursing discipline are adopted and applied.

Vascular risk reduction

More than three quarters of cardiovascular disease may be explained by the presence of riskfactors such as high blood pressure, high plasma cholesterol, high plasma glucose, tobacco, use and obesity, present as a single riskfactor or in combination[14]. Therefore, vascular risk reduction can be accomplished by continued treatment of these classical riskfactors, irrespective of the site of the initial vascular lesion. Pertinent to success are proper medication use, weight control, healthy food choices, smoking cessation, and physical exercise. Prescription as well as motivation and control of continued use of appropriate drugs (eg, aspirin, statins, and Angiotensin-converting enzyme inhibitors) are of major importance in vascular risk reduction.

Patients at increased vascular risk have a condition comparable to chronic illness. The definition of chronic illness as 'irreversible disease without prospect of complete recovery with a long duration of illness on the average'[15] applies to patients with cardiovascular disease. Vascular events affect the patient's health and capabilities to adapt. Both the patient and his or her counsellors should approach the condition as such.

Living with a chronic illness implies that one has to adopt different roles[15,16]. The role of the 'sick' is often the role of a patient with acute illness and is merely a passive one. This role fits in a medical model and patients do not feel responsible for their own temporary state. The focus is on quick cure. In contrast, the roles one has to play when 'at risk' are less obvious. This requires such attitudes as active control over disease-related symptoms in a way that functioning can become as normal as possible. On the basis of the 'at risk' role, Lubkin[15] formulated the adaptive tasks for chronically ill persons in their daily life (**Table 1**). These adaptive tasks make up the content of behavioural change necessary in coping with any chronic illness. Patients with vascular diseases also have to deal with all these adaptations. There are some priorities specific to vascular risk: adequate and life-long use of medication, cessation of smoking, a healthy diet, and adequate physical activity[14]. These major adaptations in managing vascular risk are necessary for patients with vascular diseases (**Table 2**).

A specific vascular aspect is the invisibility of increased risk. This leads to poor feedback mechanisms in vascular risk management. For instance, high blood pressure rarely causes signs or symptoms and patients are often unaware of this riskfactor. High cholesterol and mild elevations in blood glucose can easily go unnoticed, only a blood test can reveal this. Patients do not experience symptoms and do not feel ill (see case history). The 10-year life expectancy in vascular patients is comparable to that in patients with certain

Table 1 *The adaptive tasks for chronically ill persons in their daily life*

prevention of medical crises
attention for changes
prevention of complications
adaptation to the disease-process
early recognition and handling of signs and symptoms
correct use of medication
management of urgent situations
management of food and diet
preservation of adequate physical activity
cessation of smoking
stress management
effective communication with caregivers
effective management of social and financial resources
adaptation to work
re-organization of housekeeping
dealing with significant others
prevention of social isolation
management of psychological reactions in illness
coping with pain.

Table 2 *Major adaptive tasks for vascular chronic patients*

continued and adequate use of medication
following a healthy food pattern
cessation of smoking
stress management
early recognition and handling of symptoms
effective communication with caregivers
maintaining ample physical exercise.

types of malignancies, but the perceived risk differs largely between these groups. Unawareness, low feedback and little immediate health benefit are characteristics of the 'at risk' state in patients with vascular disease. Despite this, every patient with vascular disease is expected to be in charge of his or her daily choices, including risk behaviour. Therefore a patient should be made aware of the concept of chronicity of vascular risk first, and subsequently be guided on managing the adaptive tasks of the condition.

Self-management

Self-management refers to the individual's ability to manage symptoms, treatment, physical and psychosocial consequences, and lifestyle changes inherent in living with a chronic condition. Efficacious self-management encompasses the ability to monitor one's condition and to affect the cognitive, behavioural and emotional responses necessary to maintain a satisfactory quality of life[17]. Some conditions for self-management by a patient are; active participation; high level of knowledge of the illness; competence in management and insight in the changes of daily life[18,19] the ability to make decisions[20] and support of a social network.

According to Wagner and colleagues[20], four elements are essential for the organization of successful self-management programs(1) a **cooperative** problem definition (by both patient and provider); to enhance patient's participation: (2) to set realistic and personalized **goals** guided by patients' willingness for change and self-efficacy; (3) to **support** in behavioural change, exercise options and interventions to deal with the emotional demands of chronic disease (see case history); and (4) to initiate an active and sustained provider initiated **follow up**.

Empowering patients by enhancing self-management skills is successful in different groups of chronically ill patients. In patients with rheumatoid arthritis, self-management interventions are effective in reducing joint pain and inflammation, and improved mobility[21]. In patients with asthma, self-management interventions improve effective medication use[22]. In patients with diabetes mellitus, interventions to promote active participation of patients, increase short-term results in glycemic control[23] and improve quality of life[24]. Meta-analyses of studies assessing compliance with cardiovascular prevention[25] reveal that interventions become more effective with active participation of patients. The recently published meta-analysis on home monitoring blood pressure control[26] confirms this. Apart from illness-specific needs such as management of symptoms and medication use, most components of self-management are generic and can be applied to a wide range of chronic conditions[17].

The self-efficacy theory accounts for healthy behaviour and facilitates positive changes by focusing upon empowering self-management[27]. The theory is that self-efficacy, defined as one's confidence to carry out behaviour necessary to reach a desired goal, is the most important condition for successful behavioural change. This means that interventions aimed at improving self-management skills should contain specific elements directed towards enhancement of self-efficacy[28]. Interventions based on self-efficacy are providing mastery experiences by focusing on successful behaviour and setting reachable goals;

role modelling; and giving feedback on the progress patients make in controlling their vascular risk. Conditions facilitating and promoting self-efficacy are increased knowledge of riskfactors, effective social support, and high motivation on changing behaviour[29](see case history).
Compliance can decline over time, especially with more complex therapeutic regimens[30]. Adherence to (life long) medication and life-style changes can become minimal[5,25]. Self-management seems to be the best way to consolidate adherence to behavioural changes and medical treatment in the long term.

Nursing care on self-management of vascular risk

The nursing domain is oriented towards the person coping with the illness[13]. This makes the nurse well equipped for guiding and coordinating the process of behavioural change and promoting self-management of vascular risk. Interventions based on self-efficacy can promote self-management, in cooperation with both patients and care providers, in a setting in which long-term support and follow up are warranted[20].
Specific problems in care for patients with vascular diseases, such as lack of awareness, low feedback on invisible risk-factors, and little immediate health benefit, may be addressed and defined. The following nursing interventions will be developed:

- In negotiation with the patient, setting of realistic goals to facilitate active participation, thereby creating awareness, self-efficacy, and motivation with the prospect of attainable success.
- Giving feedback and evaluate progress in controlling riskfactors by discussing visible treatment results, such as measured blood glucose level, cholesterol, body weight and blood pressure, and make a link between these results and levels of physical fitness and overall well-being, to promote awareness of the risk-benefit exchange.
- Improving knowledge of riskfactors by providing information and education on atherosclerosis and vascular risk in general, and on specific items pertinent to the individual, to clarify the connection between riskfactors and chances of future vascular events.
- Stimulating effective social support by cooperating with important members of the social circle of the patient, or by searching for opportunities to create social supporters. Social support is strongly related to behaviour change by reducing smoking, increase exercise and choosing healthy food[25].
- Being supportive by initiating and organizing follow up.

- Facilitating motivation by respecting and offering space for individual choices and priorities.
- Making use of the more visible components of vascular risk reduction such as physical conditioning and controlling weight as measures to improve well-being.

In association with medical specialists and other care providers, the nurse can integrate the behavioural change interventions with medical treatment protocols. In this way, nurses coordinate all vascular care around the patient in combination with promoting self-management of vascular risk[20]. Until recently, nurse-led studies[31-34] focus on single (medically defined) riskfactors instead of a more integrated approach of vascular risk reduction. In following an integrated approach, the nurse can set priorities for subsequent treatment goals if necessary. Successful treatment of hypercholesterolemia and high blood pressure as a first step may motivate a patient to initiate behavioural change. Interventions that promote self-management can open the way to important issues for patients and support a motivated change (eg, see Case History). Successful self-management can therefore lead to long-term results in more challenging lifestyle changes such as weight reduction and smoking cessation.

Conclusion

In current clinical practice, optimal reduction of vascular risk by treatment of hypertension, hypercholesterolemia, hyperglycemia, and hyperhomocysteinemia, and initiating lifestyle changes (eg, weight reduction, smoking cessation, and exercise program) are often not achieved, and therefore new strategies need to be evaluated. Vascular diseases and vascular risk are merely chronic conditions and should be approached as such by patient, nurse, and doctor. The patient should be more aware of vascular risk and be guided on self managing them. The nurse can administer treatment and counselling on self-management to reduce the risk for patients with chronic vascular illnesses and call the doctor to diagnose and treat acute vascular problems. The self-management approach of vascular risk provides a platform for important aspects of vascular risk reduction such as awareness of the chronic aspects of the disease, invisibility of riskfactors, importance of long-term results, need for active participation, and individual priorities in goal setting. Nursing interventions that promote self-management enhance self-efficacy and can lead to better vascular risk reduction. Future research is needed to demonstrate the effects of increased self-management on vascular risk reduction.

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Case History

Mr. E. is a 62-year-old man who migrated from Turkey to the Netherlands 42 years ago. He is married and has 5 adult children. He lives in an apartment in a small town and every day he visits the mosque and the teahouse. He had to stop working 30 years ago because of arthritis in both hips. He sustained a first heart attack in 1993, followed by Percutaneous Transluminal Coronary Angioplasty in 1996. He has been treated for type 2 diabetes mellitus, hypercholesterolemia and hypertension for several years.

Intermittent claudication and symptoms of transient ischemic attacks developed in 2002. Because of this, he participated in a vascular screening program, and occlusion of a carotid artery was detected. He smoked 20 cigarettes per day, his body mass index (BMI) was 31, and he had poor diabetic control with persisting hypertension, hypercholesterolemia, and microproteinuria. With this risk profile he came to the nursing clinic for cardiovascular risk management. Mr E. and the nurse agreed to give priority to stop smoking (cooperative problem definition) but medical treatment of his hypercholesterolemia, hypertension, and diabetes was also part of the agreement. Mr E. had not succeeded in previous attempts to stop smoking because he was surrounded by friends who smoked. He finally decided to quit smoking during Ramadan, expecting it would be less difficult then (realistic and personalized goal). He was also encouraged to train and increase his walking distance. This combination provided much positive feedback, because smoking cessation apparently had a positive effect on his ability to walk. He covered the distance of 8 km to the mosque partly by car, partly by foot, and gradually increased his walking distance (mastery experiences).

The presence of cardiovascular riskfactors was not his biggest worry. His main problem was dissatisfaction with his sexual functioning. He felt free to discuss this problem with the nurse (supportive relation), who coached and advised him on possible further treatment of his erectile dysfunction and stimulated him to work on his physical condition and functioning. Meanwhile he continued to refrain from smoking and to increase his walking distance. After a holiday in Turkey he noticed his health and general condition were improved. He also noticed a more satisfying sexual performance (positive feedback). These visible and important results motivated him to go on and further improve his lifestyle (personal goal).

One year later Mr E. still does not smoke, his cholesterol levels are within target range, and his blood pressure is now 135/70. His BMI had increased slightly after cessation of smoking, but is now back to 30. Microproteinuria has decreased but glucose levels can still be better. He recently started swimming once per week to further decrease his BMI and enhance his fitness.

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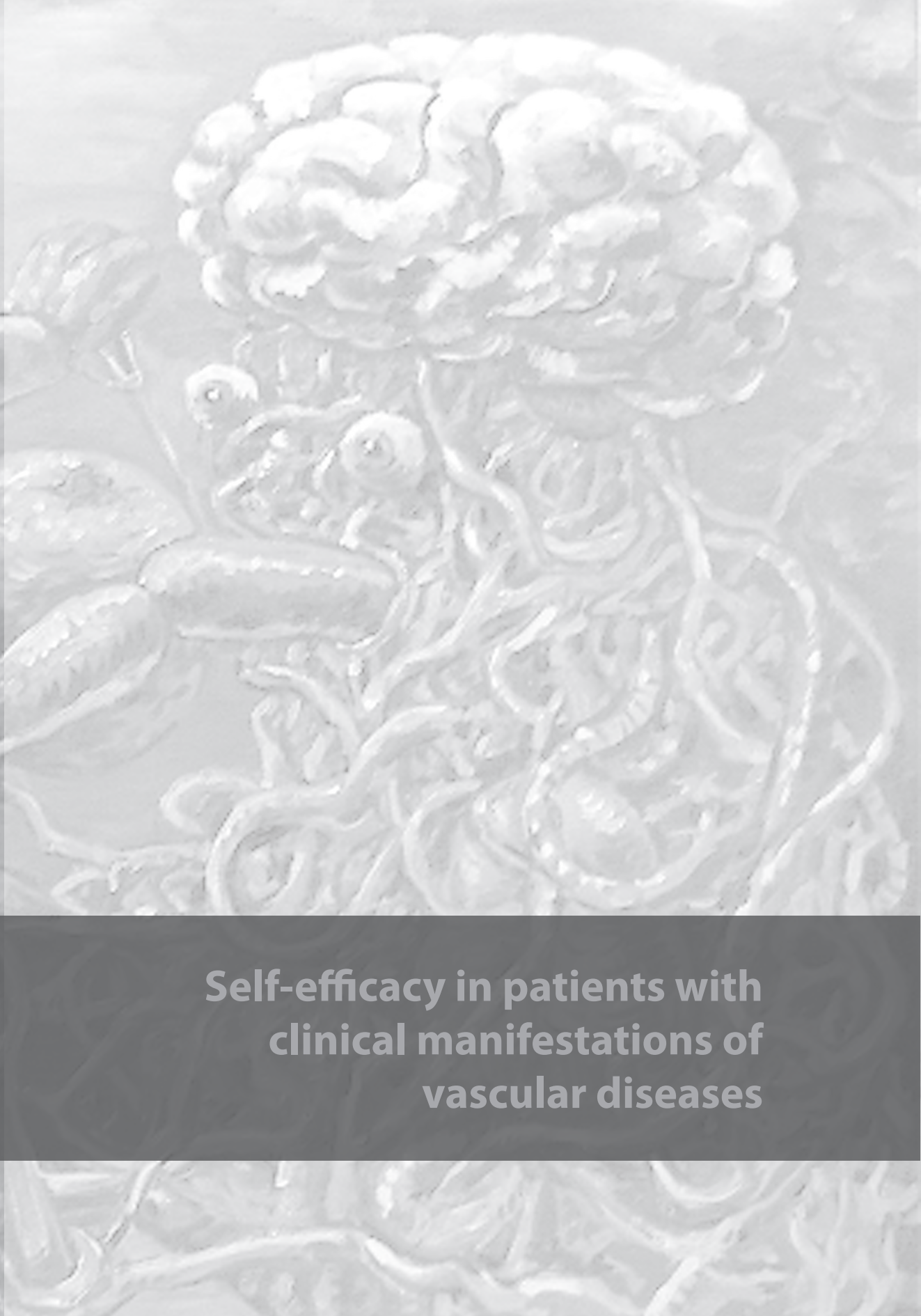

Self-efficacy in patients with clinical manifestations of vascular diseases

Abstract

Background

Patients with established cardiovascular disease are at high risk of developing new vascular events or death. This risk can be reduced by lifelong treatment of riskfactors and by permanent changes in lifestyle. Self-efficacy is important for achieving behavior change by self-management. The self-efficacy of different vascular riskfactors subgroups in patients with clinical manifestations of atherosclerotic vascular diseases was investigated.

Methods

From January 2001 until September 2003, 192 patients with recently established clinically manifest atherosclerotic disease with >2 modifiable vascular riskfactors were selected for the study. The mean self-efficacy scores were calculated for vascular riskfactors (age, sex, vascular disease, weight, diabetes mellitus, smoking behavior, hypercholesterolemia, hypertension, and hyperhomocysteinemia).

Results

Diabetes, overweight, and smoking, but none of the other riskfactors, were significantly associated with the level of self-efficacy in these patients.

Conclusions

Patients with vascular diseases appear to have high levels of self-efficacy regarding medication use, exercise, and controlling weight. In patients with diabetes, overweight, and in smokers, self efficacy levels were lower.

Practice implications

In nursing care and research on developing self-efficacy based interventions, lower self-efficacy levels can be taken into account for specific vascular patient groups.

Introduction

Cardiovascular diseases are the primary causes of illness and death in Western societies[1], and patients with established cardiovascular disease are at high risk of developing new vascular events or death[2]. Optimal treatment of vascular riskfactors is usually done by a combination of medication use and lifestyle changes (stop smoking, healthy food choice, loose weight, more exercise, and adequate lifelong use of medication)[3]. Randomized trials have shown that risk reduction by treatment of individual factors, such as hypercholesterolemia or hypertension, is effective[4-6], and current guidelines for risk reduction are based on this evidence[7]. In everyday clinical practice, a substantial proportion of patients do not meet their treatment goals[8]. It is difficult to change health behavior because such change requires specific self-management skills[9]. Self-management refers to the individuals ability to manage symptoms, treatment, physical and psychosocial consequences, and lifestyle changes inherent to living with a chronic vascular condition[10]. Self-efficacy, defined as a person's confidence to carry out behavior necessary to reach a desired goal[9], is an important precondition for successful self-management and behavior change. Indeed, perceived self-efficacy is the strongest predictor of a person's ability to change risky health behaviors by taking personal action[11]. Self-efficacy is a causal mechanism in health promotion, and modulation of self-efficacy has proven to be effective in modifying health behavior in patients with epilepsy and overweight and in healthy individuals of different ages[12-19]. In the treatment of vascular illnesses medical specialists and patients are often focused on the acute vascular problem and not on the underlying atherosclerotic process. For example after vascular surgery is performed, the patient (and doctors) tend to think that the vascular problem is "over". In general, it seems that vascular patients do not consider themselves as chronic patients, in need for chronic self-management to reduce vascular risk.

From observations in daily clinical practice, invisibility of increased risk seems negatively influencing self-management. For instance, high blood pressure rarely causes signs or symptoms, and patients are often unaware that they have a high blood pressure[20]. High cholesterol levels and slightly increased blood glucose levels can easily go unnoticed, people do not experience symptoms and do not feel ill[21]. This leads to poor feedback mechanisms in vascular risk management. During treatment, this lack of awareness is also influential because people cannot "see" that reducing blood pressure, glucose or cholesterol levels reduces vascular risk. Feedback, by means of home monitoring blood pressure, can promote awareness about hypertension[22]. The question arises

whether this invisibility (unawareness) is associated with self-management in patients with vascular disease.

All patients should be responsible for their daily choices, including risk behavior, and thus it may be necessary to make them aware of the concept of chronicity of disease risk and to help them deal with the changes associated with their condition. Little is known about relations between self-efficacy and riskfactors in patients with vascular diseases. Yet this information is important for developing specific interventions to promote self-management and reduce vascular risk in patients at high risk of developing (new) vascular events. In the present study, we investigated self-efficacy in different riskfactor subgroups of patients with clinical manifestations of vascular diseases.

Methods

In this cross-sectional study, baseline data of a randomized controlled trial were used. In this study, 236 patients with recently established clinically manifest disease (cerebrovascular, abdominal, or peripheral arteries) who entered the vascular prevention program (Secondary Manifestation of ARTerial diseases: SMART) at the University Medical Center (UMC), Utrecht, were selected if they had more than 2 modifiable vascular riskfactors: hypertension (>140/90 mmHg), hypercholesterolemia (total cholesterol >5.0 mmol/l or LDL cholesterol >3.2 mmol/l), diabetes (earlier diagnosed or glucose >7.0 mmol/l), overweight (body mass index (BMI) >25 kg/m^2), hyperhomocysteinemia (male >18.7 µmol/l, female >16.2 µmol/l), or smoking.

The SMART study is an ongoing prospective cohort study in patients referred to the UMC, Utrecht, with a manifest vascular disease and/or poorly controlled vascular riskfactors. In the vascular prevention program, baseline data were collected by blood and urine tests, ECG, a questionnaire and non-invasive measurements of arteries by ultrasound[7,23]. Patients under 80 years of age without terminal malignant disease, independent in daily activities and capable to read and write Dutch can participate.

At baseline, the following information was collected: history of vascular diseases; use of medication; blood pressure; weight and height; total cholesterol, LDL cholesterol, triglyceride, HDL cholesterol, homocysteine; glucose concentrations; and smoking behavior. Self-efficacy was measured with the adapted Diabetes Mellitus type II Self Efficacy Scale[24]. This scale measures the level of confidence people have about their ability to take the medication as prescribed; to stop smoking; to choose healthy food; to take a proper amount of exercise; and to control their weight. The 9 item questionnaire is scored on a 5-point Likert sca-

le[12] (**Table 1**). The higher the score, the better the self-efficacy (5.0); the lower the score, the lower the self-efficacy (1.0). To reduce the influence of socially desirable responses the questionnaires were sent by mail with an accompanying letter explaining that there were no right or wrong answers and that answers were not shared with the treating doctor or nurse. The accompanying letter was signed by a research nurse, who was not involved in the actual care.

Table 1 *Self-efficacy questionnaire on health behavior for vascular patients*

Self-efficacy questions	Answer categories
I think I am able to	
-take my medication as prescribed	1 2 3 4 5
	yes/ probably yes/maybe / probably not/ no
-quit smoking	1 2 3 4 5
	yes/ probably yes/maybe / probably not/ no
-choose healthy food	1 2 3 4 5
	yes/ probably yes/maybe / probably not/ no
-choose healthy food when I am not at home	1 2 3 4 5
	yes/ probably yes/maybe / probably not/ no
-take the proper amount of exercise	1 2 3 4 5
	yes/ probably yes/maybe / probably not/ no
-take extra exercise	1 2 3 4 5
	yes/ probably yes/maybe / probably not/ no
-control my weight	1 2 3 4 5
	yes/ probably yes/maybe / probably not/ no
-lower my weight	1 2 3 4 5
	yes/ probably yes/maybe / probably not/ no
-control my vascular disease	1 2 3 4 5
	yes/ probably yes/maybe / probably not/ no

The self-efficacy questionnaire we used is based on a questionnaire developed for patients with type 2 diabetes. Reliability of the questionnaire in vascular patients was tested with Cronbach's alpha. For the 9 items in the questionnaire the alpha was 0.78. Because not all the patients were smoking, we also calculated the alpha leaving out the smoking question: alpha was 0.82. This is a sufficient value for comparing groups[25]. Compared to other self-efficacy questionnaires, this questionnaire is rather short and does not take into account all dimensions of behavior in the different themes such as medication use, exercise, smoking, food choice, and weight. However, we chose to use this scale because of the

similarity of its self-management content for patients with chronic vascular diseases and type 2 diabetes[26]. Self-efficacy is usually measured in questionnaires developed for specific patient groups[15,18]. Most self-management tasks are universal for all chronic illnesses[7,23]. For that reason we measured self-efficacy in general self-management tasks[21].

SPSS 10.0 software was used for data entry and statistical analyses. The mean self-efficacy scores were calculated for subgroups based on age, sex, vascular disease, weight, diabetes mellitus, smoking behavior, hypercholesterolemia, hypertension, and hyperhomocysteinemia. The Kruskal-Wallis test was used to determine statistically significant differences between 3 answer categories (weight: BMI <25; between 25-30; >30, or age: <55; 56-65; >65 years, vascular disease: peripheral; cerebrovascular; abdominal, and smoking: actual smoker; former smoker; non-smoker). The Mann-Whitney test was used to determine statistical significant differences in the subgroups with two answer categories (Yes/No on diabetes, hypertension, hypercholesterolemia, hyperhomocysteinemia, known vascular disease, and male or female).

Results

One hundred ninety two patients (149 men) participated: 123 (64%) were younger than 65 years (**Table 2**). All patients were recently diagnosed with clinically manifest vascular disease (39% cerebrovascular disease and 43% peripheral artery disease) and more than 50% of the patients were also known with a history of vascular disease. More than 30% of the patients had diabetes mellitus, 62% had hypertension, and more than 60% was overweight (BMI >25). Ninety-two percent of the population had a history of smoking and 33% were current smokers. The prevalence of hyperlipidemia was 80%.

The overall medication self-efficacy score was 4.8 and that for exercise self-efficacy was 4.1 (**Table 3**). The mean smoking self-efficacy score was 3.6, the lowest score overall. Although women scored 0.25 lower than men on smoking cessation self-efficacy, there were no significant differences between the sexes. Younger patients (<55 years) scored significantly higher than older patients on medication self-efficacy (p=0.008). Vascular riskfactors such as hyperlipidemia, hyperhomocysteinemia, and hypertension did not significantly influence the mean self-efficacy score, and neither did previous vascular disease. Diabetes was significantly related to self-efficacy (**Table 4**). Patients with diabetes had a lower mean self-efficacy score for exercise (3.0) than did patients without diabetes (4.2) (p = 0.05). They also had a lower mean efficacy score for controlling weight than did patients without diabetes (3.7 versus 4.1, p= 0.01) (**Table 4**).

Table 2 *Baseline characteristics of the study population (n=192)*

Male sex (%)	77
Age (years)	61±10
Body mass index (kg/m^2)	27±4
Actual smoking (%)	33
Ever smoking (%)	92
Never smoking (%)	8
Vascular history (%)	59
Cerebrovascular disease (%)	39
Abdominal aortic aneurysm (%)	15
Peripheral arterial disease (%)	43
Diabetes mellitus (%) [a]	33
Hypertension (%) [b]	62
Hypercholesterolemia (%) [c]	81
Hyperhomocysteinemia ♂ (%) [d]	17
Hyperhomocysteinemia ♀ (%) [e]	11
Overweight (%) [f]	61

Data represent mean ± SD or percentages
a Glucose level > 7.0 mmol/L or use of glucose-lowering agents
b > 140/90 mmHg or use of anti-hypertensive drugs
c Total cholesterol level > 5.0 mmol/L or LDL-cholesterol > 3.2 mmol/L or use of lipid-lowering agents
d Homocysteine level > 18.7 (µmol/l)
e Homocysteine level > 16.2 (µmol/l)
f Body mass index > 25.0 kg/m2

Table 3 *Mean self-efficacy N = 192*

Self-efficacy	**mean**
I think I am able to:	
take my medication as prescribed	4.8
quit smoking	3.6
choose healthy food	3.8
take the proper amount of exercise	4.1
control my weight	4.0

Table 4 *Relation between self-efficacy and BMI, diabetes and smoking*

Self-efficacy	BMI kg/m²			Diabetes mellitus[a]		Smoking[b]		
	<25 (n=90)	25 – 30 (n=70)	>30 (n=32)	no (n=123)	yes (n=59)	actual (n=65)	ever (n=99)	never (n=19)
I think I am able to:								
take my medication as prescribed	4.7	4.8	4.8	4.8	4.8	4.8	4.8	4.9
quit smoking	3.6	3.7	3.6	3.6	3.7	3.1	4.3	--***
choose healthy food	4.0	3.7	3.3**	3.8	3.5	3.7	3.7	3.9
take the proper amount of exercise	4.2	4.0	3.9	4.2	3.0*	4.0	4.1	4.1
control my weight	4.3	3.8	3.5***	4.1	3.7**	4.1	3.9	4.0

a blood glucose > 7.0 mmol/l or use of glucose-lowering agents.
b actual smoker, ever smoker or never smoked
**** p<0.001 **p=0.01 *p=0.05*

Table 5 *Self-efficacy mean scores of vascular patients with and without diabetes mellitus, reported according to body mass index (BMI) and smoking history*

Self-efficacy	No diabetes mellitus[a] (n = 123)					Diabetes mellitus[a] (n = 59)				
	BMI			Smoking[b]		BMI			Smoking[b]	
	<25 n=63	25 – 30 n=44	>30 n=16	no n= 74	yes n= 49	<25 n=21	25 – 30 n=23	>30 n=15	no n =43	yes n = 14
I think I am able to:										
take my medication as prescribed	4.8	4.9	5.0	4.8	4.8	4.9	4.7	4.7	4.7	4.9
quit smoking	3.6	3.7	3.4	4.3	3.2****	3.5	4.0	3.7	4.2	2.8***
choose healthy food	3.9	3.7	3.8	3.9	3.7	3.9	3.7	2.8**	3.3	4.0
take the proper amount of exercise	4.2	4.2	4.1	4.2	4.1	4.1	3.7	3.9	4.0	3.9
control my weight	4.4	3.9	3.9**	4.1	4.2	4.1	3.7	3.3	3.5	4.3*

a blood glucose > 7.0 mmol/l or use of glucose-lowering agents.
b smoker and non smoker.
***** p<0.001 ***p=0.002 **p=0.02 *p=0.03*

Patients who were overweight scored significantly low on controlling weight (3.8 and 3.5, $p < 0.001$) and choosing healthy food (3.7 and 3.3, $p = 0.01$) than did patients who were not overweight (4.3 and 4.0, respectively) (**Table 4**). The self-efficacy score for stopping smoking was significantly lower for actual smokers (3.1) than for previous smokers (4.3, $p<0.001$) (**Table 4**). Duration of smoking was not significantly related to the self-efficacy level. The actual smokers (65 patients) in our study population were divided in tertiles (< 35 years smoking; between 36 and 45 years smoking and up to 45 years). The self-efficacy score on stopping smoking was 3.1, 3.0, 3.3 (not in a table).
Smoking self-efficacy was significantly low in all smokers (**Table 5**). Smoking diabetic patients had significantly lower self-efficacy scores for quit smoking (2.8 versus 4.2, $p= 0.002$) and higher scores for controlling weight (4.3 versus 3.5 $p = 0.03$) than non-smokers with diabetes. This was also seen for the combination diabetes and weight: overweight diabetic patients had significantly lower self-efficacy scores for choosing healthy food (2.8, $p=0.02$) than patients with diabetes and a BMI <25 (3.9).

Discussion and Conclusion

Discussion

The relation between self-efficacy and vascular risk is important for developing specific interventions aimed at vascular risk reduction by increasing self-management in patients at high risk of developing (new) vascular events. We investigated the self-efficacy of patients with clinical manifestations of vascular diseases with regard to riskfactors. Having diabetes, being overweight and smoking were significantly associated with lower levels of self-efficacy; none of the other vascular riskfactors were associated with self-efficacy.
These findings support the idea that 'visible risk' factors, such as overweight, smoking, and a known chronic illness, such as diabetes are associated with the level of self-efficacy in vascular patients. Diabetes self-efficacy is associated with the change in self-management behavior caused by the diagnosis of diabetes[24]. Remarkably, an earlier diagnosis of vascular disease, the location of vascular disease, gender and 'invisible' riskfactors, such as hyperlipidemia, hyperhomocysteinemia, and hypertension, were not associated with the level of self-efficacy, even though self-management behavior is equally important for vascular patients as for patients with diabetes, these chronic patients must manage the same vascular riskfactors. Patients with vascular disease seem to be less aware of the chronic character of their illness when it comes to medication compliance[27].

The self-efficacy of overweight patients to choose healthy food is important because it is related to success in the dietary treatment of elevated cholesterol levels or attrition from weight loss programs[13]. Both items interfere with vascular risk reduction and should be taken into account[17]. In reducing vascular risk by dietary measures, a distinction should be made between treatments to reduce cholesterol levels and treatments to reduce the calorie intake, because more than 50% of patients with overweight also have hypercholesterolemia. The significant difference in self-efficacy in controlling weight between diabetic smokers and non-smokers confirms that these items are related and can influence each other.

We found the self-efficacy of current smokers to stop smoking to be low compared to ever smokers. It is known that patients with low self-efficacy are less likely to successfully stop smoking compared to individuals with a higher self-efficacy[11]. The change in the smoking population (from 92% ever smoked to 33% currently smoking) could be related to reported lifestyle changes made prior to the study by former smokers, which may have affected their self-efficacy-levels. These changes could be based on recent physician's advice[28], public campaigns, health warnings or other sources. In perceptions and behavior, other variables such as hardiness, readiness, depression, stress and coping can also influence behavior[29,30]. In this study only self-efficacy levels were measured, because in contrast to most other variables, self-efficacy is easily measurable and can be influenced by interventions[9,10,31-33].

In this cross-sectional study, we could not distinguish between cause and effect in the observed association between self-efficacy and age, weight, diabetes, and smoking status. However, the study represents a first step in investigating the relation between riskfactors and self-efficacy in patients with vascular diseases.

Conclusion

Patients with vascular disease appear to have high self-efficacy in medication use, exercise, and controlling weight. In patients with diabetes, overweight and in smokers, self-efficacy levels were associated with vascular riskfactors. Self-efficacy levels were lower on specific themes. Patients with diabetes had lower self efficacy levels on performing the proper amount of exercise and on controlling their weight. Patients with overweight had lower self-efficacy on choosing healthy food and on controlling their weight. Smokers had lower self-efficacy levels on stopping smoking. Combinations of these specific vascular riskfactors were associated with lower self-efficacy levels. Patients with

diabetes and overweight had lower self-efficacy levels on choosing healthy food and smokers with diabetes scored even lower on stopping smoking.
Further research is needed to learn more about the relation between effective self-efficacy levels and self-management of vascular illnesses. Influence of actual medication use and other behavior needs further attention. Future research may also be focused on the relation between visibility and awareness of vascular riskfactors and self-management.

Practice implications

Several studies show that behavioral changes can be accomplished in different patient groups when self-efficacy levels are good10-18. Self-efficacy scores provide information about the likelihood of success of self-management tasks in patients with vascular diseases. In promoting self-management, healthcare nursing staff can influence self-efficacy by providing patients with visible physiological information and information about their performance accomplishments, by allowing patients to report on experiences, and, when necessary, by using verbal persuasion9,31. High self-efficacy is a precondition for successful self-management. Interventions to use these successes can improve lower self-efficacy in other specific themes. In general, interventions to promote self-management on medication use, exercise, and controlling weight are potentially successful in patients with vascular diseases because their mean self-efficacy level is high.

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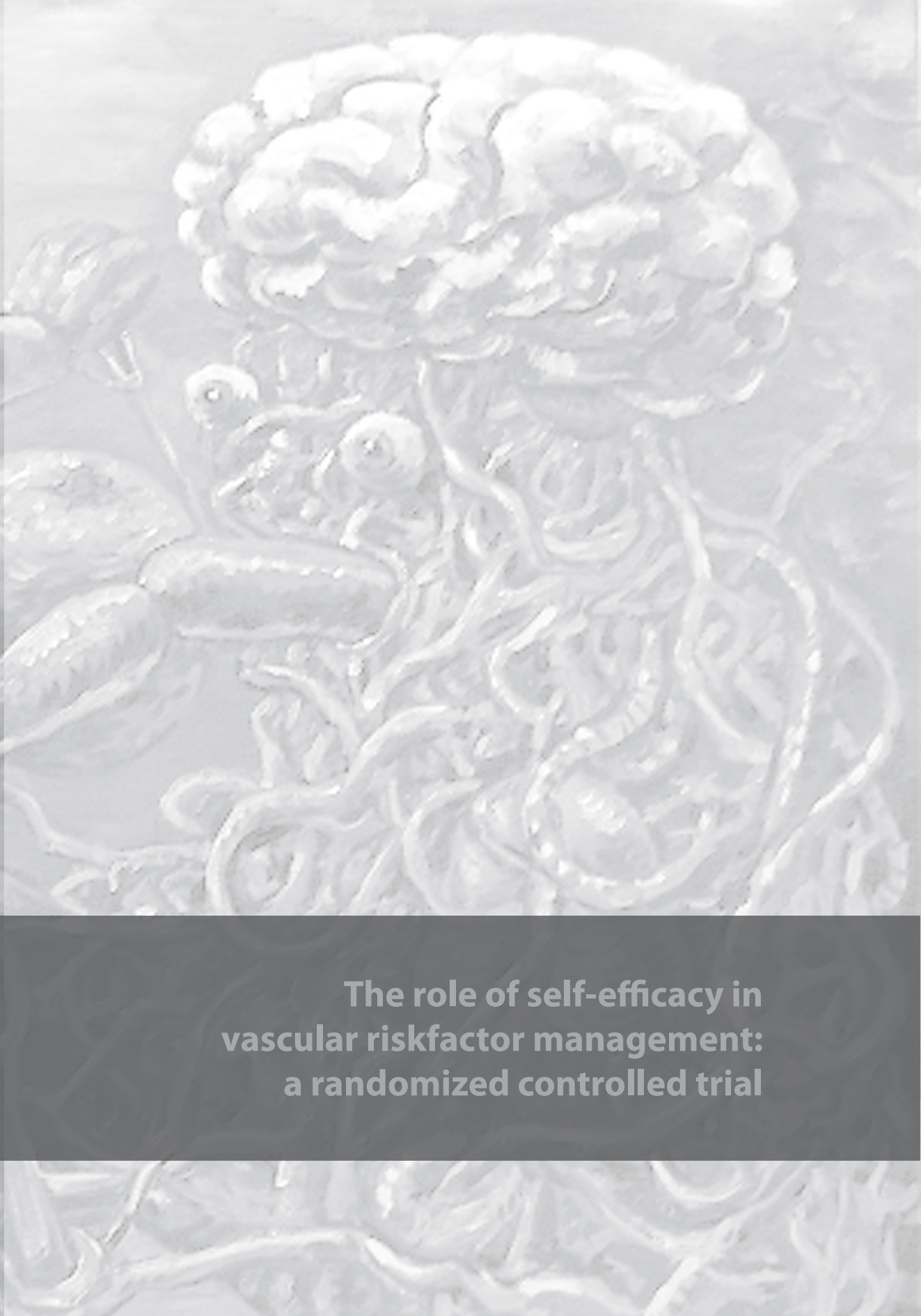


The role of self-efficacy in vascular riskfactor management: a randomized controlled trial

Abstract

Background

Given the large number of patients at high risk of vascular events, new strategies are needed to reduce vascular risk. We investigated whether self-efficacy promotion could change self-efficacy levels in patients with vascular diseases and whether baseline self-efficacy and changes in self-efficacy were related to changes in vascular riskfactors.

Methods

153 recently referred patients with symptomatic vascular diseases (cerebrovascular, abdominal, or peripheral arterial) participated in a randomized trial investigating the effect of nursing care, as compared with usual care, on vascular riskfactors. Nursing care consisted of self-efficacy promotion and medical treatment of vascular riskfactors. Self-efficacy and vascular riskfactors (smoking, BMI, waist, blood pressure, lipid, and glucose levels) were measured at baseline and after 1 year.

Results

While total self-efficacy did not change over the 1-year intervention period in either treatment group, self-efficacy in choosing healthy food (mean +0.4 ±1.4, p-value 0.01) and in doing extra exercise (mean +0.3 ±1.3, p-value 0.03) increased in the intervention group. No relation was seen between baseline total self-efficacy or change in composite self-efficacy and change in vascular riskfactors.

Conclusion

The nursing intervention did not influence total self-efficacy but did improve self-efficacy in choosing healthy food and doing extra exercise. Change in composite self-efficacy was not related to change in vascular riskfactors in patients at high risk of developing (new) cardiovascular diseases.

Practice implications

Influencing self-efficacy in choosing healthy food and doing extra exercise could be incorporated in vascular risk reduction programs in addition to medical treatment of vascular riskfactors.

Introduction

As a result of improved treatment, survival rates after myocardial infarction and stroke have increased in the last decade[1-3]. Therefore, the number of patients with vascular diseases is increasing and these patients are at high risk of developing subsequent non-fatal and fatal vascular events[4]. Vascular risk reduction can be accomplished by lifelong medical treatment of riskfactors (hypertension, hypercholesterolaemia, diabetes) and by permanent changes in lifestyle (stopping smoking, weight loss, healthy food choice, increased physical activity)[5].

In clinical practice, current healthcare strategies, such as pharmacotherapy, often fail to achieve the optimal vascular risk reduction as described in national and international treatment guidelines[5, 6]. As a consequence, and also because of the large number of high-risk patients, new effective and efficient strategies to achieve behavioural change (and hence vascular risk reduction) need to be developed. A prerequisite for successful and sustained vascular risk reduction is the active participation of high-risk patients, who need to become confident in their ability to adhere to medication and to sustain lifestyle changes in daily life. Indeed, these are the main disease-specific self-management tasks for patients with chronic vascular diseases[7]. Self-management refers to the individual's ability to manage symptoms, treatment, physical and psychological consequences, and lifestyle changes inherent to living with a chronic condition[8], such as established vascular disease.

Self-efficacy, defined as a person's confidence to carry out the behaviour necessary to reach a desired goal, is an important precondition for successful self-management and behavioural change[7, 9]. An improved self-efficacy leads to better self-management outcomes, increases life-expectancy, reduces the use of medical services[10, 11], and modifies health behaviour[12-20]. Whether self-efficacy influences vascular risk reduction is not known. In the present study, we investigated whether a nursing intervention to promote self-efficacy can change the level of self-efficacy in patients with clinically manifest vascular disease, and whether baseline levels and changes in self-efficacy are related to changes in vascular riskfactors.

Methods

Design and study population

This study is part of the Vascular prEvention by NUrses Study[21] (VENUS), a randomized trial investigating whether vascular riskfactor self-management in a hospital setting is improved by additional nursing care compared to usual care alone. A detailed description of the VENUS study design and results is published elsewhere[21]. Briefly, participants referred with cerebrovascular disease, abdominal aortic aneurysm (AAA), or peripheral arterial disease (PAD) were asked to participate in the VENUS study if they were younger than 80 years of age, without terminal malignant disease, independent in daily activities, able to read and write Dutch, and had at least two or more modifiable vascular riskfactors, namely, hypertension (>140/90 mmHg), hypercholesterolaemia (total cholesterol >5.0 mmol/l and / or low-density lipoprotein (LDL) cholesterol >3.2 mmol/l,) diabetes mellitus (use of glucose-lowering agents), overweight (body mass index (BMI) >25 kg/m^2), waist (<102cm (♂) + <88 cm (♀)), or current smoking. Patients were randomized (1:1) to care delivered by nurse practitioners or to usual care.

Usual care of vascular riskfactors

Before participating in the VENUS study, the patients were screened for vascular riskfactors as part of the Secondary Manifestations of ARTerial diseases (SMART) programme[22]. Evidence-based treatment recommendations according to the Third Joint Task Force of European Societies[5] were given for the management of individual riskfactors and/or vascular disorders by a multidisciplinary team of vascular specialists. The results of the vascular screening programme and the individualized treatment recommendations were reported in writing to the treating vascular specialist. In this study, the reports were sent to the treating vascular surgeon or neurologist and to the general practitioner, all of whom used the same guidelines on cardiovascular disease prevention[5], with further action being left to their discretion. Patients in the usual care group did not undergo specific interventions to improve self-efficacy or self-management.
After 1 year, all patients were asked to return for a follow-up visit, for the measurement of vascular riskfactors (BMI, blood pressure, waistline, fasting total cholesterol, HDL cholesterol, triglycerides, and glucose levels) and self-efficacy.

Intervention

Patients in the intervention group were invited to visit the recently established outpatient clinic for vascular risk reduction, which is run by nurse practitioners who provide medical treatment and nursing care focused on reducing vascular risk. The aim is to encourage active participation and self-management in patients by promoting self-efficacy. Self-efficacy is influenced by performance attainment, vicarious experience, verbal persuasion, and feedback[9, 14, 23, 24].
In this study, patients were given information and tailored advice about their own vascular riskfactors and how to reduce them. Patients' earlier experiences with behavioural changes were discussed and information was gathered about individuals' potential, priorities, and motivation for achieving behavioural change and factors that could promote successful behavioural change. Patients were encouraged to set individual reachable goals[26] for lifestyle changes, such as more exercise, healthy food choices, more attention for medication use[27], and smoking cessation, and to bring a partner or relative with them when visiting the clinic. Weight, blood pressure, waist, fasting lipid, and glucose levels were measured regularly to provide patients with feedback and to monitor changes in vascular riskfactors. During subsequent visits, goals were evaluated and results in terms of success were discussed [8, 9, 23, 25-27].
The medical treatment of vascular riskfactors was based on newly developed written protocols combining medical treatment and self-management interventions for each vascular risk factor[28]. Each nurse practitioner was intensively supervised by a medical specialist.

Measurement of self-efficacy

Self-efficacy was measured with the adapted Diabetes Mellitus type 2 Self Efficacy Scale. This scale was developed for use in Dutch patients with diabetes type 2[29, 30] and has not been used in a vascular population before. We chose this scale because it measures the level of confidence people have in their ability to perform the self-management tasks necessary to reduce vascular risk[7], tasks which are universal for most common illnesses[31]. The questionnaire consists of statements about nine self-management items (**Table 2**), for example: I think I am able to take my medication as prescribed. The nine-item questionnaire is scored on a 5-point Likert scale[29], with higher scores reflecting a better self-efficacy. Total and individual item scores can be calculated. Self-efficacy was measured at baseline and after 1 year. The reliability of the self-efficacy questionnaire was adequate (Cronbach's alpha was 0.69 for the nine items; it was 0.82 if the question on smoking was excluded for the non-smokers)[32].

Statistical analysis

T-test (or Mann-Whitney test) was performed to analyse differences in baseline data between the intervention group and the control group. Self-efficacy (total or individual item) scores are presented as means with standard deviation. The Wilcoxon test for paired samples was used to compare baseline self-efficacy and follow-up self-efficacy after 1 year in both groups. A T-test for unpaired samples was used to compare the self-efficacy scores of the two groups. The corresponding 95% confidence intervals (CIs) are reported.

To analyse the relationship between change in self-efficacy and vascular riskfactors, the self-efficacy scores for a specific riskfactor were combined. For example, the six self-efficacy items concerning weight, exercise, and food were combined to analyse the effect of achieving treatment goals for BMI and waist circumference.

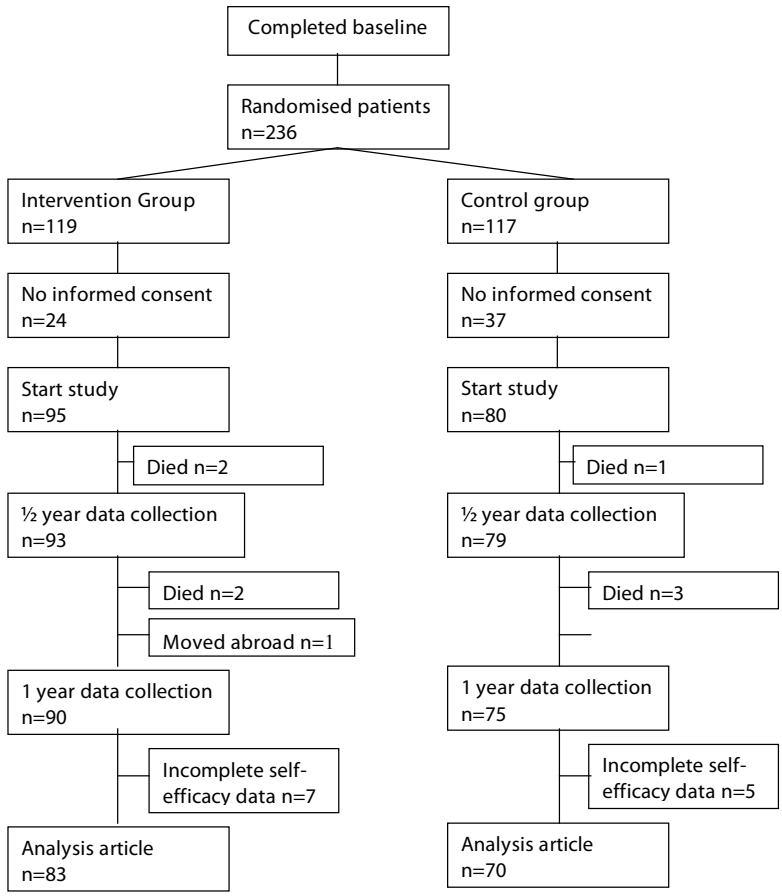
The relation between change in this composite self-efficacy score and achievement of treatment goals was estimated with logistic regression analyses. Results are presented as linear regression coefficients (ß) and odds ratios (OR) with corresponding 95% confidence limits. The regression coefficient reflects the influence of composite self-efficacy on achieving the different treatment goals. In these analyses, adjustments were made for the baseline total self-efficacy score and for treatment allocation. Analyses were performed in SPSS version 14.0 (SPSS, Chicago, Illinois, USA).

Results

Inclusion and flow of the study

Two hundred thirty-six patients were eligible for the VENUS study[21]. Thirty-seven patients in the control group did not give informed consent and 24 patients in the intervention group did not consent to study participation (**Figure 1**). Of the 175 patients included, 10 were lost during follow up. Of the remaining 165 patients, 12 patients had missing data on the self-efficacy questionnaire and were therefore excluded. The characteristics of these 12 patients were comparable with those of the included group. After 1 year, there were 83 patients in the intervention group and 70 in the control group. There were three nurse practitioners, and the mean number of contacts during the intervention was 5 ±3 visits at the outpatient clinic or by telephone.

Figure 1 *Flow of patients through the study*



Baseline characteristics

The baseline characteristics of the patients in the control and intervention groups were not significantly different (**Table 1**). Most (79%) of the participants were male, and 46% of the patients had cerebral vascular disease (CVD), 44% had peripheral arterial disease (PAD), 15% of the patients had abdominal aortic aneurysm (AAA), and 18% had coronary heart disease (CHD) as a second diagnose. More than 11% of the participants were being treated for type 2 diabetes. The frequency of current smoking was 33%. Blood pressure was higher than the target level (140/90 mmHg) in 61% of the patients, BMI was higher than 25 kg/m^2 in 62% of the patients, and LDL cholesterol was higher than 3.2 mmol/l in more than 50% of the patients. Waist circumference was greater than the target level (<102 cm (♂) or <88 cm (♀)) in almost 50% of the population.

Table 1 *Baseline characteristics of the study population*

	Intervention group (n= 83)	Control group (n= 70)
Age (years)	62.2 ± 9.4	62.4 ± 9.4[c]
Male gender (%)	76	83[d]
Body mass index (kg/m^2)	26.8 ± 4.0	27.1 ± 3.8[c]
Waist circumference (cm)	97 ± 11	99 ± 11[c]
Systolic blood pressure (mmHg)	147 ± 21	150 ± 21[c]
Diastolic blood pressure (mmHg)	84 ± 11	84 ± 11[c]
Total cholesterol (mmol/L)	5.3 ± 1.1	5.1 ± 0.9[c]
LDL-cholesterol (mmol/L)	3.2 ± 1.0	3.0 ± 0.9[c]
HDL-cholesterol (mmol/L)	1.3 ± 0.4	1.4 ± 0.4[c]
Triglycerides (mmol/L)	1.9 ± 1.1	1.8 ± 1.0[c]
Diabetes mellitus [a] (%)	13	11[d]
Current smoking (%)	39	25[d]
Ever smoking (%)	93	89[d]
Vascular disease [b]		
Coronary heart disease (%)	24	13[d*]
Cerebrovascular disease (%)	45	47[d]
Peripheral arterial disease (%)	48	39[d]
Abdominal aortic aneurysm (%)	16	14[d]
Medication usage		
Antiplatelet agents (%)	68	69[d]
Blood pressure-lowering agents (%)	47	50[d]
Lipid-lowering agents (%)	45	54[d]
Glucose-lowering agents (%)	12	10[d]
ACE-inhibitor or AIIA (%)	28	34[d]

Data represent mean (SD) or percentages
a Patients on glucose-lowering medication
b Ever or current diagnosis, a single person can be classified into more than one disease category
*c independent samples t-test two-tailed for variables on interval level of measurement * p<0.05*
*d independent samples Mann-Whitney test for variables on ordinal level of measurement * p<0.05*

Self-efficacy

At baseline, the total self-efficacy score was comparable in the two groups (**Table 2**). Self-efficacy in medication use was similar in the two groups (4.8 ±0.7 and 4.9 ±0.3 in the control and intervention groups, respectively). The lowest score in the control group was for self-efficacy in choosing healthy food when not at home (3.5 ±1.1), and that in the intervention group was for stopping smoking (3.4 ±1.5) and losing weight (3.4 ±1.2).

Table 2 *Baseline and follow-up self-efficacy on different self-managment tasks*

	Intervention group (n= 83)				Control group (n= 70)					
	Baseline	Follow-up	Δ[a] (SD)	P-value[b]	Baseline	Follow-up	Δ[a] (SD)	P-value[b]	Mean difference[c]	95% CI[d]
Medication	4.8 ± 0.7	4.9 ± 0.5	0.1 (0.7)	0.08	4.9 ± 0.3	4.8 ± 0.6	0.0 (0.6)	1.00	0.2	-0.1 - 0.4
Stop smoking	3.4 ± 1.5	3.3 ± 1.5	0.0 (1.3)	0.71	4.0 ± 1.2	3.8 ± 1.4	-0.2(1.1)	0.32	0.2	-0.4 - 0.8
Healthy food	3.7 ± 1.1	4.1 ± 0.9	0.4 (1.4)	0.01	3.9 ± 1.0	4.1 ± 1.0	0.2 (1.1)	0.15	0.2	-0.2 - 0.6
Healthy food not at home	3.5 ± 1.1	3.9 ± 1.0	0.4 (1.4)	0.01	3.5 ± 1.1	3.7 ± 1.0	-0.1(1.1)	0.08	0.4	-0.0 - 0.8
Exercise	4.1 ± 1.0	4.3 ± 1.0	0.2 (1.2)	0.09	4.0 ± 1.1	4.1 ± 1.0	0.1 (1.0)	0.42	0.1	-0.3 - 0.5
Extra exercise	3.8 ± 1.2	4.1 ± 1.2	0.3 (1.3)	0.03	3.9 ± 1.1	4.1 ± 1.1	0.2 (1.0)	0.14	0.1	-0.3 - 0.5
Weight control	3.9 ± 1.1	4.0 ± 1.0	0.1 (1.1)	0.31	4.1 ± 1.0	4.0 ± 1.0	-0.1(1.2)	0.31	0.2	-0.1 - 0.6
Loosing weight	3.4 ± 1.2	3.6 ± 1.2	0.2 (1.1)	0.19	3.9 ± 1.0	3.8 ± 1.0	-0.1(1.1)	0.47	0.3	-0.1 - 0.6
Control disease	3.6 ± 1.0	3.7 ± 1.0	0.1 (1.0)	0.56	3.7 ± 0.9	3.9 ± 0.8	0.2 (0.9)	0.15	-0.1	-0.4 - 0.2
Total self-efficacy	3.8 ± 0.7	3.9 ± 0.7	0.2 (0.8)	0.18	4.0 ± 0.5	4.0 ± 0.6	0.2 (0.5)	0.11	0.0	-0.3 - 0.3

Data represent mean (SD)
a Difference in self-efficacy within groups (follow-up - baseline)
b P-value of the Wilcoxon paired test
c Mean difference (follow-up value - baseline value in intervention group) - (follow-up value - baseline value in control group)
d 95% Confidence interval of unpaired t-test

Differences in self-efficacy between baseline and follow up

Self-efficacy in choosing healthy food and in choosing healthy food when not at home (both +0.4 ± 1.4, p=0.01) and in doing extra exercise (+0.3 ±1.3, p=0.03) improved significantly from baseline during follow-up in the intervention group (**Table 2**). While all individual self-efficacy scores increased slightly in the intervention group but gradually decreased in the control group during the follow-up, the total self-efficacy score did not change significantly in either group (0.2 ±0.8, p=0.2 in the intervention group and 0.2 ±0.5, p=0.1 in the control group) (**Table 2**).

Difference in self-efficacy between intervention group and control group

The greatest difference in self-efficacy score between the intervention group and the control group was found for self-efficacy in choosing healthy food when not at home (+0.4 95%CI 0.0 – 0.8) and in losing weight (+0.3 95%CI -0.1 – 0.6) (**Table 2**).

Self-efficacy and change in vascular riskfactors

In comparison with the control group, the intervention group showed a higher achievement of treatment goals for LDL cholesterol (45% vs 13%, respectively) and systolic blood pressure (25% vs –2%), an increased use of lipid-lowering agents (by 47% vs 19%), and increased use of blood pressure lowering agents (by 31% vs 17%). The results of the trial are published elsewhere[23].
Linear logistic regression analyses showed that baseline total self-efficacy did not influence the achievement of treatment goals in either the intervention group or the control group (data not shown). However, composite self-efficacy improved related to blood pressure in the intervention group, but not in the control group (ß =0.07) (**Table 3**).

Table 3 *Effect of change in self-efficacy on the achievement of treatment goals (n= 153)*

	Baseline				Follow-up				ß[a]	OR (95% CI) [b]
	I-group (n=83)		C-group (n=70)		I-group (n=83)		C-group (n=70)			
Achieved treatments goals	(%)	Composite of self-efficacy	(%)	Composite of self-efficacy	(%)	Composite of self-efficacy	(%)	Composite of self-efficacy		
Body mass index < 25 kg/m2	39	22.3 ± 4.6 [c]	31	22.9 ± 5.0 [c]	37	23.3 ± 4.5 [c]	23	23.1 ± 4.7 [c]	-0.07	0.93 (0.85 - 1.02)
Waist< 102cm (♂) + < 88cm (♀)	53	22.3 ± 4.6 [c]	50	22.9 ± 5.0 [c]	61	23.3 ± 4.5 [c]	56	23.1 ± 4.7 [c]	-0.02	0.98 (0.91 - 1.06)
LDL-cholesterol < 3.2 mmol/L	43	27.0 ± 4.8 [d]	54	27.6 ± 5.4 [d]	88	28.0 ± 4.6 [d]	67	27.8 ± 5.0 [d]	-0.05	0.95 (0.87 - 1.04)
Systolic blood pressure < 140 mmHg	39	19.1 ± 3.8 [e]	39	19.8 ± 3.8 [e]	64	19.8 ± 3.2 [e]	37	19.8 ± 3.6 [e]	0.07	1.07 (0.97 - 1.18)

a The % influence on achieving treatment goals by 1 point change in self-efficacy
b OR (95% CI): Odds ratio adjusted for baseline self-efficacy level and group, corresponding 95% confidence interval
c Sum of composite self-efficacy levels (weight, exercise, food:6 items)
d Sum of composite self-efficacy levels (weight, exercise, food, medication:7 items)
e Sum of composite self-efficacy levels (weight, food, medication:5 items)

Discussion and Conclusion

Discussion

In the present study, we investigated the effect of a nursing intervention on changes in self-efficacy and changes in vascular riskfactors. We found that the intervention did not influence total self-efficacy but did improve self-efficacy in choosing healthy food (not at home) and in doing extra exercise. The increase or decrease in composite self-efficacy scores did not influence the achievement of vascular risk treatment goals.

According to social cognitive theory, self-efficacy is fundamental to behavioural change[9]. Thus promoting self-efficacy in self-management should be a strategy to help patients achieve and keep treatment goals[10, 11]. This has been shown to be the case in various groups of patients with a chronic condition (overweight, epilepsy, cardiac disease, diabetes, and arthritis)[12, 16, 20, 31, 33, 34]. However, self-efficacy did not change in patients with cardiovascular diseases during a 6-week rehabilitation programme focusing on weight loss, healthy food, more exercise, and smoking cessation, which suggests that other illness-related or behavioural factors may be involved[35]. In the current study, the patients had a high total level of self-efficacy at baseline, which could explain the modest improvement in self-efficacy at follow-up, but baseline self-efficacy was not associated with the achievement of treatment goals. This high level of self-efficacy at baseline could be due to the low awareness of vascular patients of their vascular risk factors[7], and subsequent underestimation of the difficulty of self-management of vascular risk. Lifestyle changes, such as losing weight, choosing healthy food, doing more exercise, and stopping smoking, are difficult to accomplish. Patients are more likely to make and sustain lifestyle changes if they are not only confident they can perform this behaviour but also aware of its importance. We do not know the level of self-efficacy of these patients before they developed vascular disease, but it could have influenced the baseline or change in self-efficacy level[20]. Bandura stated that self-efficacy should be measured against levels of task demands that represent gradations of changes or impediments to successful performance[9]. In estimating their self-efficacy, patients indicate different levels of performance they believe they can surmount. If there are no obstacles to overcome, the activity is easy to perform and most patients would judge their self-efficacy as being high for this activity. Therefore, it is possible that the items of the scale we used did not incorporate sufficient levels of performance, so that we measured ceiling effects.

The nurse practitioner intervention was aimed at reducing vascular risk and at

promoting self-management by improving self-efficacy. While the intervention resulted in a reduction of vascular risk, it had little effect on self-efficacy. Compared to other studies of nurse practitioner interventions[3, 36-38], our study population was more diverse (different vascular diseases) and the intervention was focused not only on a variety of universal self-management tasks, but also on reducing vascular riskfactors. This wide scope may clarify the small differences we found in self-efficacy. The modest effect of the intervention on the change in self-efficacy may also be related to the limited duration of the intervention or the number of contacts these chronic vascular patients had with their nurse. Self-efficacy supports goal setting in behavioural change[10, 25] but achieving results may take more time.

Optimal treatment of vascular riskfactors in high-risk patients contributes to a reduction in vascular risk[6]. Even though medical care is initiated, treatment goals are frequently not reached. For example, patients often stop treatment with cholesterol-lowering and blood pressure-lowering medication[39]. In our study, LDL cholesterol concentrations improved more in the intervention group than in the control group (45% vs 13%), and systolic blood pressure improved in the intervention group (25%) but not in the control group (-2%). Thus the reduction in the level of vascular riskfactors achieved in our study could also be explained by the use of cholesterol-lowering and blood pressure- lowering medications rather than by extensive lifestyle changes. This is supported by the observation that self-efficacy in medication use had the highest score of the self-management items, with the use of lipid-lowering and blood pressure-lowering agents increasing the most in the intervention group. More detailed results of the trial are published elsewhere[21].

In this study, all patients (intervention and control group) were extensively screened for vascular riskfactors in a university hospital. Their treating vascular specialist and general practitioner received the results together with a written treatment advice. Patients in the control group did not undergo specific interventions aimed at improving self-efficacy or self-management, and thus changes observed over 1 year reflect the natural course of self-efficacy in these patients after an intensive period of diagnosis of a vascular disease and riskfactor screening and treatment.

Strength of this study is that we were able to compare self-efficacy levels in a randomized controlled trial; our study also had some limitations. The sample size was rather small and therefore small differences may not have been detected. Moreover, because we could not distinguish between the effect of different self-management tasks on changes in vascular riskfactors (for example, the

effect of more exercise on weight cannot be separated from the effect of changes in food intake), we used a composite self-efficacy score to estimate the effect on riskfactors. This means that there was some loss of specificity, which may explain the small differences in composite self-efficacy score between baseline and follow-up. Although it has been shown that patient characteristics, such as smoking or BMI > 30 kg/m^2, determine the level of self-efficacy[29] and changes in self-efficacy[20,23] , our population was too small to perform extensive subgroup analyses. We focused on self-efficacy, but other factors may also have influenced individual behaviour (for example, personal and medical history, social economic status, personal characteristics, external factors as social support)[40].

Conclusion

In conclusion, total self-efficacy was not influenced by additional nursing care compared with usual care. However self-efficacy in choosing healthy food and doing extra exercise did increase over the 1-year period in patients at high risk of developing (new) cardiovascular diseases. Changes in composite self-efficacy scores were not related to changes in vascular riskfactors.

Practice implications

A nurse practitioner intervention aiming at improvement of self-efficacy increased self-efficacy in choosing healthy food and doing extra exercise. This suggests that these behavioural changes are possible and could be successfully incorporated in vascular risk reduction programmes in addition to medical treatment of vascular riskfactors.

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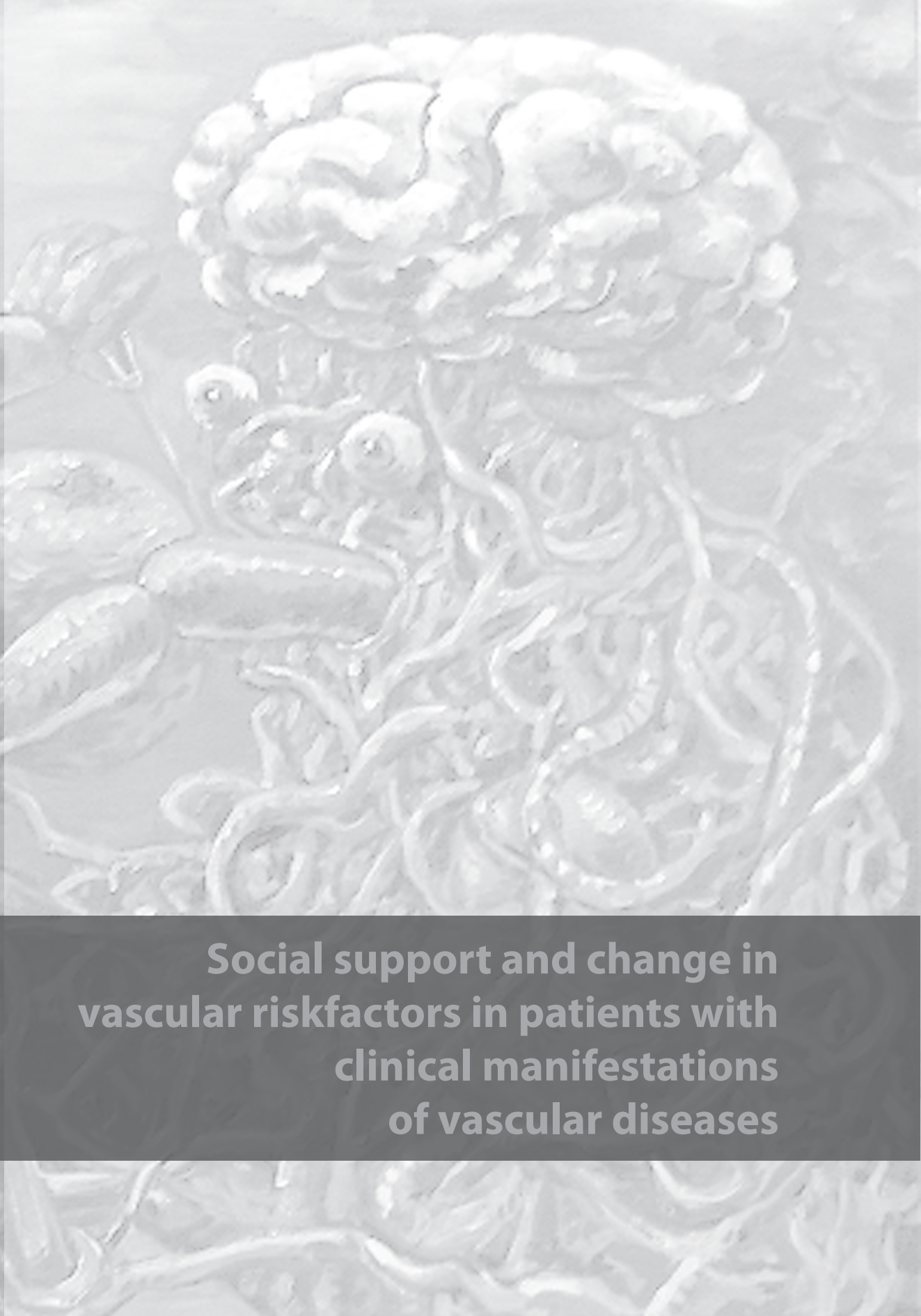

Social support and change in vascular riskfactors in patients with clinical manifestations of vascular diseases

Abstract

Background

Vascular risk can be reduced by adequate medical treatment of vascular riskfactors and by adopting a healthy lifestyle, a behavioral change that is influenced by social support. We investigated whether social support is associated with change in vascular riskfactors in patients with vascular diseases during 1 year.

Methods

140 patients who had 2 modifiable vascular riskfactors participated. Social support was measured with a questionnaire about the patient's perception of active involvement, protective buffering, and overprotection.

Results

Most types of social support were not associated with a change in vascular riskfactors over 1 year. Having a partner was associated with a reduction in BMI of 1.4 kg/m^2 (95%CI -2.2 to -0.5), less protective buffering was associated with a decrease in blood glucose of 0.47 mmol/l (95%CI 0.09-0.84), and less active involvement was associated with an increase in BMI of 0.42 kg/m^2 (95%CI 0.05-0.78).

Conclusion

Having a partner and active involvement are only associated with a decrease in BMI but not with changes in other vascular riskfactors. Protective buffering is only associated with blood glucose whereas overprotection is not associated with changes in vascular riskfactors.

Introduction

Cardiovascular diseases are the most common causes of morbidity and mortality in Western countries[1]. Despite an overall reduction in cardiovascular mortality, the number of patients with vascular diseases is increasing and these patients are at high risk of developing new vascular events or death[2-4]. Hypertension, dyslipidemia, diabetes, abdominal obesity, smoking, unhealthy lifestyle, and psychosocial factors are known vascular riskfactors, accounting for more than 90% of the incident cases of coronary heart disease (CHD)[5]. Optimal treatment of these riskfactors leads to a reduced vascular risk[4,6,7]. Despite increased attention for vascular risk management in clinical practice[8-10], treatment goals for vascular riskfactors are often not reached and the incidence of vascular morbidity and mortality remains high[11-14]. Self-management of health behavior is of major importance for reducing risk factors[15,16]. While patients with vascular diseases need to manage riskfactors lifelong (hypertension, hypercholesterolemia, diabetes) and to change their lifestyle (stop smoking, weight loss, healthy food choice, increased physical activity) permanently[17,18], self-management of vascular riskfactors, such as adherence to medication and healthy lifestyle, is difficult to accomplish[19]. In patients with CHD[20-22] and in patients with other chronic illnesses[23-25], successful self-management is associated with social support[26]. Indeed, in Bandura's social cognitive approach to health promotion, social support is an important precondition for health behavior change by adequate self-management[27].

Social support has two components, namely its structure and function. The structure of social support is dependent on the size and contact frequency of a person's network of friends and acquaintances[28]. Functional support can be divided into perceived and received social support[20] and can be informative, instrumental, or emotional[23,26,29,30]. Low levels of both structural and functional social support are associated with increased cardiac death and all-cause mortality[22] and influence the progression of atherosclerosis in patients with cardiovascular diseases[28,31,32]. In some studies, social support was found to directly affect physiological processes related to atherosclerosis. Hypertensive men with a high level of social support had epinephrine levels similar to those of controls, whereas hypertensive men with a low level of social support had much higher epinephrine levels[33]. Other prospective studies have found no association between social support and the risk of developing a first manifestation of coronary artery disease[34], peripheral arterial disease (PAD)[35], or stroke [36]. However, in patients with clinically manifest cardiovascular diseases, social support is associated with increased mortality, morbidity, and the presence of vascular risk

factors[22,28,31,32]. It is conceivable that a low level of social support is associated with a low level of success in managing vascular riskfactors over time. In clinical practice, we have observed social support not only to have positive effects but also negative effects in vascular patients (see case stories).

In the present study, we investigated whether social support is associated with a change in vascular riskfactors in patients with a recent clinical manifestation of vascular disease over a 1-year period.

Methods

Design and study population

This cross-sectional study is part of the Vascular Prevention by Nurses Study (VENUS), a randomized controlled trial comparing the effects of nurse practitioner care and usual care on vascular riskfactor management. A detailed description of the VENUS study is published elsewhere[9]. In summary, participants recently diagnosed with cerebrovascular diseases, abdominal aortic aneurysm (AAA), or PAD were asked to participate in the VENUS study if they were younger than 80 years of age, without malignant disease, independent in daily activities, able to read and write Dutch, and had more than 2 modifiable vascular riskfactors, namely, hypertension (>140/90 mmHg), dyslipidemia (total cholesterol >4.5 mmol/l and/or low-density lipoprotein (LDL) cholesterol >2.5 mmol/l), glucose >6.1 mmol/l, or diabetes mellitus (using glucose lowering agents), overweight (body mass index (BMI) >25 kg/m^2), waist circumference (♂ >102 cm or ♀ >88 cm), or current smoking. The study conforms to the principals outlined in the Declaration of Helsinki.

In the VENUS study, 175 participants were randomized to receive nurse practitioner care (n=95) or usual care (n=80). Ten participants did not complete the 1-year follow-up period: 8 participants died and 2 moved abroad. Of the remaining 165 participants, 25 participants did not complete the social support questionnaire, 8 of whom did not have any structural social support. Their data were therefore excluded from analyses. The baseline characteristics of these 25 participants were comparable with those of the other participants (not in the tables).

Usual care and nurse practitioner care of vascular riskfactors

Before participating in the VENUS study, patients were screened for vascular riskfactors as part of the Secondary Manifestations of ARTerial diseases (SMART) program[37]. A questionnaire was used to collect information on former and

current smoking behavior; blood pressure, height, weight, and waist circumference were measured; and blood samples were taken to measure serum levels of glucose, total cholesterol, triglycerides and high-density lipoprotein (HDL). LDL cholesterol was calculated according to Friedewalds' formula. The results of this vascular screening were used as baseline data for the current study.
Evidence-based treatment recommendations according to the Third Joint Task Force of European societies[4] were given for the management of the individual riskfactors and/or vascular disorders by a multidisciplinary team of vascular specialists, who sent written tailored treatment recommendations to the patient's vascular specialist or neurologist and general practitioner, all of whom used the same guidelines on cardiovascular disease prevention[38], with further action being left to their discretion.
The participants in the intervention group received additional nursing care aimed at reducing vascular risk over 1 year (see case stories). These participants attended a recently established outpatient clinic run by nurse practitioners and supervised by a vascular medicine specialist. Medical treatment based on tailored treatment recommendations and guidelines on cardiovascular disease prevention[38], in combination with nursing care aimed at vascular risk reduction, was delivered by the nurse practitioner. Active participation and self-efficacy were promoted. To support behavioral change and social support[27], patients were encouraged to bring their partner or a relative with them while visiting the clinic[19]. In the current study, all participants were asked to return for a follow-up visit, after 1 year, for the measurement of vascular riskfactors (waist, weight, blood pressure, fasting plasma concentrations of LDL- cholesterol, HDL cholesterol, triglycerides, glucose, and smoking).

Social support

Ten months after inclusion in the VENUS study, all participants received a questionnaire by regular mail, to evaluate the perceived social support. Structural social support was determined by asking the participants two questions: whether they had a spouse or cohabiting partner and whether they had someone else they could turn to about their health problems. If participants did not have a partner or anyone else on whom they could rely, they were instructed not to fill in the social support questions.
The validated ABO social support questionnaire for Dutch CHD patients was used to determine the extent of functional support[39]. We chose this scale because it not only measures positive social support but also negative social support. The internal consistency and re-test reliability of the ABO questionnaire

have been tested in Dutch cardiac rehabilitation patients[39], and the association between active involvement and emotional support has been verified in patients with CHD and patients with cancer[39,40].

This questionnaire, which takes into account perceptions of the presence of positive and negative social support, has five statements about active involvement, eight statements about protective buffering, and six statements about overprotection, to which respondents can respond on a 5-point scale, ranging from (1) 'very often' to (5) 'never'. Active involvement measures the positive emotional support the patient perceives to receive from his/her spouse/cohabiting partner or relative. An example of an active involvement statement is: "my partner tries to talk openly about my illness". The lower the score, the higher the perceived active involvement. In protective buffering, the partner or relative tries to deny that the patient has a health problem, tries to take things over, and uses ploys to get the patient to follow doctor's orders. An example of a protective buffering statement is "my partner pretends that there is nothing the matter". The lower the score, the greater the perceived protective buffering. While buffering may be perceived as being instrumentally positive, it is perceived as being emotionally negative[39,40]. Overprotection is regarded as negative emotional support in other patient groups[41], with the partner or relative taking control of the health problem (when the patient him/herself seems not able to take control). Overprotection is associated with a low quality of marriage in cardiac patient groups[39]. An example of an overprotection statement is "my partner treats me like a child". The lower the score, the greater the perceived overprotection. Overprotection may also be perceived as being instrumentally supportive.

Data analysis

Continuous variables are presented as means with standard deviations (SD) if normally distributed. In the case of a skewed distribution, median values with interquartile ranges are presented; logarithmic transformation was used in analyses. Dichotomous variables are presented as percentages. The internal consistency of the social support questionnaire was estimated, to test the correlation between the items of the different parts of the questionnaire.

In the social support analysis, the scores of each individual item and the total mean and sum scores for active involvement, protective buffering, and overprotection are presented. The lower the score, the greater the active involvement, protective buffering, and overprotection. In active involvement a low score is always positive, but in protective buffering and overprotection a low score is negative regarding emotional support and positive regarding

instrumental support. The relation between social support and change in the level of vascular riskfactors was estimated by means of linear regression analyses for the 3 categories of social support. Change in the level of vascular riskfactors was defined as the dependent variable. The independent variables are the different categories of social support (ABO).
Results are presented as β values indicating the magnitude of the change in the level of the different vascular riskfactors when the social support score changed by 1 unit. We adjusted for potential confounding variables such as sex, age, having a partner, baseline level of vascular riskfactor, and randomization to the control group or the intervention group (active support by a nurse practitioner).
Analyses were performed in SPSS version 14.0 (SPSS, Chicago, Illinois, USA).

Results

Baseline characteristics

Most participants were male (80%) and 42% had cerebral vascular disease; 14% had AAA and 44% had PAD (**Table 1**). Sixty-eight percent of the participants were diagnosed with hypertension and 47% had a glucose level >6.1 mmol/l; 32% of the participants were current smokers. Triglyceride levels were not normally distributed and therefore median values with interquartile range are presented. In this population, structural support was high: only 12% of the participants lived alone and 70% had someone else to turn to in addition to the partner (in 9% of the cases this was a son or daughter). There were no participants without any structural social support.

Structural social support

In multivariable regression analyses adjusted for age, sex, baseline BMI, and study group, having a partner was associated with a decrease in BMI of 1.4 kg/m^2 (95%CI -2.2 to -0.5). No other associations between having a partner and change in vascular riskfactors were found.

Functional social support

Cronbach's alpha measures the reliability of the different parts of the social support questionnaire, with a value of 0.70 or higher being considered sufficient[42]. Cronbach's alpha for active involvement was 0.56. When the item 'makes me feel we are in this together' was deleted, the alpha improved to 0.74, which is adequate. Therefore we performed further analyses without this question. The

Table 1 *Baseline and follow up data of the population: n=140*

male gender (%)	80	
Age (years)	60 ±9.8	
Having a partner (%)	88	
Having someone else (%)	70	
Vascular riskfactors	**Baseline**	**Follow up**
Systolic bloodpressure mmHg (SD)	145 ±19	140 ± 16
glucose mmol/l (SD)	6.7±2.0	6.0 ± 1.4
BMI kg/m2 (SD)	26.8 ±3.8	27.3 ± 3.9
Waist circumference cm (SD)	98 ±11	98 ± 12
Total chol mmol/l (SD)	5.3 ±1.0	4.5 ± 0.9
LDL cholesterol mmol/l (SD)	3.2 ±1.0	2.5 ± 0.8
HDL cholesterol mmol/l (SD)	1.3 ±0.4	1.3 ± 0.4
Triglycerides (#)	1.6 (1.2 - 2.2)	1.4 (0.9 - 2.0)
Actual smokers (%)	32	37
recently stopped smoking (%)	1	6
Prevalence of vascular diseases and diagnoses		
Cerebral vascular disease (%)*	42	
Abdominal aneurism aorta (%)*	14	
Peripheral arterial disease (%)*	44	
Coronary heart disease (%)*	20	
Diabetes Mellitus (%)*	30	
Hypertension (%)*	68	
Riskfactors above treatment level		
RR >140 mmHg (%)	84 (61)	
LDL >3.2 mmol/l (%)	76 (54)	
Glucose >6.1 mmol/l (%)	63 (47)	
BMI >25 kg/m2 (%)	90 (64)	
Waist > 102 cm ♂ or >88 cm♀	67 (48)	

Data are mean with (SD), (#) median with interquartile range or (%) percentages
** ever or current diagnosis, a single person can be classified into more than one disease category*

alpha for overprotection was 0.83 and that for protective buffering was 0.70. The lowest (best) score for active involvement was 2.1 ±0.9 for "my partner shows understanding" (**Table 2**); that for protective buffering was 2.9 ±1.2 for "my partner does everything to stop me thinking about my illness"; and that for overprotection was 2.9 ±1.3 for "my partner makes sure that I follow doctor's orders". When we analyzed structural social support, we only used data from

participants who actually had social support. Twenty-five participants did not complete the questionnaire: 8 because they did not have any structural support; and 5 because they felt uneasy answering the questions about their partner and did not want to report negatively about them; the other 12 participants did not give a reason.

Table 2 *Mean social support scores (sd) n=140*

Active involvement (5 questions)		
My partner:	**mean**	**sd**
Talk openly	2.7	0.8
Asks me how I feel	2.6	1.0
Talks about it when something bothers me	2.6	1.0
Shows understanding	2.1	0.9
Makes me feel we are in this together	2.1	2.2
mean	2.4	0.8
total sum	12.1	3.9
Protective buffering (8 questions)		
My partner:	**mean**	**sd**
Makes up stories so I follow docter's orders	4.3	1.0
Tries to keep his/her worries about me to him/herself	3.2	1.1
Denying worries	3.8	1.2
Just gives in	3.8	0.9
Can not cope when I am worried	3.8	1.0
Waves worries away	4.3	0.9
Does everything to prevent me from thinking about my illness	2.9	1.2
Takes over as much of my work	3.2	1.2
mean	3.7	0.6
total sum	29.4	4.9
Overprotection (6 questions)		
My partner	**mean**	**sd**
Treats me like a little child	4.7	0.7
Keeps an eye on me	3.2	1.2
Watches me follow docter's orders	2.9	1.3
Can not leave it to me	4.1	1.0
Controls me	4.2	1.1
Acts as if I do not know what is good for me	4.2	1.0
mean	3.9	0.8
total sum	23.3	4.7

All data are means with SD or total sum with SD
all questions have 5 answercategories:1=very strong;2=strong;3=now en then;4=seldom;5=never

Social support and change in vascular riskfactors

After 1 year, the mean blood pressure had decreased from baseline by 5 mmHg and the mean blood glucose had decreased by 0.7 mmol/l whereas the BMI had increased by 0.5 kg/m^2 (**Table 1**). The proportion of participants who smoked had increased from 32% at baseline to 37% at follow-up; however, the proportion who had recently stopped smoking had increased from 1% at baseline to 6% at follow-up.

Active involvement: In multivariable regression analyses, adjusted for treatment group, sex, age, baseline treatment levels, and having a partner, higher active involvement scores were not significantly associated with the change in vascular riskfactors, except for an association with an increase in BMI of 0.4 kg/m^2 (95%CI 0.0-0.8)(**Table 3**). Thus a 1-unit increase in the active involvement score, which means that there was less active involvement, was associated with an increase in BMI of 0.4 kg/m^2.

Protective buffering: A higher protective buffering score was associated with a 0.5-mmol (95%CI 0.1-0.8) decrease in blood glucose level (**Table 3**).

Overprotection: The overprotection score was not associated with a change in any of the vascular riskfactors.

Table 3 *association of different social support scores and change in vascular riskfactors*

	Active Involvement	95%CI	adj R^2	Protective Buffering	95%CI	adj R^2	OverProtection	95%CI	adj R^2
Systolic blood pressure (mmHg)	2	-3 to 7	29	-1	-6 to 5	28	3	-1 to 8	32
LDL-cholesterol (mmol/l)	0.0	-0.2 to 0.1	24	0.0	-0.3 to 0.5	22	0.0	-0.1 to 0.2	24
Triglycerides (mmol/l) #	0.0	0.0 to 0.0	53	0.0	-0.1 to 0.0	47	0.0	0.0 to 0.0	49
HDL-cholesterol (mmol/l)	0.0	0.0 to 0.0	65	0.0	0.0 to 0.1	66	0.0	0.0 to 0.1	65
glucose (mmol/l)	0.0	-0.2 to 0.3	22	-0.5	-0.8 to -0.1	25	-0.2	-0.5 to 0.1	23
BMI (kg/m^2)	0.4	0.0 to 0.8	84	-0.2	-0.7 to 0.2	84	0.2	-0.2 to 0.6	85
waist circumference (cm)	0	-1 to 2	71	0	-2 to 2	71	0	-1 to 1	71

Data are ß with 95%CI. ß indicating the amount of change in riskfactors when social support changes one unit
 # logaritmic transformation was used in analyses
Adjusted for group, age, sex, having a partner and baseline value
Adjusted R square accountable for the proportion of variance in the variable

Discussion

In this study, we investigated whether different types of social support are associated with changes in vascular riskfactors in patients with clinical manifestations of vascular diseases.

Positive emotional support (active involvement) and structural support (having a partner) were only associated with lower BMI at follow-up, and less protective buffering was only associated with lower plasma glucose levels at follow-up. No other associations between structural and functional social support and changes in vascular riskfactors were detected.

In our predominately male population, the influence of structural support given by the partner on BMI reduction (decrease of 1.4 kg/m^2) was greater than that of an intervention to reduce BMI (increase of 0.2 kg/m^2)[9]and can be considered important because a higher BMI is associated with a higher vascular risk[5]. According to social cognitive theory[43], social support and active involvement by a partner help people to make the behavioral changes that are often needed to lose weight or to manage weight. Obviously, people without a partner do not have this support.

Neither positive emotional support (active involvement) nor negative emotional support (overprotection) was associated with the achievement of blood pressure targets. Other studies reported associations between blood pressure level and social support[33,44]. We found a low Cronbach's alpha (0.56) for emotional support, indicating that not all the items in the questionnaire adequately measured emotional support in our vascular population. In patients with cancer, the alpha was 0.86 for active involvement, and more active involvement was seen in women[40]. However, we did not find a sex difference in social support scores, but our study included relatively few women (20%). This difference in vascular disease may be important and reflect heterogeneity of the study population because other studies that used this questionnaire had more homogeneous populations. The small change in smoking behavior during the study[9] and the small number of smokers meant that we were not able to analyze the relation between social support and smoking.

We found less protective buffering to be associated with a lower plasma glucose concentration at follow-up. In other studies, protective buffering was associated with poorer physical health in patients with cardiovascular diseases[39] and with disease severity in patients with cancer[40]. Both studies suggested that the partner's response to disease severity, rather than pre-existing social support, affected disease or health behavior. Less protective buffering and being less physically active and/or being more dependent might also be associated

with higher blood glucose levels. Older patients with cancer reported receiving more protective buffering and overprotection than younger patients[40]. In linear regression analyses, we found no influence of age on the social support score. Although patients with vascular diseases are at considerable risk of new vascular events, their functional health is not influenced by their disease as much as it is in patients with cancer[40]. Consequently, they have less need for social support and their partners' response to their attempts to reduce secondary riskfactors may be less important. This might explain the weak association between social support and change in vascular riskfactors. Other studies have reported a long-term positive effect of social support on mortality and morbidity in patients with cardiovascular diseases[22,28,31,32].

The study had some limitations. In this cross-sectional design, we measured social support only once during the study. It is possible that perceived social support changed with time; however, in patients with coronary heart disease, social support appeared to be stable when measured after an interval of 6 weeks[39]. Furthermore, we asked participants to report about the negative support behavior of their partner, which may have evoked socially desirable answers. Social support also interacts with psychosocial riskfactors in the development of cardiovascular diseases, such as stress, depressed mood, and low socioeconomic status[21-23,28,31]. As a result of our cross-sectional design, we could not distinguish between cause and effect of self-management of health behavior, health outcomes, and social support.

Conclusion

In conclusion, structural support (having a partner) and active involvement are only associated with a decrease in BMI but not with any other change in vascular riskfactors. Functional support, such as protective buffering, can negatively influence blood glucose levels but is not associated with changes in other vascular riskfactors. Overprotection does not influence vascular riskfactors.

Implications for practice and future research

The structural support provided by partners should be borne in mind when new interventions are being developed and in future research. Health care professionals can invite partners to actively participate in improving their partners' eating habits and support this new behavior at home. However, since some types of partner support can also have a negative influence on patients, interventions to enhance social support should not only focus on increasing positive support but also on preventing or changing negative support.

Case story (example of overprotection)

A 63-year-old male patient who had had a cerebral vascular accident (CVA) and who was overweight (BMI 28 kg/m^2) with a systolic blood pressure of 180 mmHg visited the outpatient clinic run by the nurse practitioner. Emphasis was placed on education and counseling about health behavior concerning food choices, amount of food, salt, and calories; exercise habits; prescription of blood pressure-lowering medication; and monitoring blood pressure and bodyweight according local protocols. Because the patient was not able to travel alone to visit the outpatient clinic, his son and wife accompanied him. However, during the consultation, they overruled his questions and concerns. For this reason, his son and wife were asked to wait in the waiting room while the father talked to the nurse. If necessary they were called in. Systolic blood pressure decreased to 150 mmHg, due to better medication adherence and lower salt intake. Because of the fatigue related to the CVA, the patient was not able to take more exercise, but he walked daily and went swimming once a week. His BMI was stable at 28 kg/m^2.

Case story (example of lack of social support)

A 71-year-old male patient had peripheral arterial disease, a history of coronary heart disease, type 2 diabetes mellitus, overweight (BMI 32 kg/m2), hyperlipidemia (LDL cholesterol 3.2 mmol/l, triglycerides 2.8 mmol/l), and hypertension (systolic blood pressure 175 mmHg). He visited the outpatient clinic for education and counseling on health behavior change concerning all aspects of healthy lifestyle. Vascular riskfactors were treated according to protocol. The patient was a widower without children and lived alone. His hobby was taking daytrips by bus. He enjoyed the company of the travelers in the bus and the scheduled meals and activities. At first, to ensure that he could continue making these trips and to promote health behavior changes, we advised him to eat low-fat and low-salt meals. Secondly, we advised him to have diner in a nearby residential care home, to enlarge his social support circle. He agreed and managed to walk the distance between his own house and the residential care home as part of his daily exercise. After 1 year, blood pressure and LDL cholesterol were below target levels; diabetes treatment was switched from oral glucose-lowering drugs to insulin. His body weight remained stable.

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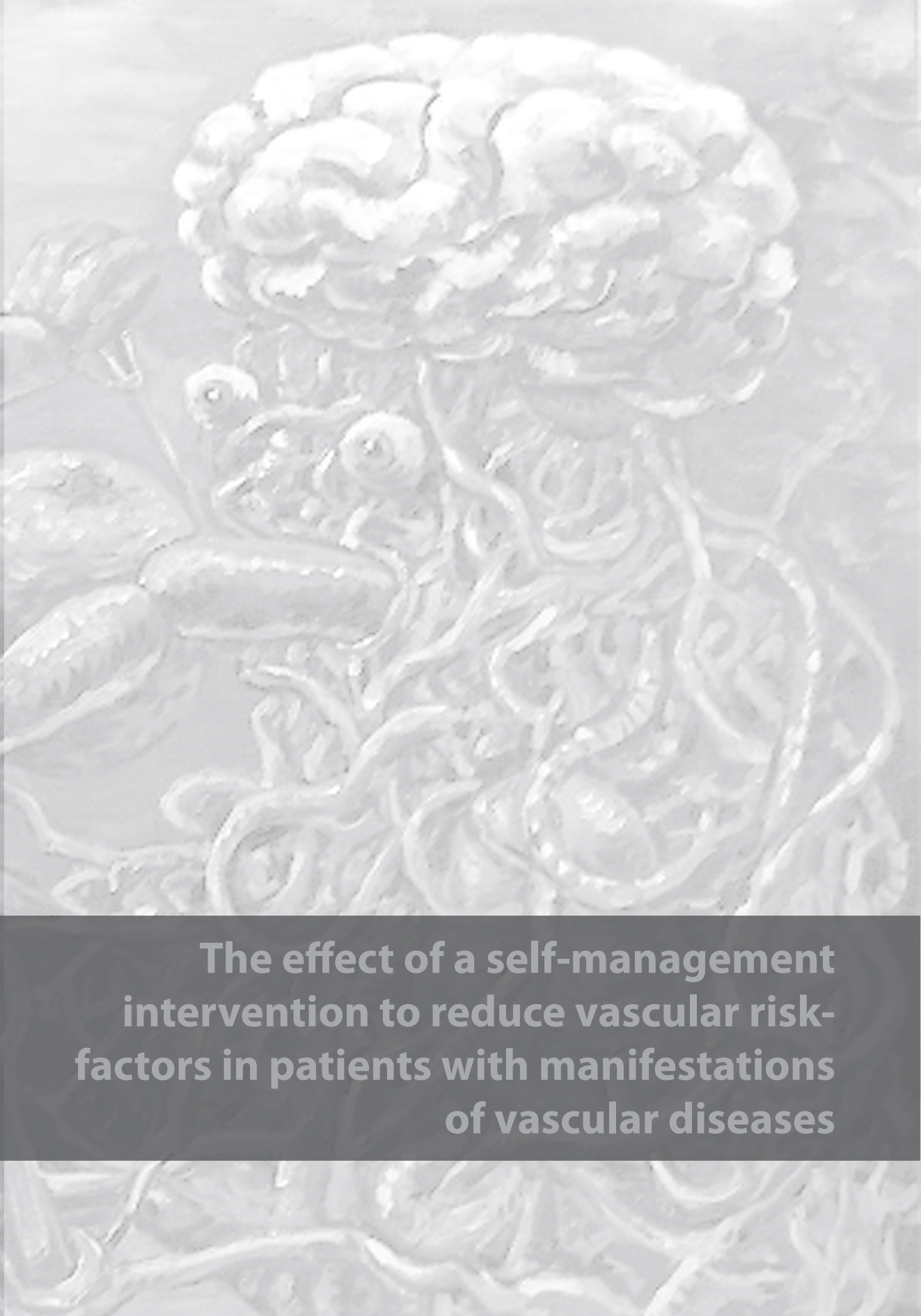


The effect of a self-management intervention to reduce vascular risk-factors in patients with manifestations of vascular diseases

Abstract

Background

Self-management improves health behavior and can be influential in reducing vascular risk. We developed a 1-year self-management intervention and compared the effect of this intervention plus usual care with usual care alone on vascular riskfactors and quality of life in patients with clinical manifestations of vascular diseases.

Design and Methods

In total 223 patients (self-management group n=125; control group n=98) with cerebrovascular disease, coronary artery disease, or peripheral arterial disease and at least two modifiable vascular riskfactors (hypertension, hypercholesterolemia, diabetes mellitus, overweight, or smoking) participated in the study.

Results

Patients in the self-management group achieved treatment goals for LDL cholesterol (difference 13% 95%CI 1-26) and HDL cholesterol (difference 9% 95%CI 0-19) more often than did patients in the control group. Mean systolic blood pressure decreased by 5 mmHg (95%CI -9 to 0) more in the self-management group than in the control group and mean BMI increased by 0.4 kg/m^2 (95%CI -0.8 to 0) more in the control group than in the self-management group. No significant differences were seen in waist circumference, smoking, or triglycerides. General health (RAND36) improved more (by 8 points 95%CI 3-12) in the self-management group than in the control group.

Conclusion

After 1 year, the self-management intervention had slightly more effect than usual care on several important vascular riskfactors in patients with clinical manifestations of vascular diseases.

Practice Implications

In this study we developed and implemented a self-management intervention in our hospital that potentially can be applicable in different care-settings.

Introduction

Cardiovascular diseases are still the most common causes of morbidity and mortality in Western countries[1]. Despite an overall reduction in cardiovascular mortality, vascular riskfactors, such as hypertension, hyperlipidemia, diabetes mellitus, obesity, unhealthy lifestyle, smoking, and psychosocial factors, account for the majority of incident cardiovascular diseases[2]. In clinical practice, awareness of the importance of reducing vascular riskfactors is increasing and so is the need for education and counseling for patients, to help them manage their vascular riskfactors and vascular disease[3-6].

A European multidisciplinary guideline for cardiovascular riskfactor management was issued in 2003[7] and integrated into Dutch guidelines in 2006[8]. In clinical practice, riskfactor management consists of medical treatment of vascular riskfactors and of supporting healthy behavior such as adherence to medical treatment[9], healthy food choices, no smoking, controlling weight, and having enough physical activity[2, 10]. This behavioral change is part of the self-management of health. Self-management is defined as the individual ability to manage symptoms, treatment, physical and psychological consequences, and lifestyle changes inherent to living with a chronic condition[11], such as established vascular disease.

In other chronic patient groups, self-management has been found to influence health behavior and outcomes such as reducing pain[12], effective medication use[13], glycemic control[14], reducing blood pressure[15], prevention of hospital admission[16] and improved quality of life[17]. Interventions that promote self-management can also contribute to successful risk reduction in vascular patients[5]. Based on Bandura's social cognitive approach to health behavioral change[18], we developed a patient-centered self-management intervention[19-21], based on the theory of self-efficacy promotion[22, 23], to support self-management of health behavior change[24] in combination with treatment of vascular risk factors[5, 20] for patients with vascular diseases.

In this study, we compared the effect of this 1-year self-management intervention in addition to usual care with usual care alone on the level of riskfactors and quality of life in patients with clinical manifestations of vascular disease.

Methods

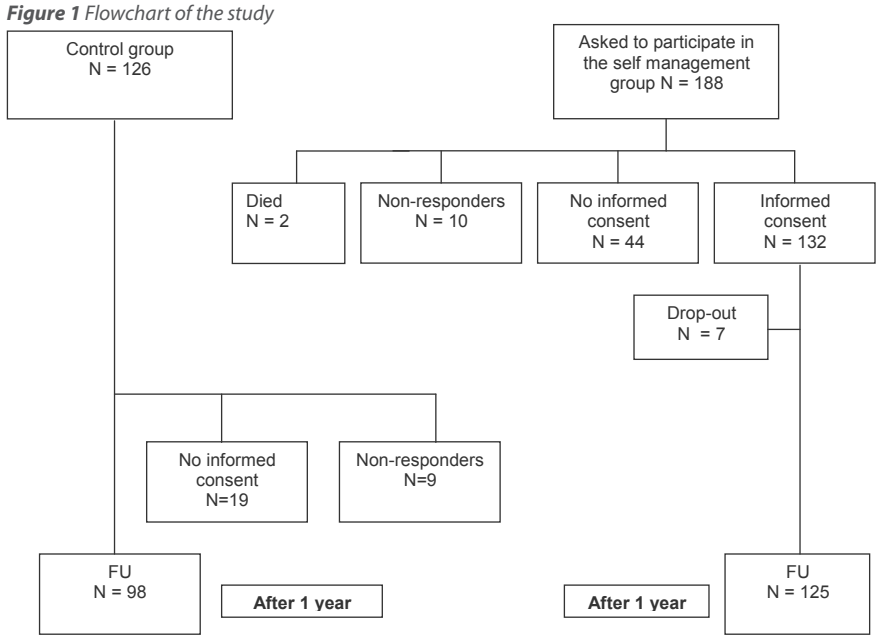
Study population and design

All participants had recently been referred for cerebrovascular disease, coronary artery disease, or peripheral arterial disease. These patients were asked to

participate in the study if they were younger than 80 years of age, without terminal malignant disease, independent in daily activities, able to read and write Dutch, and had at least two or more modifiable vascular riskfactors: hypertension (>140/90 mmHg), hypercholesterolemia (total cholesterol >4.5 mmol/l and/or low density lipoprotein (LDL) cholesterol >2.5 mmol/l,) diabetes mellitus (use of glucose-lowering agents), overweight (body mass index (BMI) >25kg/m^2), or current smoking.

In parallel to this study, another study was performed to investigate vascular risk management in general practice. For this study, the general practitioners (GPs) of referred vascular patients who met the same inclusion criteria were asked to participate. The GPs were randomized to the self-management or control group. Their patients were asked by mail to participate. The control group served as control group for both the present study and the GP study. For the self-management group of the present study, patients were invited by mail to participate if they met the inclusion criteria and if their GP's did not consent to participate in the GP study. Half of the patients (n=126) from the GP study (n=248) were randomly assigned to the (shared) control group (**Figure 1**).

Figure 1 *Flowchart of the study*



Twenty-eight patients did not consent or did not respond to the invitation to participate, leaving 98 patients in the control group. In total 188 patients were invited to participate in the self-management group, of whom 132 participated (44 patients did not consent to participate, most because they lived too far from the hospital, and 10 patients did not respond to the invitation). During the study 7 patients dropped out because they were not motivated. After 1 year, 125 patients returned for the evaluation visit. The study started in November 2004 and in June 2007 the last patient visited for the 1-year follow-up measurements.

Usual care of vascular riskfactors

Before participating in the study, all patients were screened for the presence of vascular diseases and riskfactors as part of the Secondary Manifestations of ARTerial diseases (SMART) program[25]. A questionnaire was used to report on other manifestations of vascular diseases, functional health, well-being, and smoking behavior. Blood pressure, height, weight, and waist circumference were measured, and blood samples were collected to measure serum glucose, total cholesterol, triglycerides and high density lipoprotein (HDL). LDL cholesterol was calculated according to Friedewalds' formula. Evidence-based treatment recommendations were given according to the Third Joint Task Force of European Societies[7] for the management of individual riskfactors and/or vascular disorders by a multidisciplinary team of vascular specialists. The results of the vascular screening program and the individualized treatment recommendations were reported in writing to the treating cardiologist, vascular surgeon or neurologist and to the general practitioner, all of whom used the same guidelines on cardiovascular disease prevention[7], with further action being left to their discretion. The results of the vascular screening were considered as baseline measurements. Patients in the control group also underwent vascular screening but did not receive specific interventions to improve self-management.
After 1 year, all patients were asked to fill in a questionnaire about smoking habits, functional health, and well-being, and to return for a follow-up visit for the measurement of vascular riskfactors (weight, waist circumference, blood pressure, LDL cholesterol, HDL cholesterol, triglycerides, and glucose plasma concentrations).

Treatment goals

The treatment recommendations and the self-management intervention used the following treatment goals: LDL cholesterol <2.5 mmol/l, systolic blood pressure <140 mmHg, complete smoking cessation, waist circumference ♂<102 cm and ♀<88 cm and BMI <25 kg/m^2. Because our patients already have clinical manifestations of vascular disease, we also added: HDL cholesterol ♂>1.0 mmol/l and ♀>1.2 mmol/l, triglycerides <2.0 mmol/l, glucose <6.1 mmol/l [7].

Self-management intervention

Theoretical concepts

On the basis of Bandura's social cognitive approach to health behavioral change[18] and self-management[26, 27], we developed a patient-centered self-management intervention[19-21] to promote self-efficacy[22, 23]. The intervention consisted of counseling[21] and motivation-enhancing approaches[28]. Self-management promotion was organized according to Wagner's cooperative problem definition[29]: achievable goal setting, support, and follow-up.

Counseling the self-management process

Patients were told of their vascular riskfactors and encouraged to set individual reachable goals[26, 27] for lifestyle changes, such as more exercise, healthy food choices, more attention for medication use, stop smoking, or other health-related goals. During counseling, the health counseling model[30] was used to guide the patients through the stages of behavioral change, including setting achievable goals and evaluating risks and influential factors, stress, and possible solutions. Goal-setting and results were discussed at follow-up visits[9, 11, 18, 31, 32]. Social support was facilitated by inviting the patients to bring their spouse or other important supportive relative with them to the outpatient clinic[18].

Training

Prior to the start of the intervention, each nurse practitioner received training in motivational interviewing by a certified MI trainer, with a view to improving counseling skills and guidance given to patients during the process of behavioral change. Nurses were also trained in promoting patient self-efficacy during counseling sessions. In total, training lasted 35 hours.

Vascular risk passport

To support feedback, a vascular risk passport was developed in our hospital by different vascular professionals and tested among representative groups of patients. The vascular risk passport is a booklet listing, for each patient, the riskfactors that do not meet treatment goals, together with advice (in terms of behavior, treatment, and treatment goals) for each vascular riskfactor. Patients are encouraged to register their own follow-up goals and results in the vascular risk passport.

Intervention process and implementation

All three nurse practitioners were trained and supervised weekly in providing medical treatment to reduce vascular risk factors[33]. Patients visited the outpatient clinic of the vascular medicine department. The first visit lasted 45-60 minutes, during which patients were told about the vascular risk passport and their problems and habits concerning the management of medication use, smoking, exercise, and food choices were evaluated. Follow-up sessions in the outpatient clinic lasted 30 minutes, or 15 minutes by telephone, and were structured according to the education and required behavioral change of the individual patient. The nurse practitioner registered progress at each consultation. After 1 year, the vascular specialist and general practitioner received a written report with results, to support follow-up monitoring of vascular riskfactors.

Data analysis

Continuous variables are presented as means with standard deviation (SD) and dichotomous variables as percentages. We calculated mean differences between the level of riskfactors in the self-management group and the control group. For dichotomous variables, differences in the proportion of patients in the self-management and control groups who achieved the treatment goals were determined. To adjust for baseline value of each vascular riskfactor, linear regression was used.
Quality of life was measured with the RAND-36 questionnaire[34, 35]. Linear regression was used to determine the difference in quality of life between the self-management group and the control group, adjusted for baseline quality of life. All effect measures are presented with 95% confidence intervals. Analyses were performed in SPSS version 14.0 (SPSS, Chicago, Illinois, USA).

Results and Discussion

Baseline characteristics

Most patients were men (72% in the self-management group and 85% in the control group) and overweight was the most common riskfactor (BMI > 25 kg/m^2, 77% and 82%, respectively) (**Table 1**). Coronary artery disease was the most prevalent vascular disease (66% and 70%); 54% and 48% of the population was diagnosed with hypertension, and 54% and 60% of the population did not

Table 1 *Baseline data of the population*

	Intervention group n=125	Control group n=98	no informed consent n=56
Sex (% male)	72	85	62
Age (years)	61 ±9.0	61±10	60±11
Systolic blood pressure (mmHg)	145 ±21	144 ±19	147±25
Diastolic blood pressure (mmHg)	83 ±11	83 ±10	83±12
Glucose (mmol/l)	6.0 ±1.7	6.1 ±1.4	6.8±2.7
BMI (kg/m2)	27.5 ±3.3	27.6 ±3.8	27.8±4.6
Waist (cm)	95 ±10	96 ±12	95±13
Total cholesterol (mmol/l)	4.6 ±1.1	4.5 ±1.0	4.7±1.0
LDL-cholesterol (mmol/l)	2.5 ±0.9	2.5 ±0.9	2.6±0.9
HDL-cholesterol (mmol/l)	1.3 ±0.4	1.3 ±0.3	1.4±0.4
Triglycerides (mmol/l)	1.8 ± 0.9	1.7 ±1.2	1.6±0.7
Smokers	17	15	37
Diabetes mellitus *[a]	14	22	36
Hypertension *[b]	54	48	66
Vascular diagnoses			
Cerebral vascular disease *	29	19	16
Peripheral arterial disease *	22	16	9
Coronary heart disease *	66	70	55
Riskfactors not meeting treatment goal			
Systolic blood pressure >140 mmHg	54	60	60
LDL-cholesterol >2.5 mmol/l	47	51	46
HDL-cholesterol <1.0 mmol/l	21	24	21
Triglycerides >2.0 mmol/l	31	20	20
Glucose >6.1 mmol/l	27	35	39
BMI >25 kg/m2	77	82	71
Waist ♂: >102 cm or ♀: >88 cm	41	33	30

Data are mean with SD or percentages
** ever or current diagnosis, a single person can be classified into more than one disease category*
a on glucose lowering drugs
b on bloodpressure lowering drugs

meet treatment goals for systolic blood pressure. Both groups were comparable with regard to history of vascular diseases, levels of vascular riskfactors, and proportion of riskfactors not at treatment level. Diabetes was diagnosed in 22% of patients in the control group and in 14% of patients in the self-management group.

Change in vascular riskfactors and achieved treatment goals

The absolute difference in mean systolic blood pressure between the self-management group and the control group was 5 mmHg (95%CI -9 to -0) (**Table 2**). The absolute difference in mean BMI between the self-management group and the control group was 0.4 kg/m^2 (95%CI -0.8 to 0.1). Adjustment for baseline blood pressure and BMI values did not influence the difference between the two groups. The difference in the proportion of patients that achieved the treatment goals was 13% (95%CI 1 to 26) for LDL cholesterol and 9% (95%CI 0 to 19) for HDL cholesterol after adjustment for baseline values (**Table 3**). There were no significant between-group differences in glucose, smoking, triglycerides, and waist circumference (**Table 2** and **3**). The average number of contacts between nurse practitioner and patients was 4.4 ±2.9, of which 53% were visits to the outpatient clinic and 46% were telephone contacts.

Quality of life

Functional health and well-being improved similarly in the two groups (**Table 4**). Scores for the dimension 'general health' decreased in the control group but increased in the self-management group (difference 8 95%CI 3 to 12). The general health score of healthy people is 4 points higher. In general, all scores in this study population were comparable to those of older healthy people (aged 65 to 75 years)[34].

Table 2 *Mean differences of riskfactors between the intervention (n=125) and the controlgroup (n=98)*

	intervention		control		mean Δ	95% CI	mean Δ *	95% CI
	baseline	follow up	baseline	follow up				
Systolic blood pressure (mmHg)	145±21	133±22	144±19	138±18	-5	-10 to 0	-5	-9 to 0
LDL-cholesterol (mmol/l)	2.5±0.9	2.4±1.1	2.5±0.9	2.4±1.0	-0.2	-0.5 to 0.1	-0.1	-0.4 to 0.1
HDL cholesterol (mmol/l)	1.3±0.4	1.4±0.9	1.3±0.3	1.3±0.5	0.1	0.0 to 0.2	0.1	-0.5 to 0.2
Triglycerides (mmol/l)	1.8±0.9	1.5±0.9	1.7±1.2	1.4±0.9	0.0	-0.2 to 0.2	0.0	-0.1 to 0.2
Glucose (mmol/l)	6.0 ±1.7	6.0±1.4	6.1±1.4	6.2±1.2	-0.1	-0.4 to 0.2	-0.1	-0.4 to 0.1
BMI (kg/m2)	27.5±3.3	27.5±3.3	27.6±3.8	28.0±3.8	-0.4	-0.8 to 0.0	-0.4	-0.8 to -0.1
Waist-circumference (cm)	95±10	98±10	96 ±12	100±12	-1	-2 to 1	-1	-2 to 1

Data are mean and SD
mean Δ = mean differences adjusted for baseline-value*

Table 3 *Proportions of patients who achieved treatment goals at baseline and follow up*

	Intervention group			Control group						
	baseline	follow up	%Δ	baseline	follow up	%Δ	absolute difference	95% CI	absolute difference*	95% CI
RR <140 mmHg	46	69	23	40	56	16	7	0 to 14	10	'-1 to 23
LDL-cholesterol <2.5 mmol/l	53	68	15	49	54	5	10	3 to 17	13	1 to 26
HDL-cholesterol >1.0 mmol/l	79	82	3	76	70	-6	9	1 to 15	9	0 to 19
Triglycerides <2.0 mmol/l	69	82	13	79	85	6	7	1 to 13	2	'-11 to 7
Glucose <6.1 mmol/l	72	68	-4	65	61	-4	0	-7 to 7	1	'-9 to 11
BMI <25 kg/m2	23	23	0	18	17	-1	1	-5 to 7	3	'-5 to 10
Waist ♂: <102 cm or ♀: <88 cm	59	50	-9	67	46	-21	12	5 to 19	8	'-3 to 19
Smoking	17	14	-3	15	17	2	5	-1 to 11	3	'-11 to 5

Data are proportions of the population
%Δ (Follow up - Baseline)
I - C 95% CI (Follow up value - Baseline value in the intervention group) - (Follow up value - Baseline value in the control group)
95% confidence interval of difference in proportion
I-C adjusted for baseline values*

Table 4 *Difference in quality of life (RAND35 questionnaire) between baseline and follow up in both groups*

	interventiongroup (n= 125)		controlgroup (n=98)		Δ	95%CI
	Baseline	Follow-up	Baseline	Follow-up		
physical functioning	63.5±26.7	72.0±24.4	68.9±23.4	73.9±24.0	2	-3 to 6
social functioning	72.6±25.5	80.4±21.4	69.6±25.4	78.6±25.0	1	-5 to 6
role-physical	45.7±43.8	72.3±40.7	41.1±43.0	66.3±39.8	5	-5 to 15
role-emotional	71.8±42.0	81.1±38.2	70.4±41.6	83.7±31.5	-2	-12 to 7
mental health	74.8±19.3	77.7±17.3	74.0±19.6	76.2±18.3	1	-3 to 4
vitality	57.4±22.1	63.7±19.5	58.5±20.8	62.0±20.1	2	-2 to 6
bodily pain	73.4±24.6	78.2±22.8	70.4±25.2	79.7±22.6	-3	-8 to 2
general health	55.8±21.2	60.8±21.8	59.9±19.5	56.3±19.7	8	3 to 12
health change	43.0±26.5	59.4±24.9	40.3±25.5	54.1±25.8	5	-2 to 12

Data represent mean (SD)

Δ = difference between intervention and controlgroup when adjusted for baseline value with corresponding 95% Confidence interval

Discussion and Conclusion

Discussion

In this study of the effect of a self-management intervention on vascular riskfactors in patients with clinical manifestations of vascular diseases, we found a larger decrease in LDL cholesterol and systolic blood pressure, a larger increase in HDL cholesterol, and a smaller increase in BMI in patients who followed the self-management intervention compared with patients who received care as usual. Although quality of life improved in both groups, general health was perceived to have improved more in the self-management group than in the usual care group. Our results were similar to those of the Venus trial[36] and of the Premier trial[37], which compared two lifestyle interventions to control blood pressure that were based on the same theoretical self-management concepts as those used in the present study. In our study, all patients were screened for vascular riskfactors and other vascular diseases, and the patients' vascular specialists and GPs received written treatment advice based on the screening findings. This treatment advice probably had a substantial effect on changes in the levels of vascular riskfactors in the usual care group.

The self-management intervention in the present study was effective in preventing further weight gain, as has been reported for other nurse-led lifestyle programs[36, 38]. It appears to be very difficult to reduce body weight in the long term[39], and weight maintenance may be an achievable goal over a 1-year period.

In the present study, we evaluated a 1-year self-management intervention, considering that 1 year would be long enough to allow patients to pass the different stages of change necessary to achieve behavioral change; however, this duration of intervention may be too short to generate long-term results. A large primary care, 1-year intervention study aiming at vascular risk reduction and lifestyle change reported a 5% change in mortality after 5 years of follow-up[40]. This suggests that patients with chronic vascular disorders need more time to learn to manage their own health and vascular risk.

Our study had some potential limitations. We did not perform a randomized trial, which would have been the best design for evaluating the effect of the intervention, but instead selected the intervention group on the basis of willingness and motivation to participate. In general, the study participants were highly motivated, which could have affected the outcome of the study and limits the generalization of our findings to all vascular patients or people at risk of developing vascular diseases. Moreover, the intervention was implemented during individual sessions with each patient, thereby excluding certain aspects, such as exchange of experiences and support from fellow participants, thought to be important for promoting self-efficacy[18,23,30].

Conclusion

A self-management intervention led by nurse practitioners was more effective than usual care in reducing several important vascular riskfactors and in improving general health in patients with clinical manifestations of vascular diseases after 1 year.

Practice implications

In this study we developed and implemented a self-management intervention in our hospital that potentially can be applicable in different care-settings. The developed intervention warrants the promotion of patient self-management to achieve a reduction in vascular riskfactors.

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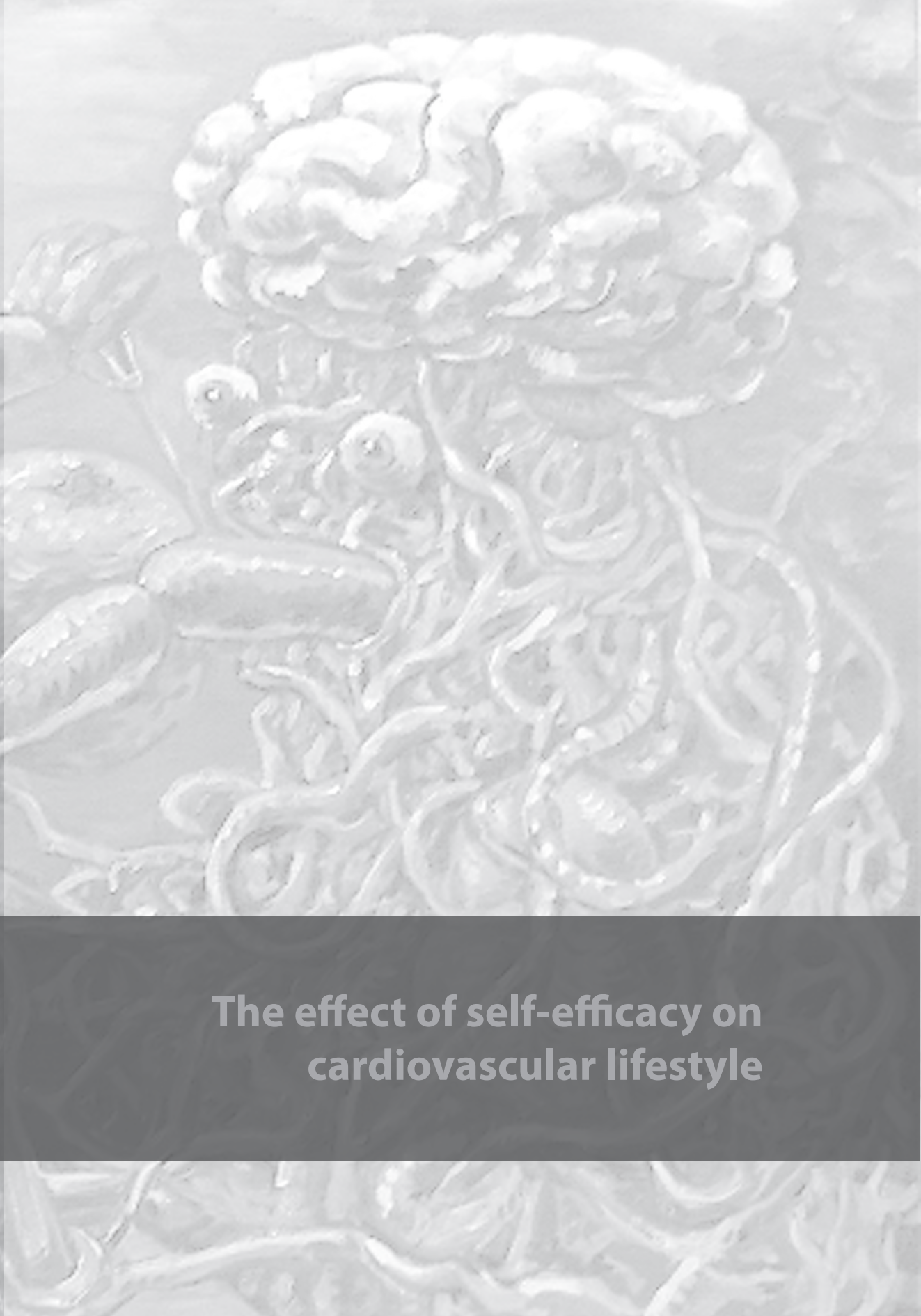


The effect of self-efficacy on cardiovascular lifestyle

Abstract

Background

It is important that patients with vascular diseases adopt a healthy lifestyle so as to reduce vascular risk. Since self-efficacy is an important precondition for health behavior change in patients with chronic disease, we investigated whether self-efficacy was associated with cardiovascular lifestyle in patients with clinical manifestations of vascular diseases.

Methods and design

In this observational cohort study, 125 patients who had recently been referred for cerebrovascular disease, coronary heart disease, or peripheral arterial disease participated in a 1-year self-management intervention. They completed a self-efficacy questionnaire and questions about their cardiovascular lifestyle at baseline and after 1 year. Logistic regression analyses were performed to quantify the impact of change in self-efficacy on physical activity, smoking behavior, alcohol consumption, and food choices.

Results

Improved self-efficacy was associated with improved adherence to guidelines for physical activity (OR 3.5 95%CI 1.0 – 11.0) and food choices (B 0.15 95%CI 0.00 - 0.31). No such improvement was seen regarding adherence to guidelines for smoking or alcohol intake.

Conclusion

In patients with vascular diseases, improvements in self-efficacy are associated with an improvement in cardiovascular lifestyle, namely, more exercise and better food choices.

Introduction

Improvements in the treatment of vascular diseases and in life expectancy have contributed to an increased number of patients with vascular diseases[1]. These patients are at high risk for new non-fatal and fatal vascular events. This risk is influenced by vascular riskfactors (e.g., hypertension, hyperlipidemia, diabetes, overweight) and unhealthy behavior (e.g., low physical exercise, smoking, and low fruit and vegetable intake)[2,3]. Even though attention is being paid to vascular riskfactors in clinical practice[4-7], the proportion of patients with vascular diseases who maintain unhealthy behavior is increasing[4].

Considering the lifelong risk of new vascular events, it is important not only to treat vascular riskfactors but also to improve cardiovascular lifestyle, by encouraging people to make healthy food choices, take enough exercise, and stop smoking[2]. Adopting a healthy cardiovascular lifestyle is an integral part of the guidelines for the management of cardiovascular risk factors[4] and can be considered a self-management task for patients[8]. Self-management refers to an individual's ability to manage symptoms, treatment, physical and psychosocial consequences, and lifestyle changes inherent to living with a chronic condition[9]. In social cognitive theory[10], self-efficacy, a person's confidence to carry out a specific behavior, is an important precondition for adequate self-management behavior[11]. In theory, self-efficacy is modifiable[12] and interventions to influence self-efficacy, such as self-management group programs for patients with different chronic diseases, are being developed[13-15]. Indeed, increased self-efficacy and self-management behavior are associated with adequate medication use[16], pain management[14], and exercise in various patient groups[17,18]. In patients with cardiovascular diseases, self-efficacy was found to have a beneficial effect on exercise and diet, but not on smoking[19]. While self-efficacy changed during cardiac rehabilitation, the change was not associated with exercise capacity[20]. In our studies involving patients with different vascular diseases, baseline self-efficacy or change in self-efficacy was not associated with change in vascular risk factors[21]. We hypothesize that improvements in self-efficacy facilitate more adequate self-management behavior, leading to a better/healthier cardiovascular lifestyle. We therefore investigated whether self-efficacy is associated with cardiovascular lifestyle in patients with clinical manifestations of vascular diseases.

Methods

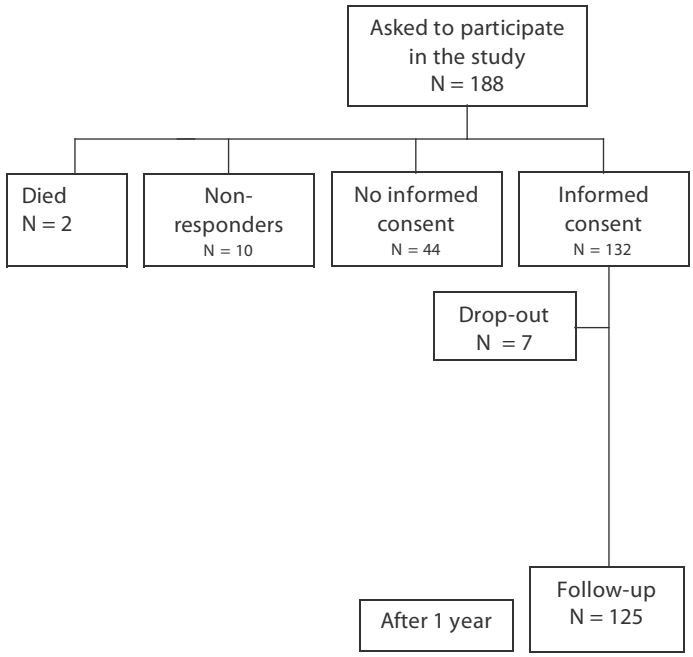
Study population and design

In this observational cohort study, all participants had recently been referred for cerebrovascular disease, coronary heart disease, or peripheral arterial disease. All patients were screened for the presence of vascular riskfactors as part of the Secondary Manifestations of ARTerial diseases (SMART) program[22].
For the present study, patients were asked to participate if they were younger than 80 years, did not have malignant disease, were independent in daily activities, were able to read and write Dutch, and had ≥ 2 modifiable vascular riskfactors: systolic blood pressure (>140 mmHg), total cholesterol >4.5 mmol/l and/or low-density lipoprotein (LDL) cholesterol >2.5 mmol/l, diabetes mellitus (defined as the use of glucose-lowering agents), body mass index (BMI) > 25 kg/m^2, waist circumference >102 cm(♂) + >88 cm (♀), or current smoking. After giving their informed consent, the participants received a self-efficacy questionnaire[23] and questions about their vascular lifestyle based on European guidelines for healthy food, exercise, alcohol intake, and smoking[4]. All patients received evidence-based treatment recommendations for the management of individual riskfactors and/or vascular disorders, based on the same European guidelines. The laboratory measurements of the SMART study were considered as baseline values in this study.
We invited 188 patients to participate, 54 of whom did not consent to participation (**Figure 1**). During the study, 2 patients died and 7 patients dropped out. After 1 year, 125 patients returned for the follow-up visit, to report on self-efficacy and vascular health behavior. The study started in November 2004, and data-acquisition was completed in June 2007.

The intervention

The participants were invited to visit the outpatient clinic for treatment of vascular riskfactors and support in self-management of cardiovascular lifestyle. The outpatient clinic was run by nurse practitioners supervised by vascular medical specialists (see Sol et al., submitted). The intervention program was based on the theory of self-efficacy promotion. Self-efficacy can be influenced by performance attainment, vicarious experience, verbal persuasion, and feedback[10,12,24,25]. Patients were given information and tailored advice about their own vascular riskfactors and how to reduce them, and then were encouraged to choose an attainable lifestyle goal, to facilitate success. Chosen lifestyle goals were evaluated regularly, as were body weight, blood pressure, waist, fasting lipid, and glucose levels, in order to give patients feedback on changes in vascular riskfactors.

Figure 1 *Flowchart of the study*



Self-efficacy

Self-efficacy, as an important precondition for successful self-management[10,26,27], was measured with the adapted diabetes mellitus type 2 self-efficacy questionnaire[21,23] at baseline and after 1 year. This scale was developed for use in patients with diabetes type 2[28]. We chose this scale because it covers the cardiovascular lifestyle factors relevant to vascular risk reduction, namely, choice of healthy food, regular exercise, smoking cessation, and adequate medication use. These factors are important for most common chronic illnesses[13]. The answer categories of the self-efficacy questionnaire ranged from 1 to 5, with 5 being the highest and best score. The Cronbach's α of the self-efficacy questionnaire was 0.76, indicating sufficient internal consistency[29].

Cardiovascular lifestyle

Cardiovascular lifestyle was evaluated with a questionnaire at baseline and after 1 year. The questionnaire collected information on smoking (former and current), alcohol intake, physical activity (hours/week spent on physical activity), and food habits. European cardiovascular guidelines recommend smoking cessation, 30 minutes of moderate intensive physical activity for at least 5 days a

week, eating at least 400 g fruit and vegetables, eating fish at least once a week, and moderate consumption of alcohol (men max. 3 units and women max 2 units a day). An example of a question is: *Do you eat two pieces of fruit every day?* Answer categories were always, regular, sometimes, or never with the answer 'always' being considered to reflect adherence to the guideline whereas the other categories were considered to reflect non-adherence.

Guidelines on saturated fat and salt intake are formulated in precise quantities (maximal of 10% of daily calorie intake and maximal 2400 mg/day)[31], but intake is difficult to quantify in practice. For this reason, we asked whether patients tried to lower their salt/fat intake, for example by asking: *Do you use low fat milk*? (always, regular, sometimes, or never). We analyzed the answers as continuous variables between 1 (never) and 4 (always).

Data analysis

If continuous variables were normally distributed, data are presented as means ± standard deviations (SD), otherwise median values with interquartile ranges are given. Differences in self-efficacy between baseline and follow-up were tested with paired T-test. Data on cardiovascular lifestyle are presented as proportions of patients following the guidelines on fish, fruit and vegetable intake, alcohol use, exercise, and smoking. Differences between baseline and follow-up were evaluated with McNemar test. Answers to questions on saturated fat and salt intake were categorized as 1 (never) to 4 (always), and differences between baseline and follow-up were evaluated with the paired T-test. For saturated fat, the answer categories ranged from 1 (unhealthy) to 4 (healthy), and for salt intake the answer categories ranged from 4 (unhealthy) to 1 (healthy). A composite food behavior variable was constructed combining fruit, vegetables, and fish together with saturated fat and salt intake, resulting in one score for food behavior ranging from 1 (unhealthy) to 4 (healthy).

Logistic regression analyses were performed to quantify the impact of self-efficacy on the attainment of lifestyle guidelines. A model was used to predict follow-up cardiovascular lifestyle, using age, gender, baseline cardiovascular lifestyle, and baseline self-efficacy. Results are presented as odds ratios (OR) with 95% confidence intervals (CI), reflecting the influence of self-efficacy at follow-up on the attainment of cardiovascular lifestyle recommendations at follow up.

Linear regression modeling was used to identify the relation between self-efficacy change and saturated fat and salt intake. Results are presented as regression coefficients (Beta) with 95% CI, reflecting the influence of self-efficacy at

follow-up on change in food choices, adjusted for sex, age baseline self-efficacy, and baseline food choices. Additional regression analyses were performed to quantify the difference between self-efficacy in participants either following or not following the exercise guideline at baseline.
Analyses were performed in SPSS version 15.0 (SPSS, Chicago, Illinois, USA).

Results

Baseline characteristics

Of the study population, 72% was male and 77% had a BMI >25 kg/m^2 (**Table 1**); 18% of the patients were obese (BMI >30kg/m^2). Most patients had been diagnosed with coronary heart disease (66%), 85% lived with a partner, 60% were former smokers, and 17% were current smokers.

Table 1 *Baseline characteristic (n=125)*

Sex (% male)	72
Age (years)	61±8.9
Systolic blood pressure (mmHg)	145±21
Diastolic blood pressure (mmHg)	83±11
Glucose (mmol/l)	5.6 (5.2-6.1)
BMI (kg/m2)	27.5±3.2
Waist (cm)	95±10
Total cholesterol (mmol/l)	4.6±1.0
LDL-cholesterol (mmol/l)	2.5±0.9
HDL-cholesterol (mmol/l)	1.3±0.4
Triglycerides (mmol/l)	1.6 (1.2-2.3)
Smokers (%)	17
Diabetes mellitus (%)[a]	15
Cerebral vascular disease (%)*	29
Peripheral arterial disease (%)*	22
Coronary heart disease (%)*	66

Data are mean with SD or percentages
[a] on glucose lowering drugs
** ever or current diagnosis, a single person can be classified into more than one disease category*

Self-efficacy and cardiovascular lifestyle

The highest mean self-efficacy score was for medication use (4.9±0.4) and the lowest was for weight reduction (3.6±1.1) (**Table 2**). While the largest

improvement in self-efficacy score was for healthy food choice (0.5±1.1), self-efficacy for weight reduction (0.4±1.2), general control of the vascular disease (0.3±0.9), and extra exercise (0.2±0.5) also improved.

Table 2 *Baseline and follow-up self-efficacy on different self-management tasks*

n=125	Baseline	Follow-up	fu-bl*	P-value‡
Medication	4.9 ± 0.4	4.9 ± 0.5	0.0 ± 0.5	0.62
Smoking	3.8 ± 1.5	3.9 ± 1.6	0.1 ± 1.2	0.44
Healthy food	3.9 ± 1.0	4.4 ± 0.8	0.5 ±1.1	<0.001
Exercise	4.1 ± 1.1	4.2 ± 1.1	0.1 ± 1.0	0.33
Extra exercise	3.9 ± 1.0	4.1 ± 1.1	0.2 ±1.0	0.01
Weight control	4.0 ± 1.0	4.3 ± 0.8	0.3 ±1.0	<0.001
Lower weight	3.6 ± 1.1	4.0 ± 1.0	0.4 ±1.2	0.001
Control disease	3.7 ± 0.8	4.0 ± 0.9	0.3 ± 0.9	<0.001
Total	3.7 ± 0.6	3.5 ± 0.6	0.2 ± 0.5	<0.001

Data represent mean (SD)
** Difference in self-eficacy within groups (follow-up - baseline)*
† P-value of the paired T-Test
Self-efficacy is measured on a scale of 1 (low self-efficacy) and 5 (high self-efficacy)

At baseline, 23% of the participants reported always eating fruit and 27% ate fish weekly (**Table 3**). At follow-up, these proportions had increased to 30% and 34%, respectively. Alcohol use at baseline was consistent with guideline recommendations in 92% of the patients but had decreased to 74% at follow-up. The proportion of patients who met the guideline for physical activity did not change between baseline and follow-up, but at follow-up 13% more participants had started physical activity (not in a table).
At follow-up, the use of low fat milk and vegetable oil had increased (0.22, 95%CI 0.08-0.36) and 0.27, 95%CI 0.10-0.43, respectively), and the use of salt in cooking had decreased (-0.21, 95%CI -0.40--0.03).

Change in self-efficacy related to cardiovascular lifestyle

Improvement in self-efficacy was associated with meeting exercise recommendations (OR 3.5 95% CI 1.0 – 11.0) adjusted for sex, age, baseline self-efficacy, and baseline exercise (**Table 3**). The influence of follow-up self-efficacy on the follow-up score for all food items was regression coefficient (ß) 0.15 (95%CI 0.00-0.31) indicating one unit change in self-efficacy is associated with 15% improvement of all food choices. For avoiding fatty meat Beta was 0.18 (95%CI 0.00-0.38) indicating one unit change in self-efficacy improved 18% in meat

Table 3 *Change of patients' cardiovascular lifestyle (n=125) in association with change in self-efficacy*

	Baseline	Follow Up	Δ % fu-bl	95%CI	influence self-efficacy (95%CI)[a]
According to the guidelines of CVRM					**OR**
Always consume two pieces of fruit every day (%)	23	30	7	1 – 14 **	2.5 (0.8 - 7.9)
Always consume vegetables every day (%)	45	41	-4	-13 - 4	1.1 (0.5 - 2.6)
Always consume fish every week (%)	27	34	7	0 – 15*	1.5 (0.6 - 3.7)
Alchol use max 3 units ♂ or 2 units ♀ per day (%)	92	74	-18	-26 – -8 **	1.2 (0.5 - 2.6)
2,5 hours moderate intensive exercise more per week (%)	28	30	2	-6 – 10	3.5 (1.1 - 11.0)†
No smoking (%)	83	86	3	-3 - 8	1.7 (0.5 - 5.9)
Saturated fat and sallt intake[b]			**Δ mean fu-bl**	**95%CI[b]**	**Beta**
Adding salt while cooking (mean)	3.11	2.90	-0.21	-0.40 – -0.03 ‡	-0.10 (-0.28 - 0.08)
Adding salt while eating (mean)	1.45	1.49	0.04	-0.10 – 0.18	-0.08 (-0.26 - 0.11)
Using low fat milk (mean)	3.28	3.50	0.22	0.08 – 0.36 ‡	0.15 (-0.04 - 0.34)
Using fluid oil (mean)	3.22	3.49	0.27	0.10 – 0.43 ‡	0.07 (-0.14 - 0.28)
Using low fat butter (mean)	3.17	3.19	0.02	-0.10 – 0.13	-0.14 (-0.04 - 0.32)
Avoiding fatty meat (mean)	3.32	3.46	0.14	-0.03 – 0.31†	0.18 (0.00 - 0.37) ♪
All food items (mean)[c]	3,06	3,19	0,13	0.07 – 0.18 ‡	0.15 (0.00 - 0.31) ♫

Data are mean scores or proportions of the population
a OR / ß is influence on FU lifestyle of follow up self-efficacy, adjusted for sex, age, baseline self-efficacy and baseline lifestyle
b using 4 answer categories: 1=never;2=seldom;3=mostly;4=always
c including fruit, vegetables, fish, salt & fat, after recoding salt items for higher=healthier
** p < 0.10, ** p < 0.05 on McNemar test*
† p < 0.05 on Wald-test
† p < 0.10, ‡ p < 0.05 on paired t-test
♪ p < 0.10, ♫ p < 0.05 on t-test

choices. Change in self-efficacy was not associated with the proportion of patients meeting guideline recommendations for fruit, vegetable, and fish consumption separately, smoking, and alcohol intake.
In patients who met the exercise recommendations at baseline, an increase in self-efficacy score of 0.8 at follow-up was associated with a 19% (from 65% to 84%) increased in the proportions of patients continuing to meet exercise recommendations at follow-up. In patients not meeting exercise recommendations at baseline, the same increase in self-efficacy score at follow-up was associated with a 14% (from 10% to 24%) increase in the proportion of patients meeting the exercise recommendations at follow-up.

Discussion and Conclusion

Discussion

In the present study, we found that changes in self-efficacy were associated with a higher proportion of patients with clinical manifestations of vascular disease who met guideline recommendations for physical activity and food choices. Alcohol intake increased above the recommended intake, and smoking did not change significantly. Thus the hypothesis that improvements in self-efficacy facilitate better self-management of cardiovascular lifestyle was confirmed with regard to physical activity and food choices. Self-efficacy scores had increased for all patients at follow-up, irrespective of baseline self-efficacy. In patients with arthritis, baseline self-efficacy was associated with the self-management of pain and self-care[26]. In patients with epilepsy, a low baseline self-efficacy was associated with a poor self-management of medication but not lifestyle[32]. These different findings suggest that disease-specific self-management tasks are associated with self-efficacy.
A person's lifestyle at baseline appears to be important for achieving a healthy lifestyle and for managing cardiovascular risk in patients with coronary heart disease[33,34-36]. At baseline, most of the patients in our study had an inadequate self-management of cardiovascular lifestyle factors (fruit intake, food choices concerning saturated fat, salt intake, and physical activity). A study of a middle-aged healthy population in the USA reported that 8.5% of the population had an optimal cardiovascular lifestyle and that 8.4% improved their cardiovascular lifestyle after a 6-year follow-up[33], indicating that unhealthy behavior, and reluctance or inability to change this behavior, is rather common. An inadequate self-management of vascular disease would be expected to influence cardiovascular lifestyle. Research has shown that patients with coronary heart disease

do not consider lifestyle changes important if they do not experience specific somatic problems, and expect lifestyle changes to be more difficult to accomplish than changes in medication use[37]. Sixty percent of the patients in our study had managed to stop smoking in the past and remained non-smokers, and 3% of the patients stopped smoking during the study. We found that a 0.8 higher level of self-efficacy was associated with physical activity and that increased self-efficacy was associated with sustaining physical activity. This may be an indication that patients also need self-efficacy promoting support in continuing physical activity[38].

Our study had some limitations. While 54 patients did not consent to participation (35%), the baseline characteristics of the non-participants were comparable to those of the participants group; however, differences in self-efficacy and cardiovascular lifestyle may have been present. While in clinical practice patients have various vascular illnesses and combinations of riskfactors, in the past many studies focused on only one vascular riskfactor, for example hypertension in specific high-risk patients, such as patients with coronary heart disease or diabetes[39,40]. Thus a strength of our study is that we included patients with a variety of vascular diseases and vascular riskfactors, all of whom were at high risk of developing new vascular events[41].

Conclusion

In this group of vascular patients, the improvements in cardiovascular lifestyle achieved were minor. Improvements in self-efficacy were associated with better self-management of physical activity and food behavior.

Practice implications

Interventions to promote self-efficacy may support the self-management of cardiovascular lifestyle with regard to physical activity and food choices in patients at high risk of new vascular events.

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Sol BG, van der Graaf J, Brouwer B, Hickop S, Visseren FLJ, The effect of a self-management intervention to reduce VRF in patients with manifestions of vascular dissease. Submitted

Discussion

Discussion

Self-management to improve treatment of vascular riskfactors

The successful treatment of vascular riskfactors is highly dependent on patients changing their health behaviour, such as taking enough exercise, making healthy food choices, stopping smoking, and adhering to prescribed medication[1]. Every day, patients make decisions about whether they exercise, what they eat, and whether to take their medication. The self-management intervention offers tools, such as education, feedback, modulation of social support, and self-efficacy promoting interventions, to support this change in health behaviour and recommendations tailored to the individual patient's possibilities and priorities[2]. However, as reported in the studies described in this thesis, this self-management approach did not lead to large improvements in vascular riskfactors. The results achieved with a combination of guideline-based vascular riskfactor treatment and self-management supporting interventions led by nurse practitioners are described in chapter 6. The self-management intervention resulted in 13% more patients achieving LDL-cholesterol treatment goals, 9% more patients reaching HDL-cholesterol treatment goals, a mean decrease in systolic blood pressure of 5 mmHg (but no difference in the proportion of patients reaching the blood pressure treatment goal), and no increase in BMI after 1 year; no effect was seen on glucose and smoking. Although the changes in riskfactors achieved with the self-management intervention were in the right direction, the absolute effect was relatively small. In this section, we discuss components of the intervention and the concept of self-management.

The self-management intervention

The self-management intervention compared to other secondary prevention interventions

Different types of intervention have been used in the treatment of vascular riskfactors, and especially in coronary heart disease (CHD). Multidisciplinary teams, working in specialized clinics and consisting of nurses and doctors, and sometimes dieticians and physiotherapists, deliver care aimed at reducing vascular risk factors[3]. However, the effectiveness of these secondary prevention clinics is variable. A recently published international programme for vascular risk reduction (Euroaction) that was based on changing the family lifestyle of patients with CHD in hospital care resulted after 1 year in significant improvements in food and exercise and a 12% (1–23%) increase in the proportion of patients

achieving blood pressure targets, but did not influence the proportion of patients who stopped smoking or who achieved blood lipid targets compared to usual care[4]. In this Euroaction programme, as well as in our smaller single-centre study presented in this thesis (chapter 6) and in the previously published VENUS study[5], the differences with usual care were relatively small. In all these studies, usual care may have been exceptionally good because of the existence of a comprehensive vascular screening programme that alerts physicians to the need to treat vascular riskfactors. The recently published guideline "Cardiovascular Risk Management in the Netherlands"[6] may have alerted healthcare professionals to the treatment of vascular riskfactors, thereby improving the level of usual care. In a comparable nurse-led intervention for vascular risk reduction in primary care for patients with CHD, treatment goals for cholesterol (OR 3.19) and blood pressure (OR 5.3) were achieved more frequently with the intervention than with usual care after 1 year[7]. Moreover, although differences between the intervention and control groups declined in the post-intervention period, the risk of development of vascular diseases and mortality was lower in the intervention group than in the control group at the 5-year follow-up (RR 0.76 95% CI 0.58–1.00 and RR 0.78 95%CI 0.58–0.98). The results for vascular riskfactors achieved with the self-management intervention presented in this thesis were similar. Given the results of longer follow-up studies with vascular endpoints, it would seem that self-management interventions might lead to a reduction in cardiovascular events.

Small results of the intervention

Despite the intervention, only a minority of patients improved their health behaviour to the extent recommended by guidelines[8]. A possible explanation for the small improvements in lifestyle is that treatment goals and guidelines define specific behaviour, such as 2.5 hours of moderately intensive exercise. In daily practice, people first need to be convinced that they can exercise safely (self-efficacy) before they are willing to start to exercise and to do it for a specified length of time. The self-management approach supports patients in setting attainable goals for behavioural change. Indeed, a weakness of many guidelines is that they often do not specify the importance of setting attainable, rather than ideal, goals. Our self-management approach is oriented towards the achievement of individual goals rather than protocol-based treatment goals, which may explain the modest improvement in riskfactors achieved.

The prevalence of obesity is increasing rapidly in the general population[9]. In the studies presented in this thesis, and in comparable intervention studies[5,10],

the intervention was associated with a stable BMI whereas BMI increased in the usual care group. Patients reported low self-efficacy scores for losing weight, which could indicate that patients think that it will be difficult to achieve this self-management task compared with other tasks. Achieving a BMI below 25 kg/m^2 might not be feasible in a middle-aged population, and for this reason preventing further weight gain should be considered a useful result of a self-management intervention even if guideline goals for weight are not met. While this modest achievement might not seem impressive, it may lead to cardiovascular risk reduction in the long term.

The duration and intensity of the intervention

In studies of vascular risk reduction, interventions have been implemented for a few months up to 5 years[3]. The intervention presented in this thesis lasted 1 year and consisted of a mean of 4.4 consultations per patient (chapter 6). This can also be viewed as usual care[5,7]. A more intensive intervention for patients with CHD involving weekly consultations for 4 months reported 1-year results for vascular riskfactors comparable to those presented in this thesis but better results for lifestyle improvements[4]. In a 2-year secondary prevention intervention study, the lifestyle improvements disappeared after 5 years[11]. Apparently interventions should be continuous in order to sustain the achieved changes in riskfactors. In a meta-analysis of diabetes self-management interventions, it became clear that repeated interventions with short-term follow-up are effective for blood pressure, cholesterol, lifestyle, and body weight[12]. From a practical perspective and in view of cost effectiveness, this may be a good approach.

Cardiovascular lifestyle as part of the intervention

The studies presented in this thesis demonstrated that it is difficult to achieve adequate self-management of cardiovascular riskfactors, such as taking medication, stopping smoking, making healthy food choices, and taking enough exercise. Only modest improvements in exercise and food choices were achieved in the self-management group (chapter 7).
One explanation for the difficulty in achieving a healthy lifestyle might be associated with an unhealthy lifestyle in general. In a study of middle-aged individuals with different vascular diseases, the level of unhealthy behaviour was found to be similar to that in healthy subjects[13]: fewer than 30% of the patients reported always consuming two pieces of fruit a day or eating fish once a week or not adding salt to their food. Moreover, as many as 45% of the patients did not make the healthiest food choices when it came to their intake of saturated

fat. Since this unhealthy behaviour was reported by patients who had already been diagnosed with a vascular disease, it can be assumed that these patients had a similarly unhealthy lifestyle before their disease was diagnosed. While unhealthy lifestyles are not easy to change, 60% of the patients in our study had in the past succeeded in giving up smoking – "only" 17% were current smokers. Better results were achieved for saturated fat intake than for exercise or salt intake. These findings are in line with the recognized associations between smoking, saturated fat intake, and the development of vascular diseases in the Netherlands[14]. Apparently the participants had successfully changed aspects of their behaviour in the past, such that only small changes could be expected with self-management interventions.

The intervention performance

Education, active patient participation, feedback, and self-efficacy promotion are important prerequisites for improving self-management. The success of interventions depends in part on the active involvement of patients in the day-to-day management of their health[15-17], and it is expected that a multidisciplinary treatment and care team for patients with vascular disease will facilitate patient involvement[18,19]. We measured patients' knowledge about the influence of different vascular riskfactors on the development of new vascular events. More than 90% of the questions on the association between cholesterol, blood pressure, body weight, and smoking and the development of vascular diseases were answered correctly at both baseline and follow-up. Thus patients with vascular diseases would appear to have adequate knowledge about the influence of vascular riskfactors on the development of vascular diseases.

We encouraged patients to set attainable goals, to increase the likelihood of success: individual goals for riskfactors were set in 45% of the consultations and in 35% of the consultations these goals were achieved. This indicates that the patient population was actively involved in achieving behavioural change. More patients reported asking their treating specialist questions: 39% at baseline and 85% at the end of the self-management intervention. Moreover, more patients contacted patient support groups (+9%) and searched internet (+53%), resulting in more patients who no longer needed to ask questions (+55%). This increase in active participation was in line with the improved self-management. We did not measure this in a control group, so these results cannot be considered an intervention effect. Goals were evaluated, and feedback was given to support successes. We did not establish vicarious experiences as part of the intervention with, for example, group sessions. This may be an explanation for

the modest effect on self-efficacy (food +0.4; exercise +0.3) (chapter 4) (food +0.5; exercise +0.2; weight +0.4 and general control +0.3) (chapter 7). It is probably valid to assume that the improvement in self-management was positively influenced by active participation and setting attainable goals.

The patient

The patient as a self-manager

Our studies included patients with CHD, peripheral vascular diseases, and cerebral vascular diseases. Studies of secondary prevention interventions for patients with different vascular diseases report different results. A vascular risk reduction intervention for patients waiting for CABG was not associated with a reduction in cholesterol but was associated with a reduction in systolic blood pressure (–9 mmHg), a decrease in the proportion of smokers, and a decrease in BMI (–1.0 kg/m^2) [20]. In contrast, a comparable intervention for a CHD population not specially waiting for any treatment showed no differences in vascular riskfactors compared to a control group of patients with CHD[11]. It is possible that differences in disease influence the results achieved. The motivation of patients with CHD to change their lifestyle appeared to be related to somatic problems such as pain or fatigue[21]. Patients with CHD due to undergo CABG can expected to experience more pain and fatigue than patients with stable disease and would therefore be more motivated to change their lifestyle to reduce their pain and fatigue. In other patients, self-management is also related to specific aspects of the disease, such as joint pain in patients with arthritis[22] or glucose regulation in patients with diabetes, which have short feedback mechanisms[23]. Our study included patients who were independent in daily activities, and such patients do not perceive themselves to have a chronic disease because their illness does not interfere greatly with their daily lives. These patients may experience less urgency to self-manage vascular riskfactors. Moreover, adequate self-management behaviour, such as adhering to medication, making healthy food choices, taking enough exercise, stopping smoking, and restricting alcohol intake, might be too difficult with too little short-term health benefit to compensate for patients' effort. We found that the participants made modest improvements in line with their own priorities. In the self-management approach, we expected the patients to be or to become aware of the urgency to change their health behaviour, but in clinical practice the urgency to change was low and may have contributed to the modest improvement in vascular riskfactor self-management observed. We may have overestimated the self-management

potential of the study population, which may have been comparable to that of a general healthy population adapting a healthier lifestyle.

Social support in vascular risk reduction

In patients with CHD, social support is associated with the presence of vascular riskfactors, morbidity, and mortality[24,25], but this association is not found in patients with peripheral vascular disease[26] or stroke[27]. In patients with CHD, the influence of social support was associated with the level of dependence in daily activities[28]. We included patients with different vascular diseases who were independent in daily activities, and therefore the influence of partners or other people from their social network may have been small. This may explain why, in our cross-sectional study, we found partner support to be associated only with a lower BMI (chapter 5) but not with other vascular riskfactors. In patients with CHD, improvements in lifestyle changes were established more frequently when partners participated: increased fruit and vegetable intake (37%, range 18–56%), fish consumption (9%, range 0–17%), reduced saturated fat (17%, range 6–28%), and exercise (28%, range 4–52%)[4,29]. These lifestyle improvements were larger than the improvements we detected in our study (chapter 7), which could be due to the approach to family and partner support that was used in the other studies. The separate influence of partner support is not known, but interventions to improve social support in patients with CHD are not associated with morbidity and mortality[30]. The influence of social support in vascular prevention is promising but has yet to be clarified.

Patients' self-efficacy in self-management of vascular risk

Self-efficacy reflects the importance of an individual's perception of his/her ability and capability to execute and achieve successful behavioural outcomes[16]. Self-efficacy is influenced by performance attainment, vicarious experiences, verbal persuasion, and feedback[31-33].We found a higher self-efficacy at follow-up to be associated with improvements in cardiovascular lifestyle (more exercise and better food choices) but not with smoking or alcohol intake (chapter 7). Other studies of patients with chronic illnesses have reported an association between a self-efficacy intervention and self-management behaviour[16,17]. Studies of self-efficacy in patients with cardiovascular diseases have reported variable results regarding the association between self-efficacy and behaviour (in this instance, exercise and diet)[34 35]. Although in our study the baseline self-efficacy scores were not associated with the level of cardiovascular lifestyle, self-efficacy scores at follow-up were associated with significant improvements

in food and exercise self-efficacy. Change in self-efficacy was not only associated with improvements in exercise, but also in maintenance of an adequate level of exercise. Thus an intervention promoting self-efficacy may be effective not only in stimulating inactive patients to take exercise but also in sustaining exercise. We expected self-efficacy to influence cardiovascular lifestyle as part of vascular risk management. This association was partly confirmed in the studies described in this thesis: interventions to promote self-efficacy were effective in improving food choices and in stimulating patients to take adequate levels of exercise.

Self-efficacy measurements

In our studies, we measured the self-efficacy of patients with vascular diseases in carrying out self-management tasks, such as taking medication, stopping smoking, making healthy food choices, increasing exercise, controlling or reducing body weight, and controlling disease[36]. In contrast to our expectations and other research[16,17,31], the high baseline self-efficacy scores could not be interpreted as a precondition for behavioural change (chapter 7) because they were not associated with a healthy lifestyle or change in lifestyle. The high self-efficacy score at baseline meant that changes at follow-up were small. It is possible that patients underestimated what a healthy lifestyle means as well as the difficulty of making changing their lifestyle. We used the adapted self-efficacy questionnaire to measure self-efficacy. Although this questionnaire was developed for patients with diabetes and covers general self-management tasks for patients with diabetes, we considered the items to be applicable to patients with vascular diseases (chapter 2), but this may not be the case. The underestimation of the difficulty to achieve behavioural change could be in part because the questionnaire did not ask appropriate questions. For example, the specific food choice question: "Do you (think you can) use low fat butter on your bread?" (chapter 7) could be used to evaluate food self-efficacy, together with questions concerning saturated fat, salt, etc. Instead we used a general question: "Do you think you can make healthy food choices?" (chapter 2), which neglects the different perceptions of healthy food choices we identified in our study (chapter 7). Thus the individual (chapter 6) and specific (chapter 7) approaches adopted in the self-management intervention we developed might not have been covered by the diabetes self-efficacy questionnaire. It is possible that only the general self-efficacy questions concerning exercise and food will be useful for future research. Alternatively, it may be necessary to develop a specific self-efficacy questionnaire that reflects the difficulty of making healthy food choices or taking exercise.

Lower self-efficacy scores were found for stopping smoking and reducing body weight, which might indicate that these behavioural changes are perceived to be more difficult than those concerning medication use or healthy food choices. The lower self-efficacy scores at baseline of patients who smoked, were overweight, or had diabetes may be an indication that these groups of patients are already more aware of the difficulties in self-managing behavioural change (chapter 3). In clinical practice, the self-efficacy questionnaire could prove useful during the patient consultation to determine individual differences in self-efficacy for the various vascular riskfactor self-management tasks, thereby facilitating the choice of attainable goal according to the best self-efficacy score.

Concluding remarks

Even though self-management is a promising and attractive approach to vascular risk management, the additional value of self-management is likely to be small. Stimulating self-management resulted in 13% more patients achieving LDL-cholesterol treatment goals, 9% more patients reaching HDL-cholesterol treatment goals, a decrease in mean systolic blood pressure of 5 mmHg, and a stable BMI after 1 year compared with the increase in patients receiving care as usual. This might be associated with the increase in exercise and improvements in food choices. No effect was seen on glucose and smoking.

The self-management intervention was aimed at promoting the active participation of patients in disease management and set attainable lifestyle goals rather than those mentioned in international guidelines. A self-efficacy and self-management intervention may be useful in improving food choices and exercise in patients with vascular diseases. Also, the self-management interventions resulted in marginal changes in self-efficacy. Other incentives may be needed to make patients aware of their own responsibility in vascular riskfactor management. For example, community initiatives are needed to promote exercise or to support individuals in adopting healthy behaviour. Public health education is also necessary, not only on the generally well-known consequences of excessive salt intake, but also on the contribution of physical inactivity to the development of vascular diseases and increased vascular risk. Continuing attention for short-term interventions to improve lifestyle and vascular risk reduction is necessary, as is research to realize the potential of social support in vascular prevention for patients with vascular diseases.

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Summary

This thesis addresses the self-management of vascular riskfactors in patients recently diagnosed with vascular diseases. Successful treatment of vascular riskfactors is highly dependent on adequate medication use, weight control, healthy food choices, smoking cessation, and physical exercise. These are all patient self-management tasks. Effective self-management is influenced by self-efficacy and the presence of social support. In the studies described in this thesis, we focused on self-efficacy and social support and their association with vascular riskfactor management. To this end, we developed a self-management intervention. In **chapter 2**, vascular disease is described as a chronic illness. Because of improvements in the treatment of the different acute and chronic manifestations of vascular diseases, more people with vascular diseases live longer and have to adapt to living with a vascular disease. In this chapter, specific problems in vascular self-management, such as unawareness of riskfactors, poor information about levels of riskfactors and medication use, and little immediate health benefit from behavioral changes (which are often difficult to achieve in the first place), are discussed. In theory, self-efficacy is a precondition for successful self-management. The combined contribution of doctors and nurses to the treatment of vascular riskfactors and to patient counseling with regard to changing health behavior is described, as are approaches to address these specific vascular self-management problems, such as education about the presence of riskfactors, regular feedback on changes in riskfactors, and counseling on health behavior change. Nursing care has a place in vascular risk reduction strategies, because it can integrate the medical treatment of vascular riskfactors such as hypertension, hyperlipidemia or hyperglycemia, with self-management promotion to improve cardiovascular lifestyle.

In the study described in **chapter 3**, we measured self-efficacy in the performance of the different vascular adaptive tasks in patients with different manifestations of vascular diseases. These patients already had high baseline levels of self-efficacy in the self-management tasks necessary for adequate vascular risk reduction. However, the overall self-efficacy of patients with diabetes, overweight (BMI > 30 kg/m^2), or current smoking was significantly lower than that of other patients: these patients had higher self-efficacy scores for medication use, exercise, and weight control, but lower scores for food choices and smoking. In **chapter** 4, the changes in self-efficacy from baseline to follow-up 1 year later achieved by patients with manifestations of vascular diseases are described. The self-efficacy scores of the patients participating in a nurse-led vascular risk reduction intervention program were compared with those of the patients from a control group receiving usual care. Self-efficacy levels for healthy food choices

and exercise had increased, but other self-efficacy scores were not influenced by the intervention. Changes in self-efficacy between baseline and follow-up were not associated with changes in vascular riskfactors. Thus although the mean self-efficacy of the patients was not influenced by the intervention, self-efficacy in food choices and exercise was improved. This shows that interventions to help patients make behavioral changes with regard to these self-management tasks can be successful. Because of the small differences between self-efficacy in the intervention group and the control group at follow-up, we propose that such interventions should focus on self-efficacy.

In clinical practice, social support influences the self-management of vascular riskfactors. Because social support is an important precondition for successful self-management, we also studied social support in association with vascular riskfactors in patients with vascular diseases in the study described in **chapter 5**. Structural social support is high among patients with different manifestations of vascular diseases. We measured patients' perceptions of positive and negative functional social support and found that having a partner was associated with a decrease in BMI and that social support was associated with a decrease in BMI and blood glucose levels. No other associations between social support and vascular risk management were found. Knowledge of this association is important because partners can be encouraged to become more actively involved in interventions aimed at weight reduction.

In the study described in **chapter 6**, we presented a self-management intervention for vascular risk reduction. This intervention is based on the social cognitive approach to achieving health behavioral change and promotes self-management and self-efficacy in combination with guideline-based treatment of vascular riskfactors. Nurse practitioners delivering the intervention received specific education and training. To provide feedback and to increase patients' awareness of their vascular riskfactors, patients were given an individualized vascular risk passport that contained information about that his/her riskfactors and targeted treatment advice (behavior changes and medical treatment). The effect of the intervention was measured by calculating changes in vascular riskfactors and change in quality of life in the self-management group and in a usual care control group. LDL-cholesterol, HDL-cholesterol, and blood pressure were reduced slightly more and there was no increase in BMI in the self-management group compared to the usual care group. Smoking and glucose concentrations were not influenced by the intervention. Quality of life, in terms of general health, improved more in the self-management group than in the control group. Thus a self-management intervention led by nurse practitioners

was slightly more effective than usual care in reducing several important vascular riskfactors and in improving quality of life in patients with vascular diseases. It therefore seems worthwhile to promote patient self-management to achieve a reduction in vascular riskfactors.

To further clarify the role of self-efficacy in the self-management of vascular risk in patients with different vascular diseases, we analyzed self-efficacy in association with changes in vascular health behavior in the study described in **chapter 7**. Vascular health behavior, such as taking enough exercise, making healthy food choices, and stop smoking, influences vascular risk. Self-efficacy was measured at baseline and at follow-up, and vascular health behavior was measured by questioning participants about their daily habits concerning exercise, fish, fruit and vegetable intake, use of salt, alcohol consumption, and smoking habits. A small proportion of subjects already had a healthy lifestyle at baseline. At the 1-year follow-up, improvements in self-efficacy were seen with regard to fruit and fish consumption (increased), salt intake (decreased), and choice of fatty foods (decreased). These changes in self-efficacy were associated with changes in food choices and with more physical exercise. Thus self-efficacy promoting interventions specifically directed toward food choices and physical exercise may further promote a healthy cardiovascular lifestyle. This needs to be investigated in further studies.

In the **chapter 8**, we discussed reasons for the relatively small effects of the self-management intervention. Attainable individually chosen goals for behavioral change were not the same as protocol-based treatment goals, and this difference influenced the results. Other recent vascular risk reduction interventions have also reported small effects. The optimal duration of a vascular risk reduction intervention is not yet clear, and thus it is possible that a short, intense program may be more effective. It is important to set realistic goals. Because obesity is becoming more common among the general population, it may be more realistic to try to prevent further weight gain rather than to try to achieve a BMI below 25 kg/m^2. A last difficulty in evaluating the success of interventions to promote health self-management is that vascular diseases have relatively little influence on a person's ability to perform activities of daily life and thus people may not perceive the need to make behavioral changes.

In clinical practice, the influence of partner support on reducing BMI could be used in a family approach to lifestyle change. The self-efficacy questionnaire is useful in clinical care for assessing potentially achievable goals for health behavior change. Change in self-efficacy concerning food choices and exercise can be used to evaluate self-management care.

Samenvatting

Ondanks veel verbeteringen in de behandeling zijn hart- en vaatziekten nog steeds de belangrijkste oorzaak van ziekte en overlijden in Nederland. Het aantal mensen dat een cardiovasculaire ziekte krijgt neemt nog steeds toe. Het risico op een volgend hart- of herseninfarct wordt grotendeels bepaald door de aanwezigheid van risicofactoren zoals verhoogde bloeddruk, cholesterol of bloedglucose, te weinig bewegen, overgewicht, ongezond eten en roken. Onderzoek bij mensen met een hart- of vaatziekte heeft aangetoond dat door goed behandelen van deze vasculaire risicofactoren de kans op een nieuwe vasculaire ziekte of overlijden kan worden verkleind. In de klinische praktijk blijkt echter dat ondanks verbeteringen in de behandeling, streefwaarden voor bloeddruk, cholesterol, glucose of gewicht vaak niet gehaald worden. Het aantal patiënten met een ongezonde leefstijl zoals roken en overgewicht neemt toe. Effectievere interventies zijn noodzakelijk om cardiovasculair risico te reduceren in de groeiende groep patiënten met hart- en vaatziekten.

Uitgangspunt van het onderzoek beschreven in dit proefschrift is, dat het succes van de behandeling van vasculaire risicofactoren in hoge mate wordt bepaald door de patiënt zelf (**hoofdstuk 2**). Adequaat medicatiegebruik, gewichtscontrole, gezonde voedingskeuzen, stoppen met roken en voldoende beweging zijn doorslaggevend. Dit gezondheidsgedrag kan beschouwd worden als 'zelfmanagement' van vasculaire risicofactoren. In de dagelijkse praktijk maken mensen zelf de keuze of ze in beweging komen, wat ze eten, of ze de voorgeschreven medicatie innemen en of ze roken. Zelfmanagement wordt gedefinieerd als het individuele vermogen om te gaan met symptomen, behandeling, lichamelijke en psychische consequenties en leefstijlveranderingen inherent aan leven met een chronisch gezondheidsprobleem. Zelfmanagement is gericht op continuïteit en behoud van kwaliteit van leven. Een voorwaarde daarbij is eigen effectiviteit (self-efficacy): het geloof in eigen kunnen. Daarnaast is de sociale steun van andere mensen (familie, vrienden etc.) ook van invloed. Een gezondheidsprobleem vraagt aanpassing van het gedrag. Als men er van overtuigd is dat dit nieuwe gedrag ook uitvoerbaar is (eigen effectiviteit), dan is de kans op succes ook groter. Als de mensen uit de omgeving kunnen meedoen of steunen dan helpt dat ook. Dit blijken belangrijke voorspellers te zijn voor effectief zelfmanagement bij andere chronische patiëntengroepen. Of dit ook het geval is bij zelfmanagement van vasculaire risico's bij patiënten met hart- en vaatziekten is niet bekend. Voor de behandeling van vasculaire risicofactoren is zelfmanagement een veelbelovend concept. Daarom is in dit proefschrift onderzoek beschreven gericht op zorg waarin zelfmanagement wordt bevorderd, zodat vasculaire risico's verminderen bij patiënten met verschillende vasculaire diagnosen, zoals hartinfarct, herseninfarct of perifere vaatziekten.

In de VENUS studie (**hoofdstuk 3**) is onderzocht wat de relatie was tussen self-efficacy (eigen effectiviteit) en vasculaire risicofactoren zoals verhoogde bloeddruk, verhoogd cholesterol, verhoogd glucose, roken en overgewicht. Mensen met hart- en vaatziekten scoren relatief hoog op self-efficacy betreffende medicatiegebruik, gezonde voeding, meer beweging, stoppen met roken en gewichtscontrole. Bij de patiënten met overgewicht, diabetes of roken was er een wat lagere score. Ook was de self-efficacy score voor stoppen met roken en afvallen lager dan de score voor meer bewegen of goed medicatiegebruik. Na 1 jaar follow-up was de self-efficacy score hoger voor beweging en gezonde voeding in de groep patiënten die werd begeleid door een verpleegkundige (**hoofdstuk 4**). Deze verbetering was niet gerelateerd aan verbeteringen van vasculaire risicofactoren .

In **hoofdstuk 5** is de invloed van sociale steun op vasculaire risicofactoren gepresenteerd. Sociale steun is geassocieerd met zelfmanagement en met het ontstaan van ziekte en overlijden bij patiënten met hart- en vaatziekten. Of er ook een relatie is tussen sociale steun en vasculaire risicofactoren was niet bekend. Daarom hebben we in deze groep de sociale steun als beïnvloedende factor op zelfmanagement gemeten met een vragenlijst. Specifiek is gekeken naar de aanwezigheid van een partner en positief en/of negatief ervaren sociale steun in relatie tot vasculaire risicofactoren. We zagen dat patiënten met een partner en positieve emotionele steun succesvoller waren in het verlagen van de BMI. Het actief betrekken van partners kan het vasculaire risico betreffende overgewicht verbeteren.

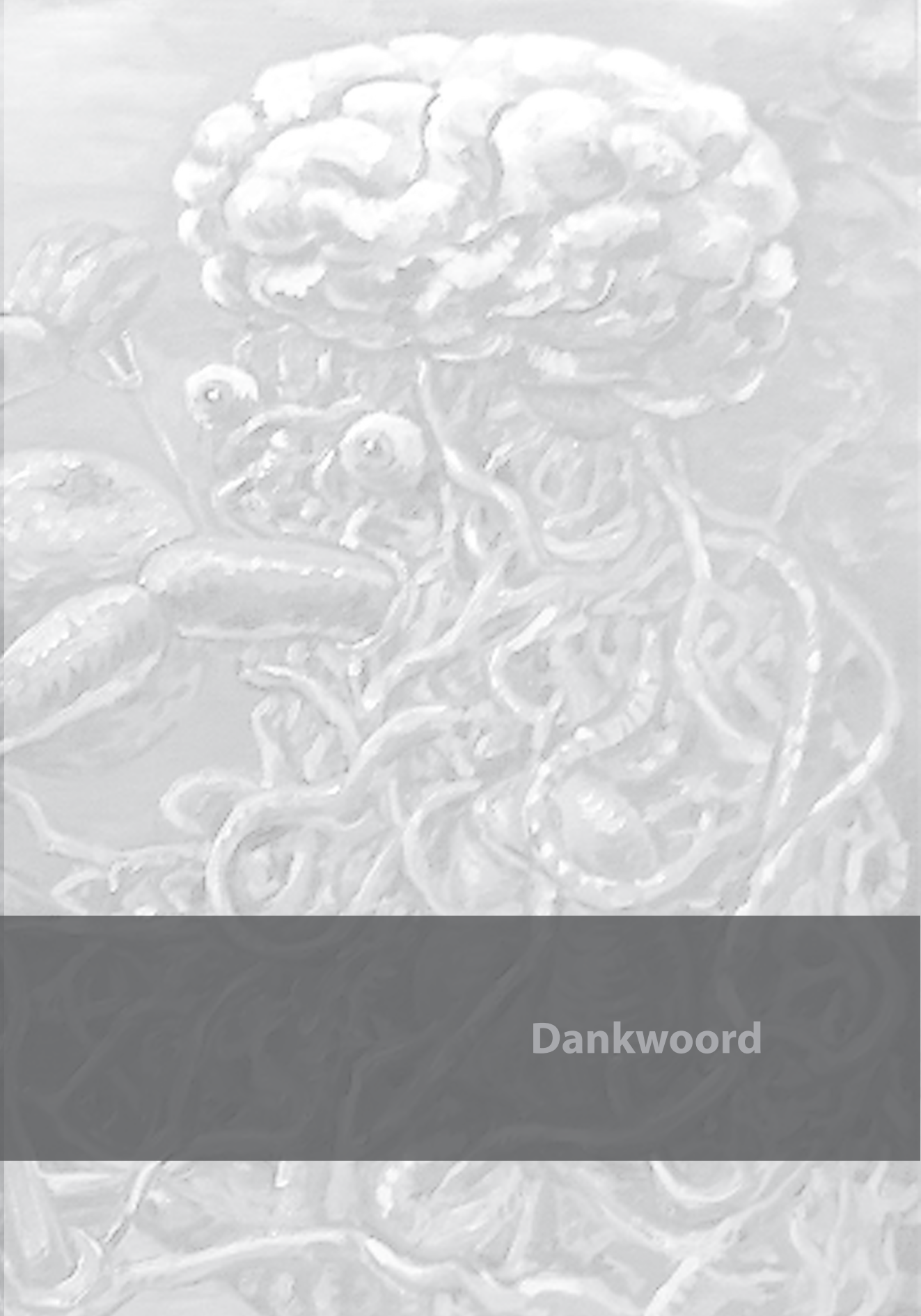
De nieuwe verpleegkundige zorg is verder toegespitst op self-efficacy en de verpleegkundig specialisten zijn getraind in motiverende gespreksvoering en self-efficay bevorderende zorg, zoals beschreven en geëvalueerd in de VIP studie (**hoofdstuk 6**). Deze zorg is ontwikkeld voor patiënten met verschillende vaatziekten zoals een hartinfarct, een herseninfarct of perifere vaatziekten. De patiënten werden gedurende een jaar volgens protocol behandeld en begeleid. Bij de begeleiding is een risicopaspoort gebruikt, waarin voor elke individuele patiënt de risicofactoren staan, met daarbij wat de patiënt zelf kan doen om deze te beïnvloeden. Patiënten kunnen aan de hand van de eigen risico's concrete en haalbare doelen stellen en realiseren gericht op verminderen van het vasculaire risico. In de zorg voor patiënten met hart- en vaatziekten kan zelfmanagement bevorderd worden door samen te werken met en aan te sluiten bij de eigen effectiviteit van patiënten, door gedragsverandering te ondersteunen, feedback te geven over de vorderingen en follow-up te organiseren. De resultaten van de zelfmanagement groep zijn vergeleken met reguliere zorg in een controlegroep. Op een aantal vasculaire risicofactoren, zoals cholesterol

en bloeddruk was de zelfmanagement benadering effectiever dan gewone behandeling: 13% meer patiënten bereikten het LDL-cholesterol behandeldoel, de bloeddruk daalde 5 mmHg meer en 9% meer patiënten behaalden het behandeldoel voor HDL-cholesterol in de zelfmanagement groep. De BMI nam niet toe in de zelfmanagement groep; dit in tegenstelling tot de controlegroep. De kwaliteit van leven betreffende algemene gezondheid was meer verbeterd in de zelfmanagementgroep dan in de controle groep. De conclusies uit dit onderzoek zijn, dat de zelfmanagement interventie wat effectiever was in het verminderen van de vasculaire risicofactoren en verbeteren van de kwaliteit van leven, in vergelijking met gewone zorg. In de zelfmanagement interventie was veel aandacht voor individuele keuzen, haalbare doelen en prioriteiten. De patiënten hebben kleine verbeterstappen gerealiseerd in cardiovasculaire leefstijl zoals starten met sport of verminderen van zoutgebruik. Deze keuzen waren niet vanzelfsprekend in aansluiting op richtlijn- of behandeldoelen zoals een BMI onder de 25 kg/m^2 of een bloeddruk onder de 140 mmHg. Mede daardoor zijn de resultaten van de interventie op vasculaire risico reductie bescheiden.

De invloed van self-efficacy in zelfmanagement op leefstijl van patiënten met hart- en vaatziekten is nader bestudeerd door te kijken naar de relatie tussen self-efficacy en leefstijl in **hoofdstuk 7**. Hiervoor is een vragenlijst gebruikt over beweging, voedingskeuzen, roken en alcoholgebruik. Dit is samen met self-efficacy aan het begin en na 1 jaar gemeten. Self-efficacy van beweging en voeding was verbeterd en deze verandering was geassocieerd met verbeteringen in beweging en in voedingskeuzen. In de zorg voor patiënten met vaatziekten geeft verbetering in de self-efficacy score (zoals in dit onderzoek op voeding en beweging) succesvoller zelfmanagement van deze vasculaire risicofactoren. Voor afvallen en stoppen met roken geldt dit niet.

Uit dit onderzoek komen de volgende aanbevelingen voor de praktijk: In de individuele patiëntenzorg kan de self-efficacy vragenlijst gebruikt worden bij het maken van de keuze voor een haalbaar doel. Een hoge score bijvoorbeeld op bewegen kan de haalbaarheid van een gekozen doel op dat gebied ondersteunen.

Herhaalmetingen van self-efficacy van bewegen en voeding kunnen een indicatie geven van verbeteringen op dit gebied. Deze gegevens kunnen gebruikt worden bij de evaluatie van zelfmanagementzorg voor deze vasculaire risicofactoren.



Dankwoord

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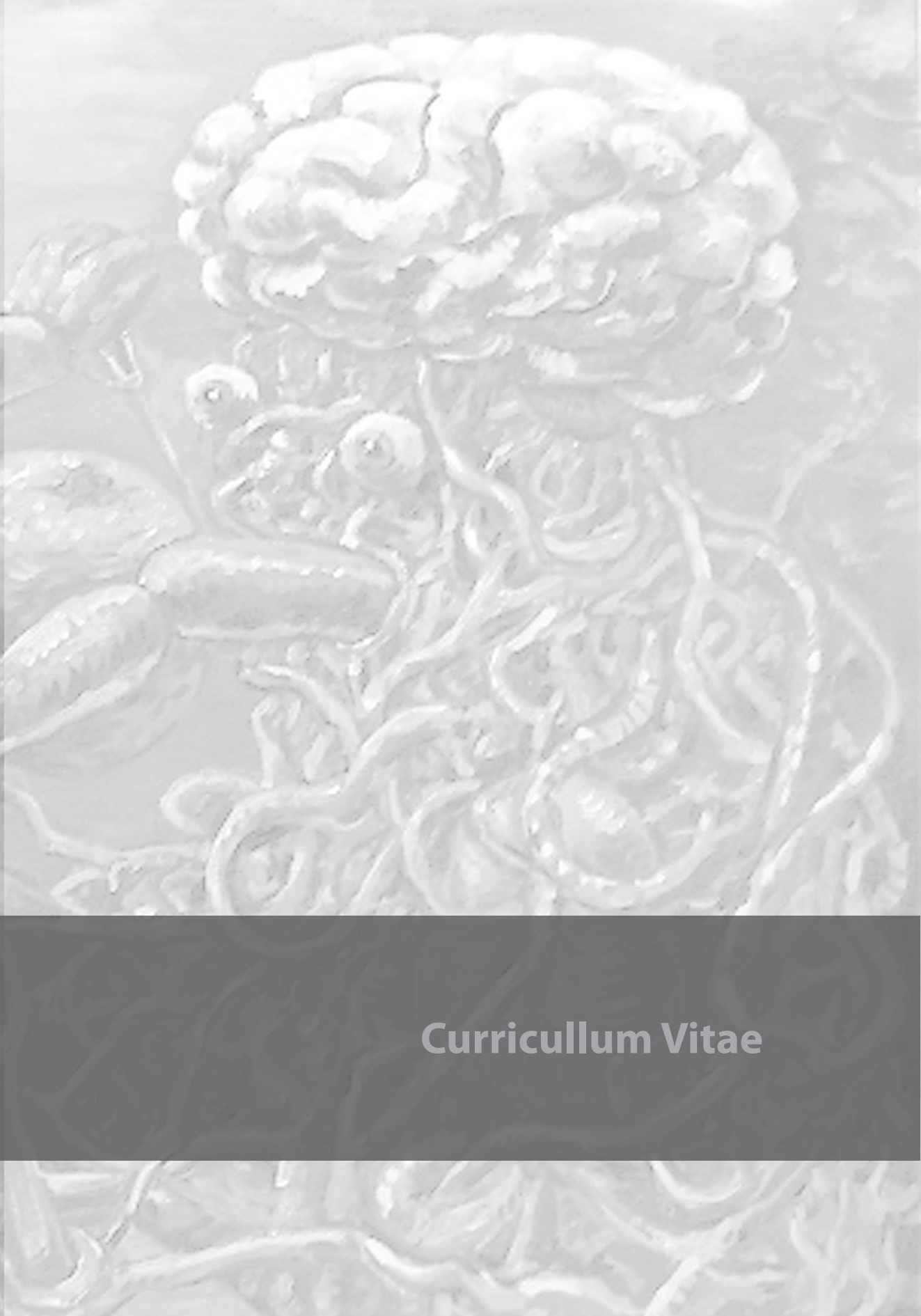

Curricullum Vitae

Berna Sol–de Rijk was born on February 14th 1958 in Amsterdam, the Netherlands. In 1976 she finished high school in Amsterdam and started her nursing studies at Slotervaart Hospital, Amsterdam, which she completed in 1980. Between 1981 and 1993 she worked in several hospitals and home-care organizations and developed an interest in the care of patients with chronic diseases. While working as a diabetes nurse specialist, she successfully completed the Nurse Specialist program at the Hogeschool of Utrecht in 1997 and went on to graduate as Master of Science in Nursing from the Hogeschool of Utrecht/ University of Wales in 2001. In 1999 she started working as nurse specialist at the Department of Clinical Geriatrics in the University Medical Center Utrecht and in 2002 she became a vascular clinical nurse specialist, combining her work with the vascular research described in this thesis. To support her research activities, she followed various courses.

Berna Sol-de Rijk has been actively involved in Dutch professional nursing organizations such as the Agemene Vergadering Verpleeegkundigen en Verzorgenden (AVVV), Europese Associatie Diabetes Verpleegkundigen (EADV), and the Nederlandse Vereniging voor Hart en Vaat Verpleegkundigen (NVHVV). Until recently, she was chair of the "leadership succession committee" of Rho Chi, a chapter of Sigma Theta Tau International, the Honor Society of Nursing.

She is a member of the Council on Cardiovascular Nursing and Allied Professions (CCNAP) and is a member of the Board of the Platform Vitale Vaten, an initiative of patient support groups. In the latter capacity, she helped to develop the recently published (2009) implementation aid for the vascular risk management guideline (Zorgstandaard).