

QUALITY OF CARE IN STROKE PREVENTION

An audit among general practitioners

This research project was financially supported by the Quality of Care Research Program (ZwaZo) of the Netherlands Organisation for Health Research and Development (ZonMW) and performed at the Department of Public Health of the Erasmus MC, University Medical Center Rotterdam. The printing of this thesis was financially supported by the Erasmus MC, University Medical Center Rotterdam and Sanofi-Synthelabo.

The study described in this thesis was supported by a grant of the Netherlands Heart Foundation (NHF-2003P045)

Quality of care in stroke prevention: an audit among general practitioners. De Koning, Johan S.

Thesis Erasmus MC, University Medical Center Rotterdam

Cover design and text layout: Johan S. de Koning

Printed by PrintPartners Ipskamp, Enschede

ISBN 90-9017194-0

© Johan S. de Koning, 2003

All rights reserved. No part of this thesis may be reproduced or transmitted in any form or by any means without permission of the author, or, when appropriate, of the publishers of the publications.

Quality of Care in Stroke Prevention

An audit among general practitioners

Kwaliteit van zorg ter preventie van het CVA

een audit onder huisartsen

PROEFSCHRIFT

ter verkrijging van de graad van doctor
aan de Erasmus Universiteit Rotterdam
op gezag van de Rector Magnificus
Prof.dr.ir. J.H. van Bommel
en volgens besluit van het College voor Promoties.

De openbare verdediging zal plaatsvinden op
woensdag 10 september 2003 om 15.45 uur

door

Johannes Stephanus de Koning

geboren te Rotterdam

Promotiecommissie

Promotoren: Prof.dr. J.P. Mackenbach
Prof.dr. N.S. Klazinga

Overige leden: Prof.dr. A.F. Casparie
Prof.dr. P.J. Koudstaal
Prof.dr. A. Prins

CONTENTS

1	Introduction	7
2	Quality of care in stroke prevention: results of an audit study among general practitioners	27
3	Stroke prevention in general practice: role of practice organisation and adherence to practice guidelines	43
4	Quality of stroke prevention in general practice: relationship with practice organisation	59
5	Deprivation and systematic stroke prevention in general practice: an audit among general practitioners in the Rotterdam region (the Netherlands)	73
6	Role of 'confounding by indication' in assessing the effect of quality of care on disease outcomes: a case-control study	89
7	Feasibility of practice-based audit to measure the quality of stroke prevention in general practice: a pilot study	101
8	General discussion	115
	Summary	139
	Samenvatting	145
	Appendix: 'User guide for practice-based audit'	151
	Dankwoord	225
	About the author	227

CHAPTER 1

INTRODUCTION

1.1 Introduction

Although death rates from stroke have declined throughout the last century, stroke continues to rank as the third leading cause of death in western societies and is a major cause of disability.^{1,2} It is estimated that in a western population of 1 million citizens, 2,400 new strokes occur every year, that 700 of those patients will die within one year, and more than 50% will be dependent of care one year after the occurrence of stroke.³ In the Netherlands, it is reported that yearly over 30,000 persons suffer a stroke, which accounts for approximately 10% of total mortality in the Dutch population.⁴ In many cases, survivors of stroke are left with residual physical, cognitive, or behavioural changes leading to family problems and occupational impairments. Given the significant impact of stroke on public health and the fact that there are no effective treatments for most types of stroke, preventive strategies are of utmost importance and offer the greatest potential for reducing the burden of this disease.⁵

The primary focus of this thesis is on quality of care in stroke prevention in general practice and methods for its assessment. General practice provides a good setting for stroke prevention because general practitioners (GPs) have frequent contact with their patients, have good knowledge of the patient's medical and social background, and have easy access to individuals at risk of cardiovascular disease (CVD). Within the primary care setting, cardiovascular risk factor management is almost entirely done by GPs. Evidence increasingly shows us that adequate practice organisation for CVD prevention, and compliance with relevant guidelines are essential for the implementation and integration of systematic prevention in general practice.^{6,7} Aforementioned conditions allow GPs to systematically identify, treat and monitor high-risk or stroke-prone individuals within the population. Furthermore, researchers have found that access and quality of prevention in primary care is poorer for those living in deprived areas. This finding suggests that the quality of care is influenced not only by factors like practice organisation (internal) but also by environmental factors (external). For example, patients living in areas of socio-economic deprivation less often receive appropriate preventive care from primary care physicians than patients living in "better" areas.⁸ One of the approaches to improving quality of preventive care in general practice is clinical audit. Clinical audit seeks to encourage the systematic and critical analysis of clinical practice and to provide a structure that encourages health professionals to reflect upon their own professional behaviour. It has the potential of being effective in changing professionals' performance, especially if targeted at areas of care where audit is likely to effect change.

The study described in this thesis investigates the quality of preventive care provided by GPs to patients who over time developed a stroke, focusing on to what extent GPs' adequately detect, treat and control risk factors relevant for stroke prevention. It provides insight in the nature and incidence of deficiencies in preventive care that enables a practice to identify opportunities for further quality improvement in stroke prevention. Furthermore, the study explores the extent to which various aspects of practice structures for support and improvement of stroke prevention are implemented in general practice, and whether they are related to the quality of patient care. In addition, the influence of patient's socio-economic status on the provision of care to prevent stroke is discussed. Finally, during the course of this study an audit method for quality assessment using stroke as adverse health outcome was developed. This method is discussed in the final chapter and is outlined in Appendix I.

This introductory chapter describes the background to our studies. First we describe the concept of 'avoidable' morbidity and mortality: i.e. adverse health events that could have been prevented by timely and appropriate medical care. Subsequently, we discuss the existing and recommended preventive strategies in primary care and Dutch general practice, as well as aspects of practice organisation and adherence to guidelines proven to be important in stroke prevention. Then a brief overview is given of the different concepts of quality of care, its assurance, and systems in general practice that are considered essential for systematic prevention of stroke. Finally, the last section summarises the specific objectives of the studies and provides an outline of this thesis.

1.2 'Avoidable' mortality and morbidity

If no health services existed, morbidity and mortality would be solely determined by social, environmental and genetic factors.⁹ Fortunately, however, in most countries health services are available that have the potential to modify the influence of some of these factors with the aim to improve health and reduce morbidity and mortality. The latter statement is generally accepted by the scientific community. Critics, however, argue that medical care has had a negligible effect on mortality, and that death rates are influenced mainly by factors other than health services. In *The role of medicine - Dream, Mirage or Nemesis?*, McKeown published his analysis of the history of mortality in England and Wales and concluded that most of the decline in mortality was not attributable to the introduction of effective medical interventions, and that today's health problems are more likely to be controlled by changing the

environment than by medical care services.¹⁰ In response to McKeown's work, various researchers have attempted to prove that medical care has led to substantial changes in mortality, and that modifications of McKeown's findings were necessary.¹¹ Notwithstanding the fact that different views on the effect of health care on morbidity and mortality exist, if we are to accept that health care has a beneficial effect on health and reduces the mortality rate of certain illnesses, mortality can act as an indicator of quality of care.¹²

The idea that "avoidable" deaths can be identified to serve as outcome indicators reflecting possible deficiencies in health care services is an appealing concept. In the last decades, public health researchers have become increasingly interested in using avoidable mortality and morbidity indicators to investigate the effectiveness of medical care. There was an increased interest in identifying factors believed to contribute to the occurrence of certain causes of illness and death, with the idea that high avoidable death rates of certain diseases could function as clear indications of failings that had occurred somewhere in the medical services. In the 1980s, a working group on preventable and manageable diseases in the USA compiled a list of certain causes of morbidity and mortality for which there was knowledge about therapeutic or preventive measures that were defined as avoidable death indicators.¹³ The logical path followed was that variation in mortality over time and across geographical areas could identify areas where the effectiveness of health services was unsatisfactory: e.g. regions or countries with an excessive number of avoidable deaths could be expected to have less effective health care.¹⁴ High death rates were seen as warning signals that should lead to further studies on the quality of care and the course of events preceding deaths.¹⁵

Particularly, during the 1980s and 1990s, several studies on avoidable morbidity and mortality were published. Suggested avoidable conditions and associated outcome indicators provided the basis for studying differences in avoidable death rates across geographic areas in European countries, Japan, the USA, Canada, New Zealand, and Greenland.¹⁶⁻²³ For CVDs and stroke, mortality rates have shown remarkable diversity between countries for men and women.²⁴ High stroke death rates and large variations between regions and social classes seem to remain, both within and beyond Europe. Although most of the studies (aggregated data studies) reported large variations in death rates from selected diseases between geographical areas, they did not provide convincing data on their relationship with health care variables. The association with health care variables was rather weak and inconsistent.¹⁷ One explanation for the lack of significant associations was that the health care variables used in

the analysis were generally rather crude measures of supply or use of health care services.²¹ Furthermore, there was increasing evidence that determinants other than health care services influence the patients' health status after medical intervention. Variation in death rates may also be explained by factors such as incidence or severity of disease and socio-economic factors.^{25,26}

The aggregated data studies did not allow to accurately establish the causes of variation in reported death rates from the avoidable mortality disease groups. Thus, rather than studying avoidable factors influencing death at an aggregate level, it was decided to employ confidential inquiry or medical audit to investigate deaths from amenable conditions at an individual level. This method is based on a systematic critical analysis of the quality of health care services, including the procedures used for diagnosis and treatment, the use of resources and resulting outcome, and quality of life for the patient.²⁷ This type of study investigates whether avoidable mortality indicators can be linked with deficiencies in the organisation, quality or accessibility of care. With respect to maternal health care, confidential inquiry into maternal deaths aiming to identify weaknesses in the delivery of maternal health care identified a substantial number of preventable causes of deaths. Findings of these latter studies have played a prominent role in improving the quality of maternal care and the subsequent decline of maternal mortality.^{28,29} Similar studies have been conducted for other conditions such as perinatal death, peri-operative death and death due to asthma.^{28,30-34} In this thesis we present a retrospective case-based audit based on expert judgement, using stroke as an avoidable mortality indicator.

1.3 CVD prevention in primary care

1.3.1 Stroke prevention

As previously described, stroke is one of the diseases that is recognised to be partly preventable by adequate medical care.^{14,35} Currently, safe and effective prevention measures (validated by clinical trials) are available that can be applied to high-risk or stroke-prone individuals.³⁶ There is ample evidence that treatment of hypertension, cessation of cigarette smoking, and alteration of other risk factors amenable to medication, diet, or other interventions (e.g. diabetes, transient ischaemic attack, obesity, excessive alcohol intake) substantially reduce the risk of stroke.^{37,38} For instance, results from 18 controlled trials have shown that treatment of hypertension, which is one of the

most important risk factors for stroke, gives a reduction in relative risk of stroke of 25-47% among treated hypertensive patients.³⁹

Public health interventions related to stroke prevention can be grouped into two main categories, namely the “mass” approach and the “high-risk” approach.⁴⁰ The mass approach applies lifestyle modifications to achieve reductions in risk factor levels in individuals in the population through health education, legislation and economic measures. In primary care settings, and particularly in general practice, GPs apply the high-risk approach: i.e. they identify individuals and target preventive interventions at those with high levels of a risk factor for CVD; these patients are the most likely to gain the greatest benefit.^{41,42} The primary care high-risk approach comprises early case detection of patients with an elevated risk of CVD, followed by adequate treatment and monitoring of these patients.

As described earlier, adequate detection and modification of risk factors substantially reduce the impact of stroke.^{43,44} Thus, in situations where the performance of GPs with respect to stroke prevention falls short, improvements in the identification of high-risk individuals and subsequent modification of stroke-related risk factors is of utmost importance. This is, of course, known by most GPs, and major efforts to define strategies and enhance the quality of CVD/stroke prevention to improve the outcome of patients with stroke have been initiated. Nevertheless, the proven effectiveness of stroke prevention and efforts to improve professional behaviour among GPs have not yet resulted in substantial changes. Studies continue to report that the GP’s delivery of preventive care falls well below recommended levels.^{45,46}

1.3.2 CVD prevention in Dutch general practice

Within the health care system, general practice plays a prominent role in CVD prevention. Health care in the Netherlands is a primary care led system with the GP in a pivotal position. Of all health care providers, GPs have the most frequent contact with individuals throughout their lives and, therefore, know their patients well. Accordingly, they have good knowledge of a patient’s medical and social background, and have easy access to individuals at risk of CVD. Almost every Dutch citizen is registered with a GP, and three quarters of the population visit their GP at least once a year.^{47,48} The GP’s key position in the health care system indicates that, theoretically, GPs could play an important role in prevention.

In 1983 and 1986, the National Association of General Practitioners formalised the preventive role of GPs in the ‘Basic Job Description of the

General Practitioner'.^{49,50} In 1992, the National Association and the Dutch College of General Practitioners formalised a long-term plan to stimulate systematic prevention in general practice. In addition to advocating a more proactive approach towards CVD prevention, this proposal covered details on conditions for practice organisation, such as adequate data recording, delegation of preventive activities to support staff, and systems for follow-up.^{51,52} Recently, the National Association of General Practitioners published the 'Future Policy of LHV, 2003-2006' (draft), describing GPs' preventive tasks in modern practice.⁵³

Despite GPs' favourable circumstances and the initiatives taken to improve preventive services in general practice, however, a wide gap still exists between the potential of CVD prevention and actual provision of preventive care by GPs.⁵⁴⁻⁵⁸ Until now, GPs have had a reserved attitude towards their 'formalised' role in providing preventive services.⁵⁹ For instance, they argue that CVD prevention demands a more active attitude that, according to their understanding, inevitably leads to an increased workload for which they are not compensated financially. Moreover, many GPs doubt whether preventive actions targeted on high-risk individuals are indeed effective. Are GPs entitled to interfere with a patient's lifestyle unless asked? Another frequently and certainly not less important issue is that of changing the practice organisation. Systematic stroke prevention, in many cases, demands modification of the practice organisation and thus investments in terms of time and money.

1.3.3 Variations in CVD prevention

When we observe unexpected variation in clinical practice, the quality of care becomes a subject of discussion. If variations in care to patients with the same basic conditions exceed certain limits, it shows that these patients receive different evaluations or treatments. These differences to some extent reflect overuse, inadequate use, or underuse of medical care services that may lead to differences in the outcomes of care for patients.

It has been shown that substantial regional differences in stroke mortality exist,⁶⁰ and that in areas of deprivation, socio-economically disadvantaged groups appear to have an increased risk of dying of stroke.⁶¹ Can these differences in risk to some extent be explained by differences in quality of care that is provided to those living in deprived and non-deprived areas? There are indications that access to and quality of primary care is poorer for those living in deprived areas, and that these variations may to some extent contribute to their relatively poor health.⁶¹ Individuals with a lower socio-economic status

appear to have a higher risk of not receiving appropriate screening for cervical cancer, breast cancer and some risk factors for CVD.⁶²⁻⁶⁵

Past research has indicated that consultation characteristics in general practice such as utilisation rates and consultation duration are influenced by practice location. With respect to the utilisation of GP services, studies on socio-economic determinants and consultation rates in general practice found that low education level, social isolation and increasing poverty predicted higher GP consultation rates.^{66,67} Additionally, with respect to consultation duration, which is an important proxy of quality of general practice care,^{68,69} studies have shown that GPs spent significantly less time with patients living in deprived areas, who may thus receive less health care.^{70,71} Given the shorter consultation time spent per patient, one may conclude that patients in deprived areas only receive care that requires shorter consultation time. It is expected that shorter consultation duration in general practice, most probably, has a negative effect on preventive care (focus on care of symptoms and signs). Whether the quality of preventive care provided by GPs to patients at risk for stroke differs between those living in deprived and non-deprived neighbourhoods is not known.

1.3.4 Recommended care

Clearly, health care has moved towards evidence-based practice in which inclusion of scientific data into clinical practice guidelines has become more or less standard. Over the years, national and international organisations and societies have developed guidelines on CVD prevention that focus primarily on management of individual risk factors.⁷²⁻⁷⁷ These guidelines provide recommendations on the detection, subsequent treatment and follow-up of patients at high-risk of CVD disease. In practice this means that health professionals integrate individual clinical expertise with the best available external clinical evidence from systematic research.

There is general agreement that the implementation of research findings and guidelines for good practice is essential to improve or achieve high-quality care.⁷⁸ Since the mid-1980s, the Dutch College of General Practitioners started to develop and implement national standards and guidelines reflecting the 'state of the art' in Dutch general practice. These guidelines constitute systematically developed statements to assist health care providers and patient decisions about appropriate health care for specific clinical circumstances, and are based on scientific evidence, broad consensus, and clinical evidence. They are developed according to a highly structured procedure in which an advisory

board of experienced GPs participate. Since 1989, more than 70 different guidelines have been developed, of which a number relate to CVD management: Hypertension, Cholesterol, Type 2 Diabetes Mellitus, Heart Failure, Angina Pectoris, Transient Ischaemic Attack and Peripheral Arterial Disease.^{77,79,80}

Irrespective of the numerous evidence-based guidelines provided to the GPs in the field, there is a large discrepancy between research findings and their implementation in clinical practice.⁸¹ Barriers to the implementation of evidence-based medicine using these guidelines are reported to include: structural problems (e.g. workload, lack of easy access to guidelines or protocols, inadequate recording systems), attitudinal (e.g. reluctance to guideline adherence, other priorities) and educational problems (e.g. methods of education).⁸² Initiatives to encourage GPs to adopt good practice can only be effective if the barriers to change current preventive care practice are recognised and addressed appropriately.

1.3.5 Importance of practice organisation

In providing adequate preventive care, GPs require organised practice settings. The importance of adequate practice organisation, including support mechanisms for systematic prevention and disease management in primary care, is widely acknowledged.^{6,7,83-85} For example, in the management of risk factors for CVD, adequate information on a patient's risk status is essential. Organised patient management systems enable the GP to adequately record risk factors and preventive activities risk.^{56,86,87} Practices with organised patient management systems (computer-assisted) have shown higher levels of risk factor recording.⁸⁸ Additionally, as described earlier, GPs also need to detect and follow-up high-risk or stroke-prone patients. With the increasing workload, the complexity of care in general practice, and the need to make effective use of resources, improvements in CVD prevention imply the need to delegate preventive tasks to the practice assistant.^{89,90} Observations have learned that Dutch general practice is not yet sufficiently well-equipped to implement large-scale preventive services.^{91,92} Lack of adequate practice organisation is an important reason why GPs do not deliver preventive care as often as recommended. Adequate practice organisation for systematic stroke prevention, in turn, needs to be embedded in a system of quality assurance: i.e. in which GPs systematically plan activities and institute measures to continuously assure and improve the quality of patient care and practice performance.^{93,94}

1.4 Quality of care

1.4.1 Definition and concept

Donabedian reported in 1980 that there are several definitions of quality, or several variants of a single definition: each definition or variant is legitimate in its appropriate context.⁹⁵ The large number and variety of definitions, and the ongoing debate about the definitions of quality of care, demonstrates that authors continue to actively search for a definition that identifies and expresses their common goals, or at least try to make the underlying intention more transparent. Characteristic for most of the definitions, however, is the striving for an optimal balance between the actual care and expectations, guidelines or arrangements.⁹⁶

In 1990, the Institute of Medicine performed a study in which a definition for quality of care was formulated.⁹⁷ In this study, hundreds of definitions were used to finally create the following definition: "Quality of care is the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge." In the Netherlands, at a national conference in 1989, different parties that participate in the Dutch health care system accepted a definition that originates from industry: "Quality is the degree in which the whole of characteristics of a product, process or service meets the requirements that originate from the goal of use".⁹⁸ Three years later, in 1992, the National Council on Public Health adapted the definition from the International Organisation for Standardisation which up until now plays a central role in health policy documents: "Quality is the totality of characteristics of an entity that bear on its ability to satisfy stated and implied needs".⁹⁹

Donabedian emphasised three major elements of quality of care: structure, process, and outcome.¹⁰⁰ This so-called 'Donabedian's triad' of quality has generally been accepted as the point of departure for the assessment and improvement of health care quality. Structure refers to measures which form the input to the process of care that contribute to service quality. Structure is usually defined as "the facilities, equipment, services, and manpower available for care and the credentials and qualifications of the health care professionals involved".¹⁰¹ Process, on the other hand, refers to the actual process of care delivery by care providers. It includes elements such as preventive measures, diagnostic tests, treatments, and other care-related activities; it is the clinical interactions and communication between care providers and patients.¹⁰² Outcomes encompass changes in patient's condition (biologic changes in

disease, comfort, ability for self-care, physical function and mobility, emotional and intellectual performance, patient satisfaction and self-perception of health, health knowledge and compliance with medical care, and viability of family, job, and social role functioning).¹⁰¹

1.4.2 Quality improvement in general practice

In general practice, the growing interest and commitment to quality care was initiated by the increasing demand of governments to increase quality and provide evidence for effectiveness and efficiency. Moreover, GPs expected that improvement of quality of care would solve some of the problems a general practice faces, e.g. problems with the identity of the profession, and acceptance by other parties in the health care system. There was, and still is, an increasing demand by patients, health economists and insurers to provide value for money and to increase transparency and accountability with regard to the quality of care that is provided.

Consequently, since the mid-1980s, quality policies for systematic quality assurance and improvement in general practice were developed and offered to GPs in the Netherlands.⁹⁴ Increasingly, GPs receive structural professional support from the Dutch College of General Practitioners to enhance quality assurance activities.¹⁰³ Many interesting developments and projects can be seen, providing an understanding of how methods for systematic measurement and improvement of care are developed and implemented in general practice. For example, as part of a national guideline program, the Dutch College of General Practitioners began developing practice guidelines in 1987.¹⁰⁴ Since that time, this program has given much attention to the implementation of their guidelines, using a multifaceted approach. This approach consists of written materials (publication in the GP journal, educational packages) and personal approaches (contact with colleagues, outreach visits). Furthermore, the concern with and interest in quality of care resulted in the development and implementation of comprehensive quality of care assessment tools, the introduction of obligatory continuous medical education with accredited educational programmes, participation of GPs in obligatory peer review in small local GP groups, and the introduction of a new certification system and so on.^{94,105,106}

1.4.3 Quality of care assessment

Since health care aims to achieve good or improved outcomes for patients, quality of care measurement determines whether processes of care provided to

patients achieve good outcomes, or represent those processes that are thought or known to be associated with achievement of good outcomes.

As described in the previous section, Donabedian's triad provides a framework to measure the quality of care. In structure-oriented quality assessment (i.e. education, facilities, personnel etc.) one assumes that good preconditions are likely to result in an appropriate process of care and a favourable outcome as compared to poor preconditions. Structure-oriented measures of quality are, however, considered to be of low validity. It is argued that because of the wide gap between the structure and outcome of care, quality assessment of this type is weak. This method is therefore not frequently used in quality assessment. Process-oriented quality assessment, however, focuses on how health care providers carry out assessments, interventions, treatments and other procedures.¹⁰⁷ In other words, it critically scrutinises what a health care provider is doing in daily practice. In outcome quality assessment, the focal point is the patient's current and future health status that can be attributed to the care that was provided to that patient. The key problem in assessing outcome as a measure of quality, is knowing to what extent the outcome is attributable to the service rather than to other factors related to the care process. Additionally, if GPs want to perform quality assessment with the purpose of improvement, outcome-oriented quality assessment would not be helpful to them. Simply knowing the outcome of care does not clarify which aspects of care were good or bad and, therefore, does not provide information on which you can take actions. If the outcome was bad, outcome measures do not tell what changes a GP should make to improve that aspect of care.

Clinical guidelines describe specific processes of care originating from the best available external clinical evidence from research. These guidelines are often used in the assessment of the quality of patient care, to determine to what extent care provided to the patient followed specified processes, and to investigate whether the outcome is achieved. The ability to assess and evaluate the quality of care is, however, bounded by the strengths and weaknesses of clinical science.¹⁰⁸ Input for good clinical practice comes from clinical and health technology studies which provide evidence about valuable procedures for diagnosis, treatment and prevention. Knowledge on the relationship between the process and health outcome should derive from well-grounded studies establishing such relationships. There has been an overwhelming amount of new scientific evidence on how to manage health problems, which is included in clinical practice guidelines.¹⁰⁹ However, clear evidence is

available for only part of the practical decisions and actions recommended in the guidelines.

1.4.4 Medical audit

Various terms are available to describe the audit of health care, each emphasising a slightly different approach (e.g. confidential enquiry, significant event audit, clinical audit, medical audit, case-based audit). Confidential enquiry is usually referred to as an anonymised survey or data collection of identified adverse events and their related circumstances. In general practice this term is often used for the review of individual cases, but it is recommended to refer to the term significant event analysis or medical audit. Medical audit is a systematic critical analysis of the quality of health care, including the procedures used for diagnosis and treatment, the use of resources and the resulting outcome and quality of life for the patient.²⁸ The aim is to identify weaknesses in a particular area of the health care service with a view to remedying them. Additionally, if employed as part of a quality assurance activity in general practice, it aims to improve the actual performance of GPs.¹⁰² In scientific research, this method has frequently been employed in various studies on cause specific mortality, yet, despite its popularity, it has rarely been carried out in the domain of CVD prevention.¹¹⁰ With respect to stroke, there is one English study on avoidable death from stroke and hypertensive disease. This study uncovered a number of deaths from related diseases that might have been prevented by good medical practice.¹¹¹

Medical audit can be done either prospectively or retrospectively. The general approach is to document in detail the process of care provided to a single patient preceding the occurrence of an adverse event, followed by an assessment of the quality of care by an expert panel. Clinical practice guidelines are employed to assess quality of care, which can be translated into evaluation tools and used to determine whether the care provided conforms to the guideline (guideline-derived quality evaluation).^{97,112} Medical audit into avoidable factors influencing adverse events allows for investigations of the quality of preventive care preceding the occurrence of stroke, identifying shortcomings in the process of care delivery by the primary care physician. Health service data from general practice, if carefully handled and analysed, can provide the basis for internal quality assurance and inter-practice audit. Results emerging from medical audit could subsequently function as a tool for health-improving strategies and health service planning on a regional or national level.

An important limitation of this type of study, without control subjects, is its inability to fully establish a causal relationship between identified deficiencies in care and the adverse outcome and to determine to what extent identified deficiencies are related to the occurrence of such an event. It is expected that identified deficiencies in care most likely indicate only to a certain extent an increase in risk of an adverse health outcome, while the probability of having an adverse outcome can only be calculated by comparing care given to patients who suffered an adverse outcome with patients who did not suffer such an event. An alternative approach would be to perform a case-control study with patients with an adverse event as 'cases' and a comparable group of patients without an adverse outcome as 'controls'. In the work presented here, we investigated the feasibility of a case-control method for assessing the relationship between the effect of guideline adherence for stroke prevention on the one hand, and the occurrence of stroke on the other.

1.5 Aims and outline of the thesis

The present study was part of a scientific research programme on quality of care research from The Netherlands Organisation for Scientific Research (NWO). The main objective of this programme was to provide scientific support with regard to process and outcome quality measures within three domain of the Dutch health care system (homecare, care for the mentally handicapped, and care for patients with chronic physical and/or psychological diseases). Additionally, the programme aimed to gain more insight in the availability and feasibility of utilising indicators that measure the quality of patient care (process and outcome). The research questions addressed in this thesis are:

- 1) What is the nature and prevalence of deficiencies in preventive care provided by GPs to patients who over time develop a stroke in general practice?
- 2) To what extent are aspects of practice organisation relevant for stroke prevention implemented in general practice, and what is their relationship with the GP and practice characteristics?
- 3) Do aspects of practice organisation and adherence to clinical practice guidelines relevant for stroke prevention in general practice relate to the actual quality of care provided to stroke-prone patients in general practice?

- 4) Are there differences in the quality of preventive care provided by GPs to those at risk of stroke between patients living in deprived and non-deprived neighbourhoods?
- 5) Is it possible to develop a feasible and acceptable practice-based audit method to measure the quality of stroke prevention in general practice, using the research-based audit method as a starting point?
- 6) What is the feasibility of applying a case-control method to assess the effect of guideline adherence for stroke prevention on the occurrence of stroke in general practice?

Chapter 2 deals with the first research question. In a retrospective case-based audit using guideline-based review criteria, an expert panel explored the nature and frequency of shortcomings in preventive care provided by GPs to patients who over time develop a stroke. Additionally, based on the assessment, the panellists provided a final judgement on the relationship between the quality of care and the occurrence of stroke. Chapter 3 addresses the implementation of various aspects of practice organisation that are considered to be important for systematic stroke prevention in general practice. The aim of the study was to review the presence of recommended aspects of practice organisation relevant for stroke prevention in general practice, and explore their relationship with GP and practice characteristics. Subsequently, in chapter 3 we discuss whether those items necessary for systematic stroke prevention measurably improve GPs' quality of care delivery compared with colleagues with less organised care delivery systems. In other words, do structural adaptations in practice organisation necessary for systematic stroke prevention in general practice measurably improve the quality of patient care?

Another related aspect is that patients at risk of CVD living in 'deprived' areas may receive less quality of care. Therefore, in chapter 5 we investigated whether differences exist in the provision of preventive care between deprived and non-deprived areas. There are indications that patients at risk of CVD in areas of deprivation indeed receive less quality of care, indicating that quality of care is influenced by environmental factors. In the following chapter, chapter 6, we describe the results of a case-control study. In this study, using stroke patients and controls selected from the GPs' patient register, we investigated the effect of guideline adherence for stroke prevention on the occurrence of stroke. What potential obstacles in the application of a case-control method (recruitment of cases and controls and confounding by indication) were expected to arise, and to what extent is it possible to control for these biases.

Finally, the audit method that was used in the research project was taken as a starting point to develop a practice-based audit method. This practice-based method is intended to enable GPs to critically and systematically assess the quality of stroke prevention delivered to patients who developed a stroke. In a structured well-ordered audit instrument all audit phases and procedures are explained in detail using a step-by-step approach (Appendix 1). Chapter 7 is an introductory chapter to this instrument. It describes the results of a pilot study that was performed to investigate the feasibility and acceptability of this practice-based audit method in real-life settings.

References

1. Goldstein LB, Adams R, Becker K, Furberg CD, Gorelick PB, Hademenos C, et al. Primary prevention of ischaemic stroke: A statement for healthcare professionals from the Stroke Council of the American Heart Association. *Stroke* 2001;32:280-99.
2. Gorelick PB. Stroke prevention. An opportunity for efficient utilization of health care resources during the coming decade. *Stroke* 1994;25:220-4.
3. Hankey GJ, Warlow CP. Treatment and secondary prevention of stroke: evidence, costs, and effects on individuals and populations. *Lancet* 1999;354:1457-63.
4. Looman SJ, Bots ML, Hofman A, Koudstaal PJ, Grobbee DE. Beroerte bij ouderen: prevalentie en opnamefrequentie: het ERGO-onderzoek (Stroke among the elderly: prevalence and frequency of hospital admission: the Ergo-study). *Ned Tijdschr Geneesk* 1996;140:312-6.
5. Sacco RL, Benjamin EJ, Broderick JP, Dyken M, Easton JD, Feinberg WM, et al. American Heart Association Prevention Conference. Prevention and Rehabilitation of Stroke. *Stroke* 1997;28:1507-17.
6. Solberg LI, Kottke TE, Brekke ML. Will primary care clinics organize themselves to improve the delivery of preventive services? A randomized controlled trial. *Prev Med* 1998;27:623-31.
7. Bero LA, Grilli R, Grimshaw JM, Harvey E, Oxman AD, Thomson MA. Closing the gap between research and practice: an overview of systematic reviews of interventions to promote the implementation of research findings. *BMJ* 1998;317:465-8.
8. Wiggers JH, Sanson-Fisher R. Practitioner provision of preventive care in general practice consultations: association with educational and occupational status. *Soc Sci Med* 1997;44:137-46.
9. Holland WW, Fitzgerald AP, Hildrey SJ, Phillips SJ. Heaven can wait. *J Publ H Med* 1994;16:321-30.
10. McKeown TF. *The Role of Medicine - Dream, Mirage or Nemesis?* London: Nuffield Provincial Hospitals Trust, 1976.
11. Mackenbach JP. The contribution of medical care to mortality decline: McKeown revisited. *J Clin Epidemiol* 1996;49:1207-13.
12. Carr-Hill RA, Hardman GF, Russell JT. Variations in avoidable mortality and variations in health care resources. *Lancet* 1987;789-92.
13. Rutstein D, Berenberger W, Chalmers T, Child G, Fischmen A, Perrin E. Measuring the quality of medical care. *N Engl J Med* 1980;302:1146.
14. Mackenbach JP, Bouvier-Colle MH, Jouglu E. "Avoidable" mortality and health services: a review of aggregate data studies. *J Epidemiol Community Health* 1990;44:106-11.
15. Westerling R. Studies of avoidable factors influencing death: a call for explicit criteria. *Qual Health Care* 1996;5:159-65.
16. Charlton JR, Velez R. Some international comparisons of mortality amenable to medical intervention. *BMJ* 1986;292:295-301.

17. Mackenbach JP, Kunst AE, Looman CWN, Habbema JDF, van der Maas PJ. Regional differences in mortality from conditions amenable to medical intervention in The Netherlands: a comparison of four time periods. *J Epidemiol Community Health* 1988;42:325-32.
18. Gill LMB, Rathwell T. The effect of health services on mortality: amenable and non-amenable causes in Spain. *Int J Epidemiol* 1989;18:652-7.
19. Poikolainen K, Eskola J. The effect of health services on mortality: decline in death rates from amenable and non-amenable causes in Finland 1969-1981. *Lancet* 1986;17:86-9.
20. Westerling R. Indicators of "avoidable" mortality in health administrative areas in Sweden 1974-1985. *Scand J Soc Med* 1993;21:176-87.
21. Marshall SM, Kawachi I, Pearce N, Boorman B. Social class differences in mortality from diseases amenable to medical intervention in New Zealand. *Int J Epidemiol* 1993;22:255-61.
22. Bjerregaard P, Knud J. Avoidable deaths in Greenland 1968-85: variations by regions and period. *Arct Med Res* 1990;49:119-27.
23. Rutstein D, Berenberger W, Chalmers T, Child G, Fischmen A, Perrin E. Measuring the quality of medical care. *N Engl J Med* 1976;294:582-8.
24. Bonita R, Stewart A, Beaglehole R. International trends in stroke mortality: 1970-1985. *Stroke* 1990;21:989-92.
25. Walker A, Petruckevitch A, Bourne H, Burney P. Contributions of incidence and case fatality to mortality from bladder cancer in the south Thames Regions. *J Epidemiol Community Health* 1992;46:387-9.
26. Westerling R. Small-area variation in multiple causes of death in Sweden- a comparison with underlying causes of death. *Int J Epidemiol* 1995;24:552-8.
27. Secretaries of State for Health, Wales, Northern Ireland and Scotland. Working for patients: Working Paper 6. London: HMSO, 1989.
28. Cook R. The role of confidential enquiries in the reduction of maternal mortality and alternatives in this approach. *Int J Gynecol Obstet* 1989;30:41-5.
29. Marmol JG, Scriggins AL, Vollman RF. History of the maternal mortality committees in the United States. *Obstet Gynecol* 1982;34:123-38.
30. Department of Health, Welsh Office, Scottish Home and Health Department. Report of confidential enquiries into maternal deaths in the United Kingdom 1985-1987. London: HMSO, 1991.
31. Mersey Region Working Party on Perinatal Mortality. Confidential inquiry into perinatal deaths in the Mersey Region. *Lancet* 1982;27:491-4.
32. Buck N, Devlin H, Lunn H. The report of the confidential enquiry into perioperative deaths. London: Nuffield Provincial Hospitals Trust, 1987.
33. Sears MR, Rea HH, Beaglehole R, Gillies AJ, Holst PE, O'Donnell TV, et al. Asthma mortality in New Zealand: a two year national study. *N Z Med J* 1985;98:271-5.
34. British Thoracic Association. Death from asthma in two regions of England. *BMJ* 1982;285:1251-5.
35. Charlton JRH, Hartley RM, Silver R, Holland WW. Geographical variation in mortality from conditions amenable to medical intervention in England and Wales. *Lancet* 1983;691-6.
36. Yusuf S, Lessem J, Jha P, Lonn E. Primary and secondary prevention of myocardial infarction and strokes: an update of randomly allocated, controlled trials. *J Hypertens Suppl* 1993;11:S61-S71.
37. Bronner LL, Kanter DS, Manson JE. Primary prevention of stroke. *N Engl J Med* 1995;333:1392-400.
38. Leys D, Deplanque D, Mounier-Vehier C, Mackowiak-Cordoliani M-A, Lucas C, Bordet R. Stroke prevention: management of modifiable vascular risk factors. *J Neurol* 2002;249:507-17.
39. O'Brien AA, Rajkumar C, Bulpitt CJ. Blood pressure lowering for the primary and secondary prevention of stroke: treatment of hypertension reduces the risk of stroke. *J Cardiovasc Risk* 1999;6:203-5.

40. Dunbadin DW, Sandercock PAG. Preventing stroke by modification of risk factors. *Stroke* 1990;21:36-9.
41. Gubitz G, Sandercock P. Prevention of Ischaemic stroke. *BMJ* 2000;321:1455-9.
42. D'Agostino RB, Wolf PA, Belanger AJ, Kannel WB. Stroke risk profile: adjustment for antihypertensive medication. The Framingham Study. *Stroke* 1994;25:40-3.
43. Sacco RL. Newer risk factors for stroke. *Neurology* 2001;57:S31-4.
44. Sacco RL. Reducing the risk of stroke in diabetes: what have we learned that is new? *Diabetes Obes Metab* 2002;4:27-34.
45. Frijling BD. Management of patients at high cardiovascular risk. Quality improvement in general practice (Thesis). Centre for Quality of Care Research. Nijmegen: University of Nijmegen, 2002.
46. Stange KC, Flocke SA, Goodwin MA, Kelly RB, Zyzanski SJ. Direct observation of rates of preventive service delivery in community family practice. *Prev Med* 2000;31:167-76.
47. Drenthen T. Challenges to prevention in Dutch general practice. *Am J Clin Nutr* 1997;65:1943-5.
48. van der Velden K. General practice at work. Thesis. Department of Public Health. Rotterdam: Erasmus University Rotterdam, 1999.
49. Landelijke Huisartsen Vereniging LHV. Basistakenpakket van de huisarts. (Basic job description for the GP). Utrecht, 1983.
50. Landelijke Huisartsen Vereniging LHV. Basistakenpakket van de huisarts (Basic job description for the GP). Utrecht, 1986.
51. Bart J. Preventie door de huisarts (Prevention and the GP). *Medisch Contact* 1992;47:715-8.
52. Landelijke Huisartsen Vereniging LHV-Dutch College of General Practitioners NHG. Concept-voorstel inzake preventie in de huisartspraktijk (Draft proposal for prevention in general practice). Utrecht, 1992.
53. Landelijke Huisartsen Vereniging LHV. Meerjarenbeleid LHV 2003-2006 (Future Policy LHV 2003-2006) (Draft). Utrecht: National Association of General Practitioners, 2003.
54. van Drenth BB, Hulscher ME, van der Wouden JC, Mokkink H, van Weel C, Grol R. Relationship between practice organization and cardiovascular risk factor recording in general practice. *Br J Gen Pract* 1998;48:1054-8.
55. Lewis CE. Disease prevention and health promotion practices of primary care physicians in the United States. *Am J Prev Med* 1988;4:9-16.
56. van Drenth BB, Hulscher MEJL, van der Wouden JC, Mokkink HG, van Weel C, Grol RP. Relationship between practice organization and cardiovascular risk factor recording in general practise. *Br J Gen Practice* 1998;48:1054-8.
57. Stange KC. Preventive medicine in primary care: moving from theory to practice. *Postgrad Med* 1991;30:125-8.
58. Pyorala K. Prevention in clinical practice. *Lancet* 1996;348:S26-8.
59. Berden HJJM, Drenthen AJM. Prevention of cardiovascular disease in Dutch general practice. *Neth J Cardiol* 1993;4:220-4.
60. Treurniet HF, Looman CW, van der Maas PJ, Mackenbach JP. Variations in 'avoidable' mortality: a reflection of variations in incidence? *Int J Epidemiol* 1999;28:225-32.
61. Kaplan GA, Keil EK. Socioeconomic factors and cardiovascular disease; a review of the literature. *Circulation* 1993;88:1973-98.
62. Giles WH, Anda FR, Jones DH, Serdula MK, Merritt RK, DeStefano F. Recent trends in the identification and treatment of high blood cholesterol by physicians. Progress and missed opportunities. *JAMA* 1993;269:1133-8.
63. Shelley JM, Irwig LM, Simpson JM, Macaskill P. Who has PAP smears in New South Wales? Patterns of screening across socio-demographic groups. *Am J Publ Health* 1994;18:406-11.
64. Bostick RM, Sprafka JM, Virnig BA, Potter JD. Predictors of cancer prevention attitudes and participation in cancer screening examinations. *Prev Med* 1994;23:816-26.
65. Makuc DM, Freid VM, Kleinman JC. National trends in the use of preventive health care by women. *Am J Publ Health* 1989;79:21-6.

66. Scaife B, Gill P, Heywood P, Neal R. Socio-economic characteristics of adult frequent attenders in practice: secondary analysis of data. *Fam Pract* 2000;17:298-304.
67. van der Meer JB, Mackenbach JP. Low education, high GP consultation rates: the effect of psychosocial factors. *J Psych Res* 1998;5:587-97.
68. Carr-Hill R, Jenkins-Clarke S, Dixon P, Pringle M. Do minutes count? Consultation lengths in general practice. *J Health Serv Res Policy* 1998;3:207-13.
69. Campbell JL, Ramsay J, Green J. Practice size: impact on consultation length, workload, and patient assessment of care. *Br J Gen Pract* 2001;51:644-50.
70. Wiggers J, Sanson-Fisher R. Duration of general practice consultations: association with patient occupational and educational status. *Soc Sci Med* 1997;44:925-34.
71. Stirling AM, Wilson P, McConnachie A. Deprivation, psychological distress, and consultation length in general practice. *Br J Gen Pract* 2001;51:456-60.
72. Guideline Sub-committee. Guidelines for the management of mild hypertension: memorandum from a WHO/ISH meeting. *J Hypertension* 1989;7:689-93.
73. British Cardiac Society, British Hypertension Society, British Diabetic Association. Joint British recommendations on prevention of coronary heart disease in clinical practice: summary. *BMJ* 2000;320:705-8.
74. Wood D, De Backer G, Faergeman O, Graham I, Mancina G, Pyorala K. Prevention of coronary heart disease in clinical practice: recommendations of the Second Joint Task force of European and other Societies on Coronary Prevention. *Atherosclerosis* 1998;140:199-270.
75. American Diabetes Association. Clinical practice recommendations. *Diabetes Care* 2001;24:S33-44.
76. The Task Force on Stable Angina of the European Society of Cardiology. Guidelines for the management of stable angina pectoris. *Eur Heart J* 1997;18:394-413.
77. Geijer RMM, Burgers JS, van der Laan JR, Wiersma TJ, Rosmalen CFH, Thomas S. NHG-Standaarden voor de huisarts (Dutch College of General Practitioners' guidelines). Utrecht: NHG, 1999.
78. NHS Central Research and Development Committee N. Methods to promote the implementation of research findings in the NHS priorities for evaluation. London: NHS, 1995.
79. Rutten GEHM, Thomas S. NHG-Standaarden voor de huisarts (Dutch College of General Practitioners' guidelines). Utrecht: NHG, 1993.
80. Thomas S, Geijer RMM, Van der Laan JR, Wiersma TJ. NHG-Standaarden voor de huisarts (Dutch College of General Practitioners' guidelines). Utrecht: NHG, 1996.
81. Haines A, Donald A. Getting research findings into practice: making better use of research findings. *BMJ* 1998;317:72-5.
82. Cranney M, Warren E, Barton S, Gardner K, Walley T. Why do GPs not implement evidence-based guidelines? A descriptive study. *Fam Pract* 2001;18:359-63.
83. Solberg LI, Kottke TE, Conn SA, Brekke ML, Calomeni CA, Conboy KS. Delivering clinical preventive services is a systems problem. *Ann Behav Med* 1997;19:271-8.
84. Dickey LL, Kamerow DB. Primary care physicians' use of office resources in the provision of preventive care. *Arch Fam Med* 1996;5:399-404.
85. Crabtree BF, Miller WL, Aita VA, Flocke SA, Stange KC. Primary care practice organization and preventive services delivery: a qualitative analysis. *J Fam Pract* 1998;46:403-9.
86. Maitland JM, Reid J, Taylor RJ. Two stage audit of cerebrovascular and coronary heart disease risk factor recording: the effect of case finding in screening programmes. *Br J Gen Pract* 1991;41:144-6.
87. Fleming DM, Lawrence MS, Cross KW. List size, screening methods and other characteristics of practices in relation to preventive care. *BMJ (Clin Res Ed)* 1985;291:869-2.
88. van den Hoogen JP, van Ree JW. Preventive cardiology in general practice: computer-assisted hypertension care. *J Hum Hypertens* 1990;4:365-7.
89. de Haan J. De doktersassistente. Delegeren van taken in een huisartspraktijk (The practice assistant. Task delegation in general practice). Lelystad: Meditekst, 1986.

90. Nijland A, de Haan J. Ondersteuning van de Britse huisarts (Support of British general practitioners). *Huisarts en Wetenschap* 1991;34:540-5.
91. Verhaak PFM, Bosman JM, van der Velden J. Preventie: nationale studie van ziekten en verrichtingen in de huisartspraktijk (Prevention: national survey of morbidity and interventions in general practice). Utrecht: Nederlands instituut voor onderzoek van de eerstelijnsgezondheidszorg (NIVEL), 1991.
92. Hulscher ME, van Drenth BB, van der Wouden JC, Mokkink HG, van Weel C, Grol RP. Changing preventive practice: a controlled trial on the effects of outreach visits to organise prevention of cardiovascular disease. *Qual Health Care* 1997;6:19-24.
93. Ministerie van WVC. Preventiebeleid voor de Volksgezondheid: praktische keuzen voor de jaren negentig (Ministry of Welfare, Public Health and Culture (WVC) Policy on Public Health Prevention: practical choices for the nineties). 's-Gravenhage: Tweede Kamer, vergaderjaar 1992-1993, 22 894, nr. 1, 1992.
94. Grol R, Wensing M. Implementation of quality assurance and medical audit: general practitioners' perceived obstacles and requirements. *Br J Gen Pract* 1995;45:548-52.
95. Donabedian A. The definition of Quality and Approaches to its Assessment. Explorations in Quality Assessment and Monitoring. Michigan: Health Administration Press, 1980.
96. Harteloh PPM, Casparie AF. Kwaliteit van zorg. Van een inhoudelijke benadering naar een bedrijfskundige aanpak. (Quality of care. From a caring approach to a management approach): Lochem: Vuga, 1991.
97. Lohr KN, Sundwall DN, Bergman D. A strategy for quality assurance. Volume 1 and 2. Washington DC: National Academy, 1990.
98. Klazinga NS. Quality management of medical care in The Netherlands: an explorative study of its nature and development (Thesis). Rotterdam: Erasmus University Rotterdam, 1996.
99. Harteloh PPM, Casparie AF. Het begrip 'kwaliteit van zorg'; een analysekader. *Medisch Contact* 1991;46:18-20.
100. Donabedian A. Twenty years of research on the quality of medical care: 1964-1984. *Eval Health Prof* 1985;8:243.
101. Council on Medical Care. Quality of Care. *JAMA* 1986;256:1032.
102. Ram P, Grol R, van den Hombergh P, Rethans JJ, van der Vleuten C, Aretz K. Structure and process: the relationship between practice management and actual clinical performance in general practice. *Fam Pract* 1998;15:354-62.
103. Grol R, Wensing M, Jacobs A, Baker R. Quality assurance in general practice. The state of the art in Europe. Utrecht: Dutch College of General Practitioners, 1993.
104. Grol R, Thomas S, Roberts R. Development and implementation of guidelines for family practice: lessons from the Netherlands. *J Fam Pract* 1995;40:435-9.
105. Grol R. Kwaliteitssystemen in de huisartsgeneeskunde: wat betekent dit voor de huisarts? (Quality systems in general practice: what does it mean for general practitioners?). *Huisarts en Wetenschap* 1993;36:106-12.
106. Grol R. Quality assurance in general practice: the state of the art in Europe. *Fam Pract* 1994;11:460-6.
107. Ovreteit J. Evaluating Health Interventions. Buckingham, Philadelphia: Open University Press, 1998.
108. Donabedian A. The quality of Care; How can it be assessed? *JAMA* 1988;260:1743-8.
109. Chassin MR. Is health care ready for Six Sigma quality? *Milbank Q* 1998;76:565-91.
110. Wolfe C. Deaths from stroke in younger people. *BMJ* 1993;307:1020-1.
111. Payne JN, Milner PC, Saul C, Browns IR, Hannay DR, Ramsay LE. Local confidential inquiry into avoidable deaths from stroke and hypertensive disease. *BMJ* 1993;307:1027-30.
112. Donabedian A. The quality of medical care. Methods for assessing and monitoring the quality of care for research and for quality assurance. *Science* 1978;200:856-63.

CHAPTER 2

QUALITY OF CARE IN STROKE PREVENTION: RESULTS OF AN AUDIT STUDY AMONG GENERAL PRACTITIONERS

Johan S. de Koning
Niek S. Klazinga
Peter J. Koudstaal
Ad Prins
Diederik W.J. Dippel
Jan Heeringa
Ruud P. Kleyweg
Arie Knuistingh Neven
Jan W. van Ree
Gabriel J.E. Rinkel
Johan P. Mackenbach

Abstract

BACKGROUND: In identifying opportunities to improve the quality of stroke prevention in general practice, insight in areas of sub-optimal care is essential. This study investigated the quality of care in stroke prevention in general practice and its relation to the occurrence of stroke.

METHODS: Retrospective case-based audit with guideline-based review criteria and final judgment of sub-optimal care by an expert panel.

RESULTS: A total of 292 stroke patients were identified through stroke registers of the two main referral hospitals for stroke in Rotterdam. The GPs (n=95) of these patients were approached. The overall response rate from GPs was 81%, and a total of 193 patients from 77 GPs were included in the study. Data on the process of care at patient level were collected by means of chart review and by structured interviews with GPs during site visits. All cases were presented to a six-member panel of GPs and neurologists. In 44% of the cases, sub-optimal care was identified (31% judged as possibly or likely failing to prevent stroke). Of the total number of identified shortcomings, 52% was related to inadequate hypertension control, particularly lack of follow-up after established hypertension. Another 17% of identified shortcomings concerned inadequate cardiovascular risk assessment.

CONCLUSIONS: A substantial number of shortcomings in care, particularly in the domain of hypertension control and the assessment of patient's risk profiles for cardiovascular disease, were identified. This study suggests that improving preventive care delivery in general practice could substantially reduce the occurrence of stroke.

Introduction

Stroke is the third leading cause of death after heart disease and cancer, and is a major cause of long-term disability in industrialised countries.¹ It is estimated that in a western population of 1 million citizens, 2,400 new strokes occur every year, that 700 of those patients will die within one year, and less than 50% will be independent one year after the occurrence of stroke.² In the Netherlands, it is reported that yearly over 30,000 persons suffer a stroke, which accounts for approximately 10% of total mortality in the Dutch population.³ Because of its high prevalence and burden of illness, stroke places a great burden on health care and health care resources.⁴

As there are no effective treatments for most types of stroke, prevention offers the greatest potential for reducing the burden of this disease. Prevention of stroke can be applied because of the availability of safe and effective prevention measures validated through clinical trials.^{5,6} There is ample evidence to show that treatment of hypertension, cessation of cigarette smoking, and alteration of other risk factors amenable to medication, diet, or other interventions (e.g. diabetes, transient ischemic attack (TIA), obesity, excessive alcohol intake) substantially reduce the risk of stroke.^{6,7}

Within the health care system in the Netherlands, as in many other European countries, general practice plays a prominent role in cardiovascular disease (CVD) prevention. General practice provides a good setting for CVD prevention as general practitioners (GPs) have frequent contact with their patients, and usually have good knowledge of the patients' medical and social background. Their usual approach is to identify patients with high levels of a risk factor for CVD and to intervene as effectively and safely as possible (high-risk or stroke-prone patients are the most likely to gain the greatest benefit).⁸ Such intervention comprises early case detection to identify patients with an elevated risk, followed by adequate treatment and monitoring.⁹

Although studies have demonstrated the effectiveness of systematic prevention of stroke in primary health care settings,^{10,11} preventive services in primary care settings are not always delivered at optimal rates.¹²⁻¹⁶ A variety of factors determine whether or not a GP provides adequate prevention, ranging from knowledge, attitudes and beliefs about prevention,^{17,18} inadequate practice organisation including support mechanisms,¹⁸⁻²² to competing demands encountered by GPs during patient consultation.²³ Improvements in the quality of stroke prevention are expected to be most effective when these barriers to change are recognized and addressed appropriately.

In our aim to identify opportunities for improvement, we reviewed the quality of stroke prevention in general practice by performing an audit of an unselected series of patients with stroke. Clinical audit into avoidable factors influencing adverse events allows to investigate of the quality of preventive care preceding the occurrence of stroke, thus identifying shortcomings in the process of care delivery by the GP. This type of study has attracted considerable attention in recent years, but is scarce in the field of CVD prevention.²⁴⁻²⁶

In the present study, we investigated the quality of care in stroke prevention in general practice and its relationship with the occurrence of stroke. We assessed the adequacy of detection, treatment and control of risk factors relevant for stroke prevention. Details on the care process were presented to a multidisciplinary expert panel that retrospectively assessed the quality of care and its (possible) failure to prevent the occurrence of stroke.

Methods

Study design

Data on the process of preventive care provided by GPs to stroke patients in the southern part of Rotterdam and the surrounding region were studied. By means of structured interviews with GPs, data on preventive care during a two-year period preceding the occurrence of stroke were collected retrospectively. At the time of interview, GPs used either handwritten or electronic patient records to retrieve patient information. Subsequently, a panel of experts specifically composed for this study, carried out an assessment of (possible) shortcomings in preventive care and their relation to the occurrence of stroke. The expert panel comprised three neurologists and three GPs, selected on the grounds of their expertise related to preventive care, CVD, experience in quality of care evaluation, and to have equal representation of university and non-university affiliation.

Study population

Patients were selected from the two main referral hospitals for stroke in the region. These hospitals are the two largest in the city of Rotterdam. Both are the principle referral center for all strokes that occur within their respective district. Patients from outside the district are referred only for logistic reasons. After approval by the Medical Ethics Committee, stroke patients were identified and selected. Criteria for inclusion in the study were: (a) diagnosis of intracerebral hemorrhage or infarction according to the WHO definition,²⁷ (b) GP of the patient practising in the southern part of Rotterdam or surrounding region, (c) patient aged 39-80 years, (d)

occurrence of stroke in the years 1996-1997, (e) stroke caused by cardiovascular and cerebrovascular disease and not by trauma, infection or malignancy, (f) registration of patient with the local GP for not less than two years, and (g) the patient was not living in a nursing home during the two-year period prior to stroke.

We identified 368 stroke patients who fulfilled these criteria. Of these patients, hospital records were used to identify the patient's GP. In this way, 122 GPs were identified, of whom a random sample of 100 GPs (325 patients) was selected for the audit study. Eighteen patients were excluded because of unknown GP characteristics and 15 patients because of relocation and/or retirement of the GP. The remaining group of 95 GPs (292 patients) was contacted by mail and asked to participate in the study. Eighteen GPs (66 patients) declined to participate. At the time of the interview, 11 patients were excluded because of relocation, 17 because they were registered with the GP for less than 2 years, and 3 patients were excluded because patient records were not available. In total, 77 GPs participated in the study and provided data on 193 stroke patients (Figure 1). These 193 stroke patients represented 59% of the target group of 325 patients originally selected for the study.

Collection of data

Data were collected by means of face-to-face interviews with GPs using separate questionnaires for each stroke patient. At time of the interview, the GP used either hand-written or electronic records to retrieve patient's information (memory recall in case information was absent). The questionnaire comprised questions related to patient characteristics and medical history with regard to cardiovascular risk factors, family history of CVD, detection and treatment of cardiovascular risk factors such as hypertension, diabetes mellitus, TIA and cardiac failure. Similarly, data were collected on lifestyle-related risk factors such as smoking status, body weight (overweight), and excessive alcohol intake. The questionnaire was constructed such that all 65 review criteria (see below) could be assessed.

Assessment method

The panel used six practice guidelines relevant to stroke prevention (hypertension, diabetes mellitus, TIA, peripheral vascular disease, cardiac failure and angina pectoris) to assess the quality of care. All six practice guidelines (based on scientific evidence, broad consensus, and clinical evidence) had been developed and implemented by the Dutch College of General Practitioners, as part of a national guideline program operational since 1987.²⁸

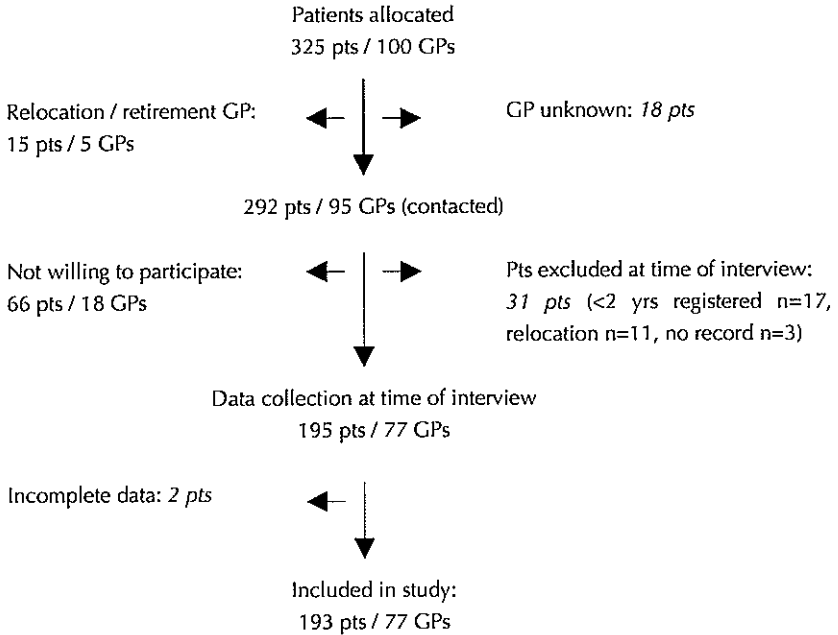


FIGURE 1. Flow diagram illustrating enrolment of stroke patients (pts) and general practitioners (GPs) in the study.

Implementation of these guidelines is done through written materials (publication in scientific journal) and education (educational packages). From each guideline, specific elements of care were selected and systematically converted into review criteria,²⁹ allowing the panellists to measure in detail a GP’s adherence to guidelines. During a pilot study among 32 GPs in the northern part of Rotterdam, the review criteria were tested on their feasibility. A total of 65 review criteria were included in the final evaluation tool.

Assessment of sub-optimal care

Panellists were given detailed information on the process of care delivery. Based on the identified aspects of sub-optimal care and seriousness of shortcomings (minor vs. major), panellists graded sub-optimal care (see Box). Aspects related to the patients’ behaviour, e.g. non-compliance to recommended therapy and specialist treatment, were not included in the assessment.

- 0 No sub-optimal factors have been identified
- 1 Sub-optimal factor(s) have been identified, but are unlikely to be related to the occurrence of stroke in this patient.
- 2 Sub-optimal factor(s) have been identified, and possibly have failed to prevent the stroke in this patient.
- 3 Sub-optimal factor(s) have been identified, and are likely to have failed to prevent the stroke in this patient.

BOX. Gratings of sub-optimal factors.

If risk factor information was insufficient, no final grading was given. Intersubpanel agreement was measured by Cohen's kappa statistic, which takes chance agreement into account.³⁰ The intersubpanel agreement was assessed for 36 patients. These patients were selected by drawing a random sample of 12 cases out of all patients assessed by a particular sub-panel. Of these cases, copies were made and sent for evaluation to another sub-panel. Final grades were used to measure the intersubpanel agreement.

Audit procedure

In a two-round evaluation, with a final plenary round, cases were assessed by the panellists.³¹ Panellists were divided into sub-panels, consisting of one neurologist and one GP. During the first and second round, cases were evaluated by each panellist separately. If, within a sub-panel, the panellists assigned equal grades to a particular case, no further evaluation was needed. If no consensus was reached, a second evaluation was done. During this round, panellists received a copy of their own grading form and a copy of that of the other sub-panellist. If no consensus decision was reached during the second evaluation round, the case was discussed in a final and plenary round. Consensus was considered to be reached when both sub-panellists provided the same grade, or when opposite adjacent grades were given during the first and second evaluation round (e.g. 1-0 grade in 1st round, 0-1 grade in 2nd round).

Results

Study population

The participation rate of GPs was 81% (77/95). For gender and age distribution, practice type (single versus duo practices) and list size, the group of GPs was comparable to the Dutch GPs in general.³² The mean number of stroke patients per GP was 2.5, with 35 (46%) GPs having more than two cases. The maximum number of patients from one GP was eight. Among the non-respondents, the average number of stroke patients per GP was higher (3.1). Lack of time and interest were given as the main reasons not to participate. Of all participating GPs, 70% had started their current practice in the period 1970-1989, and 16% between 1990-1999. The majority of GPs in our study worked in a single-handed practice (62%), which is comparable to the reported average (64%) for the three main cities in the Netherlands (Amsterdam, Rotterdam and The Hague).³² However, the number of GPs working in group practices was substantially higher than the average for these latter cities (13% vs. 2,5%).

Among the stroke patients included in the study, 45% (87/193) were female and 55% (106/193) were male; 21% (40/193) had suffered a recurrent stroke. With regard to gender and age of the patient, the study population was representative of all stroke patients in the Netherlands.³³

Audit procedure

The intersubpanel agreement was $k = 0.63$ (overall agreement on assigned grades between sub-panels was 74%). After the first evaluation round, in 45% (87/193) of the cases a consensus decision was reached. This percentage increased to 70% (136/193) at the end of the second round, and reached almost 100% (192/193) during the final round. No significant difference in grading was found between the neurologists and GPs during the first, second and third round. However, GPs tended to allocate lower grades than the neurologists.

Final grades

In 54% (105/193) of the patients no shortcomings in preventive care (grade=0) were identified. In 13% (26/193) of the patients shortcomings were identified, but the panel concluded that there was no relationship between identified shortcomings and the occurrence of stroke (grade=1). In 21% (40/193) and 10% (19/193) of the patients, respectively, shortcomings in care were identified that possibly (grade=2) or likely (grade=3) failed to prevent stroke (Table 1). In other words, in approximately two-thirds (67%) of the cases the occurrence of stroke was not

related to sub-optimal care. However, one-third of all stroke patients did receive some form of sub-optimal care which had possibly or likely failed to prevent stroke. In only one case, panellists did not reach consensus on a final grade. Two cases were 'not-auditable' because of insufficient information.

TABLE 1. Final grades given by the expert panel.

		Cases (n=193)	%
Grading:	0	105	54
	1	26	13
	2	40	21
	3	19	10
	Dissensus	1	1
	Lack of information	2	1

Risk factors

Hypertension (99/193) and cigarette smoking (98/193) were the most frequently diagnosed risk factors (Figure 1), whereas overweight (62/193), diabetes mellitus (36/193) and TIA (34/193) occurred less often. All diabetes mellitus patients (n=36), and 89% of the hypertensive patients (n=88) were diagnosed during the pre-audit period (preceding the two-year period before the occurrence of stroke). Of 31 patients who experienced a TIA, 22 occurred during the pre-audit period. The prevalence of risk factors among cases with grade 0 and grade 1 was higher than among cases with grade 2 and grade 3. The distribution of risk factor prevalence was approximately 60% vs. 40%, respectively.

Arguments for labelling care as sub-optimal

In patients with sub-optimal care that failed to prevent stroke (n=59), 91 arguments for sub-optimal care were provided by the panellists. All arguments were based on consensus decisions (Table 2). The majority (52%) of arguments for sub-optimal care related to management of hypertension (1.3 argument per patient). In 25% (n=23, 0.6 argument per patient), quarterly follow-up on antihypertensive treatment was sub-optimal, and in 13% (n=12, 0.3 argument per patient) lack of blood pressure measurements for detection of hypertension. With respect to patients' cardiovascular risk profile assessment, the panellists identified deficiencies in 17% (15/91) of all patients. For advice with respect to patients' lifestyle (quit cigarette smoking, reduce alcohol consumption, weight reduction, physical exercise), care

was sub-optimal in 8% of the patients. Table 2 shows that sub-optimal care was most frequently judged present in the follow-up of patients, which accounts for 54% of all arguments used by the panellists.

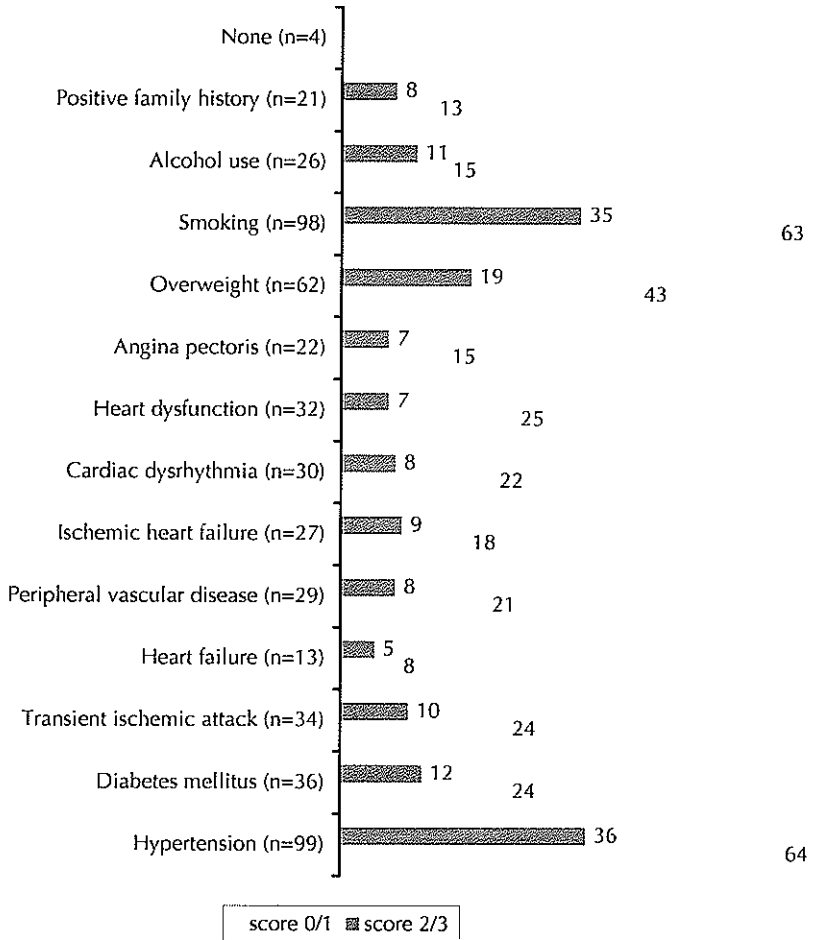


FIGURE 2. RISK FACTOR DISTRIBUTION. Prevalence of risk factors among patients with 0/1 score (receiving care that prevented stroke) and 2/3 score (receiving care that failed to prevent stroke) (numbers). N is the number of cases with each particular risk factor.

TABLE 2. Arguments labelling sub-optimal care failing to prevent stroke (n= number of arguments).

NHG practice guidelines	Elements of care	n	%
Arguments derived from practice guideline Hypertension	Detection of hypertension ^a	12	13
	Confirmation diagnosis hypertension	2	2
	Laboratory evaluation	1	1
	Pharmacologic therapy	2	2
	Follow-up (at start of treatment)	1	1
	Follow-up (quarterly)	23	25
	Follow-up (annually)	6	7
	Total	47	52
Arguments derived from Practice guideline Diabetes Mellitus	Follow-up (quarterly)	4	4
	Follow-up (annually)	1	1
	Laboratory evaluation	1	1
	Referral to eye specialist	1	1
	Total	7	8
Arguments derived from Practice guideline Transient Ischemic Attack	Referral to specialist	4	4
	Treatment (therapy and follow-up after TIA)	1	1
	Total	5	6
Arguments derived from Practice guideline Peripheral Vascular Disease	Physical examination	1	1
	Total	1	1
Arguments derived from more than one practice guideline	Advice to quit smoking	3	3
	Dietary advice (overweight)	4	4
	Evaluation of cardiovascular risk profile ^b	15	17
	Physical examination of patient with heart failure	1	1
	Total	23	25
Arguments not derived from practice guidelines	Records (documentation) of GPs	3	3
	Miscellaneous	5	6
	Total	8	9
Total arguments		91	100
Total patients		59	

^a Case finding: blood pressure measurements: (1) 1/year, if patient has diabetes, suffered stroke, or ischemic heart disease, hypertensive; (2) 1/3 years, male in age group 55-65 years; (3) 1 x 3 years, patient known with positive family history <60 years for CVD, cholesterol \geq 6.5 mmol/l, smoking.

^b Evaluation of cardiovascular risk profile (1/year) of patients with hypertension and diabetes cigarette smoking, overweight, alcohol consumption, family history of cardiovascular disease, hypercholesterolemia.

Discussion

In this study, we investigated the quality of care in stroke prevention in general practice and its relationship with the occurrence of stroke. Although we found that more than half of the stroke patients received optimal care, one third of the patients received sub-optimal care that possibly or likely failed to prevent stroke. Sub-optimal care delivery, according to the panel, had a clear effect on the occurrence of stroke. Shortcomings in care were identified mainly in the domain of hypertension control and, to a lesser extent, in patients' risk profile assessment for CVD and healthy lifestyle advice. With respect to hypertension control, the most frequent deficiencies were insufficient quarterly follow-up and insufficient numbers of blood pressure measurements to confirm the diagnosis.

The findings of our study should be interpreted in light of the strengths and weakness of this study. To answer our research question, theoretically, a case-control could have provided a valid and efficient alternative. Case-control studies are increasingly used for evaluation research, however, they pose serious methodological challenges that, so far, have not been met in the area of quality of care research (confounding biases). It is for this reason that we decided to perform an audit study. Audit studies, on the other hand, do have limitations as well. An important limitation of this type of study design (without control subjects) is its inability to 'fully' establish a causal relationship between identified shortcomings in care and the adverse outcome. In the present study, the panel assessed the adherence of GPs to practice guidelines relevant for stroke prevention and judged the causality of the relationship (combining expert opinion with scientific evidence) between non-adherence and the occurrence of stroke.

In this study, patient recruitment was incomplete. One reason for this is that 15% of the allocated patients was excluded from the study as a result of inadequate recording in hospital records or relocation and/or retirement of GPs. These problems in patient recruitment were expected in advance (real-life setting), and considered to be beyond the control of the study. For GPs, being "unwilling" to participate was the most frequent reason given for non-participation; this decision might have been influenced by the GP's perception of the quality of care (sub-optimal care) provided to the patient(s) selected for the study. Compared to the respondents, among non-respondents the average number of stroke patients was higher (2.5 versus 3.1, respectively). If the hypothesis above is valid, incomplete patient recruitment due to GP unwillingness to participate might have caused an underestimation of sub-optimal care.

With regard to shortcomings in care delivery identified by the expert panel, there are reasons to expect both an overestimation and an underestimation of sub-optimal care. Two types of bias may have introduced overestimation of sub-optimal care. First, knowledge of the clinical outcome (in our study, the serious complication of stroke) might have influenced reviewers' judgments on the quality of care,³⁴ resulting in a more critical analysis of performance. Second, incompleteness of legitimate reasons for non-conformance to the guideline which were formulated by the expert panel (not covering every possible combination of patient circumstances); correct clinical behavior could, therefore, wrongly be classified as sub-optimal care. On the other hand, other forms of bias might have caused an underestimation of sub-optimal care. First, recording of information on lifestyle-related risk factors (cigarette smoking, alcohol consumption and overweight) was substantially lower than hypertension and diabetes, 93% versus 46%, respectively. In 54%, information on lifestyle-related risk factors was obtained from GPs' memory and is thus considered less reliable and more subject to social desirability bias.³⁵ Albeit that this type of information is considered less reliable, the latter shows that by interviewing the GP (instead of chart review only) more information on lifestyle-related risk factors could be retrieved. Second, in the majority of hypertensive patients, diagnosis was established in the pre-audit period (before the two-year period preceding the occurrence of stroke) and was therefore not included in the assessment. Shortcomings in this aspect of care were, however, substantial and therefore expected to be even more impressive had they been included. We hypothesise that inclusion of this aspect of care would have increased the percentage of sub-optimal care related to the occurrence of stroke. Taking into consideration all the aforementioned types of bias causing overestimation/ underestimation of sub-optimal care, the number of stroke patients receiving sub-optimal care failing to prevent stroke is most likely to be underestimated.

With regard to shortcomings in hypertensive care, our results are consistent with previous studies. Several studies have indicated that the management of hypertension is characterised by underdiagnosis, misdiagnosis, undertreatment, overtreatment and misuse of medication, and that there are substantial opportunities for the prevention of stroke through better treatment of hypertension.^{36,37} Fewer studies reported on the relationship between the risk of stroke and the quality of control of hypertension in routine general practice. In a population-based matched case-control study Du *et al.* found that in 21% of stroke patients the occurrence of stroke was attributable to inadequate hypertension control in routine general practice.²⁶ Similar results were reported in a study by

Payne *et al.*, in which 29% of deaths from hypertensive or cerebrovascular disease were associated with avoidable factors in care; in their study, shortcomings were identified predominantly in the area of follow-up of hypertensive patients.²⁴ Both latter studies investigated the quality of hypertensive care in relation to death from stroke or hypertensive disease. In our study, however, we did not focus on hypertension only, but investigated the quality of care related to several risk factors for stroke. Besides finding similar results with respect to the quality of hypertensive care and its relation to the occurrence of stroke, we identified other areas of sub-optimal preventive care delivery that played a role in the failure to prevent the occurrence of stroke.

We conclude that, despite increased awareness and efforts to improve the quality of preventive care in general practice, the quality of preventive care provided by GPs to patients who develop a stroke remains sub-optimal. Of all aspects of care to prevent stroke in general practice, sub-optimal care predominantly originates from inadequate follow-up of hypertensive patients and inadequate annual assessment of patients' risk profile for CVD among hypertensive patients receiving antihypertensive and diabetic treatment. In addition to identifying the frequency and nature of shortcomings in care, our findings suggests that improving preventive care delivery in general practice could reduce the occurrence of stroke. This could be achieved by implementing a more systematic organisation of preventive services in general practice.

References

1. Trénent A. Stroke: Populations, Cohorts, and Clinical Trials. Minnesota: Butterworth-Heinemann Ltd, 1993.
2. Hankey GJ, Warlow CP. Treatment and secondary prevention of stroke: evidence, costs, and effects on individuals and populations. *Lancet* 1999;354:1457-63.
3. Looman SJ, Bots ML, Hofman A, Koudstaal PJ, Grobbee DE. Beroerte bij ouderen: prevalentie en opnamefrequentie: het ERGO-onderzoek (Stroke among the elderly: prevalence and frequency of hospital admission: the Ergo study). *Ned Tijdschr Geneesk* 1996;140:312-6.
4. Bonita R. Epidemiology of stroke. *Lancet* 1992;339:342-7.
5. Gorelick PB. Stroke prevention. An opportunity for efficient utilization of health care resources during the coming decade. *Stroke* 1994;25:220-4.
6. Yusuf S, Lessem J, Jha P, Lonn E. Primary and secondary prevention of myocardial infarction and strokes: an update of randomly allocated, controlled trials. *J Hypertens Suppl* 1993;11:S61-S71.
7. Bronner LL, Kanter DS, Manson JE. Primary prevention of stroke. *N Engl J Med* 1995;333:1392-400.
8. Gubitz G, Sandercock P. Prevention of Ischaemic stroke. *BMJ* 2000;321:1455-9.
9. Rose G. The strategy of preventive medicine. Oxford: Oxford University Press, 1992.
10. Fullard E, Fowler G, Gray M. Promoting prevention in primary care: controlled trial of low technology, low cost approach. *BMJ* 1987;294:1080-2.

11. Family Heart Study Group. Randomised controlled trial evaluating cardiovascular screening and intervention in general practice: principal results of British family heart study. *BMJ* 1994;308:313-20.
12. Lewis CE. Disease prevention and health promotion practices of primary care physicians in the United States. *Am J Prev Med* 1988;4:9-16.
13. Jaen CR, Stange KC, Tumieli LM, Nutting P. Missed opportunities for prevention: Smoking cessation counseling and the competing demands of practice. *Fam Pract* 1997;45:348-54.
14. Stange KC, Flocke SA, Goodwin MA, Kelly RB, Zyzanski SJ. Direct observation of rates of preventive service delivery in community family practice. *Prev Med* 2000;31:167-76.
15. Solberg LI, Kottke TE, Brekke ML. Variation in clinical preventive services. *Eff Clin Pract* 2001;4:121-6.
16. Lopez-de-Munain J, Torcal J, Lopez V, Garay J. Prevention in routine general practice: activity patterns and potential promoting factors. *Prev Med* 2001;32:13-22.
17. Drenthen T. Challenges to prevention in Dutch general practice. *Am J Clin Nutr* 1997;65:1943-5.
18. Frame PS. Health maintenance in clinical practice: strategies and barriers. *Am Fam Phys* 1992;45:1192-200.
19. Dickey LL, Kamerow DB. Primary care physicians' use of office resources in the provision of preventive care. *Arch Fam Med* 1996;5:399-404.
20. Fleming DM, Lawrence MS, Cross KW. List size, screening methods and other characteristics of practices in relation to preventive care. *BMJ (Clin Res Ed)* 1985;291:869-2.
21. Dietrich AJ, Woodruff CB, Carney PA. Changing office routines to enhance preventive care. The preventive GAPS approach. *Arch Fam Med* 1994;3:176-83.
22. Calnan M, Cant S, Williams S, Killoran A. Involvement of the primary health care team in coronary heart disease prevention. *Br J Gen Pract* 1994;44:224-8.
23. Jaen CR, Stange KC, Nutting PA. Competing demands of primary care: a model for the delivery of clinical preventive services. *J Fam Pract* 1994;38:166-71.
24. Payne JN, Milner PC, Saul C, Browns IR, Hannay DR, Ramsay LE. Local confidential inquiry into avoidable deaths from stroke and hypertensive disease. *BMJ* 1993;307:1027-30.
25. Wolfe C. Deaths from stroke in younger people. *BMJ* 1993;307:1020-1.
26. Du X, Cruickshank K, McNamee R, Saraee M, Sourbutts J, Summers J, et al. Case-control study of stroke and quality of hypertension control in north west England. *BMJ* 1997;314:272-6.
27. Bostick RM, Sprafka JM, Virnig BA, Potter JD. Predictors of cancer prevention attitudes and participation in cancer screening examinations. *Prev Med* 1994;23:816-26.
28. Grof R, Thomas S, Roberts R. Development and implementation of guidelines for family practice: lessons from the Netherlands. *J Fam Pract* 1995;40:435-9.
29. Agency for Health Care Policy and Research. Using clinical practice guidelines to evaluate quality of care. (AHCPR Publication no. 95-0045) ed. Rockville, MD, 1995.
30. Fleiss JL. Statistical methods for rates and proportions. New York: Wiley, 1981.
31. Brook RH, Chassin MR, Fink A, Solomon DH, Koseoff J, Park RE. A method for the detailed assessment of the appropriateness of medical technologies. *Int J Technol Assess Health Care* 1986;2:53-63.
32. NIVEL. Cijfers uit de registratie van huisartsen (Figures from general practitioners registration). Utrecht, 1993.
33. Wiegers T, Harmsen J. Rapportage Arbeidsmarkt Zorgsector (Report of Labour market Health sector). Utrecht: NIVEL, 1997.
34. Caplan RA, Posner KL, F.W.Cheney. Effect of outcome on physician judgements of appropriateness of care. *JAMA* 1991;265:1957-60.
35. Adams AS. Evidence of self-reported bias in assessing adherence to guidelines. *Int J Qual Health Care* 1999;11:187-92.

CHAPTER 2

36. Colhoun HM, Dong W, Poulter NR. Hypertension management: is England sticking to the rule of halves? Results from the health survey for England 1994. *J Hypertens* 1996;14:289.
37. Trilling JS. The urgent need to improve hypertension care. *Arch Fam Med* 2000;9:794-801.

CHAPTER 3

STROKE PREVENTION IN GENERAL PRACTICE: ROLE OF PRACTICE ORGANISATION AND ADHERENCE TO PRACTICE GUIDELINES

Johan S. de Koning

Niek S. Klazinga

Peter J. Koudstaal

Ad Prins

Gerard J.J.M. Borsboom

Johan P. Mackenbach

Submitted for publication.

Abstract

STUDY OBJECTIVE: This study investigates the implementation of recommended aspects of practice organisation relevant for systematic stroke prevention, and compliance with relevant practice guidelines.

METHODS: The study was conducted among 113 general practitioners (GPs) practising in the Rotterdam area. Data on aspects of practice organisation, guideline adherence, and GP/practice characteristics were collected by means of a self-administered questionnaire with 77 questions.

RESULTS: Of all GPs, 69% had implemented at least 50% of the aspects for systematic recording of preventive activities, risk factors and risk groups (e.g. 86% mark diabetic patients, 85% record blood pressure measurements in their patient records, 51% keep records of patients with an elevated risk of CVD and the patient's smoking status). Only about 50% of GPs delegate follow-up visits for treated hypertensive and diabetic patients to the practice assistant (28% never, and 18% rarely delegates preventive activities). Although GPs are most familiar with guidelines for hypertension (66%) and diabetes (67%), self-reported compliance with these guidelines is comparatively low. A relationship was found between practice characteristics and the level of recording and delegation; i.e. GPs in group practices record ($p=0.02$) and delegate ($p=0.01$) more often, GPs with more than 1.0 fte practice assistant delegate more often ($p=0.03$), full-time working GPs record and delegate less often ($p=0.03$), and GPs in more deprived neighbourhoods delegate less ($p=0.07$).

CONCLUSION: This study shows that implementation levels of practice organisation and guideline adherence relevant for stroke prevention in general practice are moderate to low. To facilitate the implementation of cardiovascular disease/stroke prevention in general practice, improvements in the recording of cardiovascular risk factors and delegation of preventive activities to support staff are needed. In particular, GPs practising in single-handed practices or working full-time need to strengthen their efforts in this area.

Introduction

In the Netherlands, as in many other western industrialised countries, priority is given by the Ministry of Health and professional organisations to reinforce prevention in primary care.¹⁻³ Efforts to enhance and systematically improve prevention focus primarily on general practice, since general practice is a key feature in the health care system in which general practitioners (GPs), theoretically, play a pivotal role in providing preventive care. They have easy access to their patients and see most of their patients over a long period, allowing them to adequately detect, treat and follow-up patients at high cardiovascular risk.

Several studies have demonstrated the effectiveness of systematic prevention of cardiovascular disease (CVD) in primary care.⁴⁻⁷ For example, there is strong and consistent evidence that adequate treatment of hypertension, cessation of cigarette smoking, and alteration of other risk factors amenable to medication, diet, or other interventions (e.g. diabetes, transient ischaemic attack, obesity, excessive alcohol intake) substantially reduce the risk of CVD and stroke.⁸ However, despite its proven effectiveness and recognition that GPs do have an important role to play in CVD prevention, GPs' delivery of preventive care falls well below recommended levels.^{9,10}

Systematic prevention constitutes effective targeting of preventive interventions to groups or patients at a high risk of CVD. In addition to GP-related factors (e.g. self-efficacy, attitude, skills, lack of time) and patient-related factors (e.g. cultural beliefs, anxiety), many studies have reported that a key to improving preventive services in general practice is a widespread implementation of organized support systems.¹¹⁻¹⁴ In the practice environment, measures that assist GPs to optimize CVD prevention include, for example, the coordination and delegation of preventive tasks to support staff, adequate recording systems and reminder systems, and educational programmes. Absence of an adequate practice organisation is seen as one of the main reasons why GPs do not deliver preventive care as often as recommended.

Various initiatives have been taken to achieve a more systematic approach and greater involvement of GPs in CVD prevention in the Netherlands. For example, Dutch professional organisations officially formalised the preventive role of GPs in 'the Basic Job Description of the General Practitioner'.¹⁵ Since that time (mid-1980s), GPs are expected to consider what preventive measures are suitable for the patient at risk of CVD and ensure that these measures are adequately performed. Also, the Dutch Association of General Practitioners and the Dutch College for General Practitioners formulated a long-term plan to promote systematic

prevention, indicating specific preventive tasks and responsibilities. To target preventive actions more effectively, improvements in practice organisation were also recommended.

Parallel to these developments, quality policies for systematic quality assurance and improvement in general practice were developed and offered to GPs in the Netherlands.¹⁶ For example, as part of a national guideline program, the Dutch College of General Practitioners began to develop practice guidelines, some of which are related to CVD prevention (e.g. hypertension, diabetes mellitus, hypercholesterolaemia, heart failure).¹⁷ Since the start of this programme in 1987, much attention has been given to the implementation of their guidelines. The guidelines are offered to the GP by means of written materials (publication in the GP journal, educational packages) and personal approaches (contact with colleagues, outreach visits). Furthermore, the concern with and interest in quality of care resulted in the development and implementation of comprehensive quality of care assessment tools, the introduction of obligatory continuous medical education with accredited educational programmes, participation of GPs in obligatory peer review in small local GP groups, etc.¹⁸⁻²⁰

This study addresses the presence of adequate practice organisation relevant for stroke prevention and of compliance with relevant guidelines in general practice, and explores to what extent their presence is related to practice and GP characteristics. This investigation was part of an overall study on quality of stroke prevention in general practice.

Data and Methods

Design

The GPs recruited for the study were located in the southern part of Rotterdam and the urbanised surrounding region. All of the 113 GPs participating in the larger study, agreed to participate in the present study. Identification and recruitment of GPs was done by a) checking hospital records of stroke patients referred to the main referral hospitals for stroke in Rotterdam (n=77), and b) random sampling of GPs (n=36) practising in the southern part of Rotterdam. The period of patient referral was 1996-1997. The study was restricted to patients with a first-ever stroke meeting the following criteria for inclusion: (a) diagnosis of intracerebral haemorrhage or infarction according to the WHO definition of stroke,²¹ (b) aged 39-80 years, (c) occurrence of stroke in the period 1996-1997, (d) stroke caused by CVD and not by trauma, infection or malignancy, (e) GP of the patient practising in the southern part of Rotterdam or surrounding region, (f) patient registered with the

local GP for not less than two years, and (g) patient not living in a nursing home during the two-year period prior to stroke.

Data collection

GPs received a postal questionnaire containing 77 pre-structured questions on the implementation of practice organisation for stroke prevention: i.e. addressing formalised co-operation within GP practice, continuous medical education (CME), knowledge and application of clinical practice guidelines, systematic registration of preventive activities, risk factors and risk groups, support staff and delegation of preventive activities, and formalised co-operation with other health care providers. The questions were selected from the literature, from research conducted by the Centre for Quality of Care Research (University of Nijmegen, the Netherlands), and practice guidelines developed and implemented by the Dutch College of General Practitioners. In addition, the questionnaire contained a number of questions on GPs' and practice characteristics: i.e. GP characteristics (age, gender, date of medical qualification), practice characteristics (practice type, list size, teaching practice, practice location, working hours of GP).

Analysis

The unit of analysis was the GP. To determine the implementation level of aspects of practice organisation for stroke prevention and self-reported compliance with the various elements of practice guidelines, frequencies were calculated. Outcomes on implementation (yes/no) and compliance (yes/no) were dichotomised. Sum scores were constructed and used to calculate implementation levels of conditions of practice organisation for stroke prevention and compliance with elements of practice guidelines.

To determine the relationship between aspects of practice organisation for stroke prevention on the one hand, and GP/practice characteristics on the other, we calculated the percentage of GPs with at least 50% implementation level. Arbitrarily, a cut-off point of 50% was chosen as a reference for the implementation level. Logistic regression analysis was performed to explore the relationships between aspects of practice organisation for stroke prevention and GP/practice characteristics. Dichotomised sum scores served as dependent variable. Independent variables in the analysis were the GP and practice characteristics.

Results

Study population

In total, 103 of the 113 GPs completed and returned the questionnaire (response rate 91%). For a number of characteristics (age distribution, gender, type of practice, list size) the study population was comparable with the general GP population in the Netherlands.²² However, compared with GPs working in the three main cities in the Netherlands, the number of GPs working in group practices was higher (11% vs. 2.5%).²³ Of all participating GPs, 70% started their current practice in the period 1970-1989 and 16% between 1990-1999. No significant differences were found in GP characteristics (age, date of qualification) between respondents and non-respondents.

Implementation of relevant aspects of practice organisation

(i) Recording of risk factors and risk groups

In total, 69% of GPs implement three to four/all conditions for recording of preventive activities, risk factors and risk groups (Table 1). The majority of GPs state that they mark diabetic patients (86%) and record blood pressure measurements (85%) in their patient records. Fifty-one percent of GPs keep records of patients with an elevated risk of CVD and the patient's smoking status. A relatively high percentage (16%) does not record patient's smoking status, even if the patient is known to be a smoker. Among those using computerised GP information systems (92%), approximately two-thirds (64%) utilise electronic medical records to record patient information, test results, and risk factors.

(ii) Support staff and delegation of preventive tasks

Regular delegation of follow-up visits for treated hypertensive and diabetic patients to the practice assistant is done by half the group of GPs (51%). A relatively high percentage of GPs does not delegate preventive activities to the practice assistant. Twenty-eight percent of GPs never, and 18% of GPs rarely delegates follow-up visits of treated hypertensive patients

(iii) Others (CME, peer review, co-operation with other health care providers)

Less than 50% of GPs participated in at least one regional course relevant for stroke prevention (during the previous five years) and/or in peer review sessions. With respect to co-operation with other health care providers, 70% of GPs co-operate with dieticians and 24% with diabetes nurses (24%).

TABLE 1. Implementation of aspects of practice organisation relevant for stroke prevention in general practice (percentage).

Conditions	GP's (%)
Recording:	
Patients with elevated risk of cardiovascular disease	51
Marking patients with diabetes mellitus in patient's record	86
Blood pressure measurements	85
Smoking (if discussed with patient)	51
Presence of:	
0 condition	3
1-2 conditions	28
3-4 conditions	69
Delegation:	
Delegate follow-up visits for diabetes patients to practice assistant	52
Delegate follow-up of hypertensive patients to practice assistant	53
Presence of:	
0 condition	33
1 condition	30
2 conditions	37
Continuous medical education (CME):	
CME (cardiology)	28
CME (diabetes mellitus)	54
Presence of:	
0 condition	35
1 condition	47
2 conditions	18
Co-operation within practice team:	
Peer review	41
Formalised co-operation ^a	87
Presence of:	
0 condition	9
1 condition	54
2 conditions	37
Co-operation with other health care providers:	
Co-operation with dietician	70
Co-operation with diabetes nurse	24
Presence of:	
0 condition	29
1 condition	48
2 conditions	23

^a regular scheduled meetings (including drawing-up minutes)

*Guidelines relevant for stroke prevention**(i) Knowledge and application*

The mean percentage of GPs who were not at all, little or well informed about stroke-related guidelines was 4%, 49% and 47%, respectively. GPs are most familiar with guidelines for diabetes mellitus (67%), hypertension (66%), and cholesterol (61%), and least familiar with guidelines for peripheral vascular disease (29%) and chronic heart failure (32%) (Table 2). Table 3 presents self-reported compliance to various elements of each guideline separately. GPs report remarkably high guideline compliance ($\geq 2/3$ and $\geq 60\%$ compliance) with the guidelines for transient ischaemic attack (100%), peripheral vascular disease (99%) and angina pectoris (92%). Compliance with the guidelines for hypertension and diabetes, however, was much lower (75% and 56%, respectively). A similar pattern was observed for compliance with all guideline elements.

TABLE 2. Knowledge of NHC* practice guidelines relevant for stroke prevention (percentages).

	Not informed	Little informed	Well informed
Hypertension	2	32	66
Diabetes Mellitus	1	32	67
Transient Ischaemic Attack	7	57	36
Peripheral Vascular Disease	8	63	29
Chronic Heart Failure	3	65	32
Cholesterol	4	35	61
Angina pectoris	4	57	39

* NHC, Dutch College of General Practitioners

Relationship between practice organisation/guideline adherence and GP/practice characteristics

Table 4 shows the relationship between aspects of practice organisation/guideline adherence and GP/practice characteristics. There were significant relationships between four practice characteristics, and recording of preventive data and delegation of preventive activities. First, compared to single-handed practices, group practices more frequently record preventive activities, risk factors and risk groups ($p=0.02$), and more frequently delegate preventive activities to the practice assistant ($p=0.01$). Second, GPs working full-time record preventive data and delegate preventive activities less frequently than part-time GPs ($p=0.03$).

TABLE 3. Compliance with clinical guidelines relevant for stroke prevention (percentages).

NHG* practice guidelines (per element)	GPs			
Hypertension :				
Confirmation diagnosis hypertension (95-104 mmHg)			55	
Confirmation diagnosis hypertension (≥ 104 mmHg)			81	
Lifestyle modification as initial treatment			85	
Start pharmacologic therapy (CVD risk level increased and Dbd >100 mmHg)			87	
Diureticum or beta-blockers used as first choice medication			75	
Annual follow-up of hypertensive patients			64	
	Adherence to:	0	element	0
		$\geq 2/3$	elements	75
		all	elements	24
Diabetes Mellitus:				
Treatment goal: blood glucose < 6.5 mmol/l			83	
Treatment for patients aged > 75 yrs. According to physical complaints			31	
Evaluation of dietary intake and physical exercise before pharmacological therapy			19	
Initial pharmacologic therapy: Tolbutamide			57	
Quarterly follow-up (diet/medication/body weight/glucose)			80	
	Adherence to:	0	element	1
		$\geq 60\%$	elements	56
		all	elements	5
Transient Ischaemic Attack:				
Symptoms last less than 24 hours			96	
Life-long treatment with antithrombotic medications			93	
Patients with TIA and atrial fibrillation receive coumarine			89	
	Adherence to:	0	element	0
		$\geq 2/3$	elements	100
		all	elements	79
Peripheral Vascular Disease:				
Detection of possible cardiovascular risk factors among suspected patients			96	
Referral to medical specialist in patients without symptoms			75	
Lifestyle advice (smoking) to all PVD patients			100	
	Adherence to:	0	element	0
		$\geq 2/3$	elements	99
		all	elements	72
Chronic Heart Failure:				
Sodium/Potassium/Creatine levels before pharmacologic treatment			68	
Initial pharmacologic therapy: Furosemide			57	
Follow-up after six months of stable (optimally treated) HF			60	
	Adherence to:	0	element	7
		$\geq 2/3$	elements	60
		all	elements	32

(see next page)

(continued)

Angina pectoris:			
Ability to treat stable angina			99
EKG in case recent myocardial infarction is suspected			47
Pharmacologic therapy at > two pain episodes (related to AP) per week			89
	Adherence to:	0	element
		≥2/3	elements
		all	elements
			44

* NHC, Dutch College of General Practitioners

Third, in practices with more than 1.0 fte practice assistant per GP, GPs delegate preventive activities more frequently ($p=0.03$). Fourth, GPs in deprived neighbourhoods tend to less often delegate preventive activities to the practice assistant ($p=0.07$), despite the fact that no significant differences were found between the employment rate of practice assistants and practice location (deprived versus non-deprived neighbourhoods). Multivariate regression analysis showed similar trends; however, none of these trends was significant (data not presented).

Discussion

Despite numerous efforts to enhance and systematically improve preventive care in general practice, requirements for systematic stroke prevention are only moderately implemented. This study showed that different aspects of practice organisation, such as recording of preventive activities, risk factors and risk groups, and delegation of preventive tasks to the practice assistant, are clearly related to practice characteristics. Particularly GPs working in single-handed practices or working full-time less often record information about a patient's risk status and less often delegate preventive activities.

We should note that our study has some limitations. When studying the clinical performance of health professionals using self-reported measures, there is a risk of introducing response bias. When clinicians are questioned on their actual adherence to guidelines, they tend to overestimate their own professional performance. In a literature review on self-reported bias in assessing adherence to guidelines, Adams found that clinicians tend to overestimate their compliance with recommended norms by a median absolute difference of 27%.²⁴ In our study, therefore, we expect the results on self-reported knowledge and compliance with guidelines, and to a lesser extent results on the implementation of practice organisation for stroke prevention, to be overestimated as well.

In the management of risk factors for CVD prevention, adequate information on a patient's risk status is essential. Studies have indicated a positive relationship between practice organisation for CVD prevention and the availability of cardiovascular risk factor information.^{25,26} Practices with organised patient management systems (computer-assisted) have shown higher levels of risk factor recording.²⁷ In our study, 92% of GPs had access to a 'practice computer', while only 64% of GPs utilised electronic medical records to record patient information, test results, and risk factors. GPs reported to use their electronic information system mainly for recording financial data, updating patients' journal (text writing) and management of receipts, as previously reported.²⁸ In a study on electronic information systems in Norwegian hospitals it was found that, despite the widely implemented electronic medical record systems, physicians used these systems mainly for reading patient data.²⁹ It seems that having a computerised data management system does not automatically lead to its effective use. GP's individual dedication to optimise the system is another important determinant for effective electronic information system in general practice.³⁰

For optimal preventive care delivery, GPs should be able to detect and follow-up patients at risk in a practical manner. With the increasing workload and complexity of care in general practice, GPs need to make effective and efficient use of resources and, therefore, with regard to CVD prevention, delegate preventive tasks to the practice assistant. Two Dutch studies recognised the importance of delegating preventive tasks to the practice assistant, and considered this an essential element in improving the quality of preventive care.^{31,32} Our results show that, despite its recognition, only 50% of GPs delegate either follow-up visits for diabetic mellitus patients or treated hypertensive patients to the practice nurse (one-third of GPs did not delegate these activities at all). Because we found a positive relationship between the employment rate of a practice assistant and delegation of preventive activities, the limited availability of support staff may be responsible for this result (36% of the practices had less than one full-time employed practice assistant per GP).

With regard to formalised co-operation within the practice team, in particular peer review, GPs have not changed their participation in this type of activity significantly since the early 1990s. GPs' participation in peer review continues to be low which, according to the literature, is due to a variety of barriers. Studies on GPs' perception towards quality assurance and medical audit indicate that lack of time, money, staff and facilities, play an important role.^{18,33}

TABLE 4. Relationship between GP/practice characteristics and aspects of practice organisation and compliance with guidelines (univariate logistic analysis).

		n	Implementation				Compliance		
			(1) [*]	(2)	(3)	(4)	(5)	(6)	(7)
<u>Practice characteristics:</u>									
Type of practice	Single-handed	60	15	25	20	37	32	73	49
	Duo-practice	18	39	44	0	28	11	67	53
	Group practice	11	55 ¹	73 ¹	27	55	18	80	80
	Health centre	7	14	57	14	0	0	80	60
	Other types	6	50	33	17	17	0	100	25
List size ^a	≥ 2500	55	42	44	16	42	24	32	49
	< 2500	48	42	27	17	23	21	18	62
Employment rate of practice assistant ^b	≥ 1.0 fte	66	38	44 ¹	18	36	21	81	54
	< 1.0 fte	37	49	22	14	27	24	63	56
Working hours GP	Full-time	76	34 ¹	32 ¹	20	36	26	69	50
	Part-time	27	52	52	7	30	7	67	48
Training/teaching practice ^c	Yes	52	35	40	19	27	19	68	48
	No	51	43	28	14	37	24	69	51
Practice location / neighbourhood	High/medium	40	63	48 ²	20	38	18	73	53
	Low	63	56	29	14	31	25	76	56
<u>GP characteristics:</u>									
Gender	Male	90	41	38	17	30	24	72	42
	Female	13	46	23	16	31	8	100	50
Date of medical qualification	1960 – 1974	31	19	29	19	39	29	75	25
	1975 – 1984	58	28	38	16	31	19	70	62
	1985 - 1994	14	29	43	14	29	21	92	67
N		103	26	37	17	34	23	75	75

Recording of preventive activities, risk factors and risk groups, (2) Delegating preventive activities to practice assistant, (3) Continuous medical education, (4) Formalised co-operation within GP team, (5) Co-operation with other health care personnel, (6) ≥ 2/3 compliance with practice guideline hypertension, (7) ≥ 60% compliance with practice guideline diabetes mellitus.

^a Number of patients per full-time GP, ^b Practice assistance per full-time GP, ^c GPs training GP residents and/or teaching medical students, ^{*} 2/3 of items implemented, ¹ p < 0.05 (group versus single-handed practice), ² p < 0.05, ³ p < 0.1.

In this study, two-third of the GPs were well informed about hypertension and diabetes mellitus guidelines, compliance with hypertension and diabetes guidelines was relatively low. Detailed and more comprehensive guidelines, such as hypertension and diabetes mellitus, are less often followed than less detailed guidelines. Several factors may explain this controversy. First, compliance with more detailed and comprehensive guidelines is associated with a more adequate practice organisation. For practices with limited support staff, for example, recommended quarterly follow-up of treated hypertensive patients will be less achievable than practices with more assistance. Second, hypertensive and diabetic care requires longer treatment and follow-up than patients with e.g. TIA or angina pectoris. Optimising care for hypertensive and diabetic patients requires more effort and resources and is, therefore, more dependent on the practice organisation.

We found a relationship between practice characteristics and the implementation of practice organisation, with strong associations clustered round the delegation of preventive tasks to the practice assistant and recording of cardiovascular risk factors and risk groups. For delegation of preventive tasks to the practice assistant, four out of six practice characteristics (type of practice, employment GP, employment rate of the practice assistant, practice location) were significantly related. For two practice characteristics, practice type and employment rate of practice assistant, associations with task delegation to the practice assistant have been established earlier. For practice type, it was found that GPs working in group practices and health centres more frequently delegate preventive activities to the practice assistant.³⁴ They argue that in single-handed practices GPs usually have one practice assistant who is generally busy with telephone calls and other administrative tasks and therefore has no time for other tasks such as examination and follow-up of cardiovascular patients. In a Dutch study on determinants for delegation of tasks to the practice assistant in general practice, Nijland et al. found that a higher employment rate of practice assistant per GP (more than one full-time employed practice assistant per GP) positively influences delegation of preventive tasks.³⁵ Our finding that GPs' working hours (full-time vs. part-time) and practice location (deprived vs. non-deprived) significantly influenced GPs' behaviour towards task delegation adds new insights to this field.

Compared to single-handed practices, group practices tend to more frequently record preventive activities, risk factors and risk groups. In a study by Fleming et al., variation in risk factor recording explained by practice characteristics was not related to practice type. They reported higher recording levels for blood pressure and smoking in training practices in the UK, and lower levels of recording in practices with increasing list sizes.²⁶ The finding in our study that GPs working full-

time record preventive data less frequently than GPs working part-time could not be confirmed by other studies.

In summary, this study indicates that practice organisation and compliance with guidelines relevant for stroke prevention in general practice is not yet optimal. If GPs, particularly those practising in single-handed practices or working full-time, want to target preventive activities for stroke prevention more effectively, special attention and investments to improve cardiovascular risk factor recording and delegation of preventive activities to support staff are needed.

References

1. National Association of General Practitioners LHV-Dutch College of General Practitioners NHG. Concept-voorstel inzake preventie in de huisartspraktijk (Draft proposal for prevention in general practice). Utrecht, 1992.
2. Stange KC. Preventive medicine in primary care: moving from theory to practice. *Postgrad Med* 1991;30:125-28.
3. Ministerie van WVC. Preventiebeleid voor de Volksgezondheid: praktische keuzen voor de jaren negentig (Ministry of Welfare, Public Health and Culture (WVC) Policy on Public Health Prevention: practical choices for the nineties). 's-Gravenhage: Tweede Kamer, vergaderjaar 1992-1993, 22 894, nr. 1, 1992.
4. Gorelick PB. Stroke prevention. An opportunity for efficient utilization of health care resources during the coming decade. *Stroke* 1994;25:220-4.
5. Yusuf S, Lessem J, Jha P, Lonn E. Primary and secondary prevention of myocardial infarction and strokes: an update of randomly allocated, controlled trials. *J Hypertens Suppl* 1993;11:S61-S71.
6. OXCHECK Study Group. Effectiveness of health checks conducted by nurses in primary care: final results of the OXCHECK study. *BMJ* 1995;310:1099-104.
7. Family Heart Study Group. Randomised controlled trial evaluating cardiovascular screening and intervention in general practice: principal results of British family heart study. *BMJ* 1994;308:313-20.
8. Bronner LL, Kanter DS, Manson JE. Primary prevention of stroke. *N Engl J Med* 1995;333:1392-400.
9. Frijling BD. Management of patients at high cardiovascular risk. Quality improvement in general practice (Thesis). Centre for Quality of Care Research. Nijmegen: University of Nijmegen, 2002.
10. Stange KC, Flocke SA, Goodwin MA, Kelly RB, Zyzanski SJ. Direct observation of rates of preventive service delivery in community family practice. *Prev Med* 2000;31:167-76.
11. Solberg LI, Kottke TE, Brekke ML. Will primary care clinics organize themselves to improve the delivery of preventive services? A randomized controlled trial. *Prev Med* 1998;27:623-31.
12. Dickey LL, Kamerow DB. Primary care physicians' use of office resources in the provision of preventive care. *Arch Fam Med* 1996;5:399-404.
13. van Drenth B. Organizing cardiovascular preventive care in general practice (Thesis). Centre for Quality of Care Research. Nijmegen: Katholieke universiteit Nijmegen, 1998.
14. Ramsey SD, Cheadle AD, Neighbor WE, Gore E, Temple P, Staiger T, et al. Relative impact of patient and clinic factors on adherence to primary care preventive service guidelines: an exploratory study. *Med Care* 2001;39:979-89.
15. National Association of General Practitioners LHV-Dutch College of General Practitioners NHG. Basistakenpakket van de huisarts (Basic job description for the GP). Utrecht, 1986.
16. Grol R, Thomas S, Roberts R. Development and implementation of guidelines for family practice: lessons from the Netherlands. *J Fam Pract* 1995;40:435-9.

17. Rutten GEHM, Thomas S. NHG-Standaarden voor de huisarts (Dutch College of General Practitioners' guidelines). Utrecht: NHG, 1993.
18. Grol R, Wensing M. Implementation of quality assurance and medical audit: general practitioners' perceived obstacles and requirements. *Br J Gen Pract* 1995;45:548-52.
19. Grol R. Kwaliteitssystemen in de huisartsgeneeskunde: wat betekent dit voor de huisarts? (Quality systems in general practice: what are the implications for GPs?) *Huisarts en Wetenschap* 1993;36:106-12.
20. Grol R. Quality assurance in General Practice: the State of the Art in Europe. *Fam Pract* 1994;11:460-66.
21. WHO Special Report. Stroke-1989. Recommendations on stroke prevention, diagnosis, and therapy. Report of the WHO Task Force on Stroke and other Cerebrovascular Disorders. *Stroke* 1989;20:1407-31.
22. Dutch Institute of Primary Care, NIVEL. Cijfers uit de registratie van huisartsen (Figures from general practitioners registration). Utrecht, 1993.
23. Verheij RA. De huisarts in de grote stad (The GP in large cities). Utrecht, 1992.
24. Adams AS. Evidence of self-reported bias in assessing adherence to guidelines. *Int J Qual Health Care* 1999;11:187-92.
25. Maitland JM, Reid J, Taylor RJ. Two stage audit of cerebrovascular and coronary heart disease risk factor recording: the effect of case finding in screening programmes. *Br J Gen Pract* 1991;41:144-6.
26. Fleming DM, Lawrence MS, Cross KW. List size, screening methods and other characteristics of practises in relation to preventive care. *BMJ* 1985;291:869-2.
27. van den Hoogen JP, van Ree JW. Preventive cardiology in general practice: computer-assisted hypertension care. *J Hum Hypertens* 1990;4:365-7.
28. Knottnerus JA. Role of the electronic patient record in the development of general practice in The Netherlands. *Meth Inform Med* 1999;38:350-4.
29. Hallvard Lærum H, Ellingsen G, Faxvaag A. Doctors' use of electronic medical records systems in hospitals: cross sectional survey. *BMJ* 2001;323:1344-48.
30. Litvin C, Ornstein S, Anthony WJ, D T. Quality improvement using electronic medical records: a case study of a high-performing practice. *Top Health Inf Manage* 2001;22:59-64.
31. van Ree JW. Het Nijmeegs Interventie Project (Thesis) (The Nijmegen Intervention Project). Nijmegen: Katholieke Universiteit Nijmegen, 1981.
32. Schraven DLM, van den Hoogen H, van Gerwen W, van Ree JW. Het RIFOH-huisartsenproject nader beschouwd (The RIFOH project reviewed). Nijmegen: Nijmeegs Universitair Huisartsen Instituut, 1986.
33. Black N, Thompson E. Obstacles to Medical audit: British doctors speak. *Soc Sci Med* 1993;36:849-56.
34. van den Hombergh P, Grol R, van den Hoogen HJ, van den Bosch WJ. Assessment of management in general practice: validation of a practice visit method. *Br J Gen Pract* 1998;48:1743-50.
35. Nijland A, Groenier K, de Jong BM. Determinanten van het delegeren van (medisch-technische) taken aan de praktijkassistenten. *Huisarts en Wetenschap* 1991;34:484-87.

CHAPTER 4

QUALITY OF STROKE PREVENTION IN GENERAL PRACTICE: RELATIONSHIP WITH PRACTICE ORGANISATION

Johan S. de Koning

Niek S. Klazinga

Peter J. Koudstaal

Ad Prins

Gerard J.J.M. Borsboom

Johan P. Mackenbach

Submitted for publication.

Abstract

STUDY OBJECTIVE: To investigate the relationship between aspects of practice organisation relevant for stroke prevention in general practice (structure), and sub-optimal preventive care preceding the occurrence of stroke (process).

DESIGN AND SETTING: A study was conducted among 69 Dutch GPs in the Rotterdam region. Results of a previous audit study on shortcomings in preventive care towards stroke patients, and a postal questionnaire with 77 questions addressing aspects of practice organisation were used. With logistic regression analysis we investigated the relationship between the probability of sub-optimal care delivery and the presence of practice organisational structures for stroke prevention (tailored information systems, formal delegation of preventive tasks, standardization of care i.c. compliance to clinical practice guidelines).

RESULTS: GPs with a higher level of systematic recording of blood pressure measurements, a higher level of marking of high-risk patients in the patient records ($p < 0.05$), and a higher level of delegation of preventive activities to support staff ($p < 0.01$) less often provided sub-optimal care. A positive relationship was found between self-reported compliance to clinical practice guidelines and sub-optimal care delivery: GPs reporting a higher level of compliance delivered less sub-optimal care ($p < 0.05$). GP and other practice characteristics did not have a significant correlation with the quality of preventive care.

CONCLUSIONS: This study shows that GPs with a higher level of integrated organisational structures for stroke prevention (tailored information systems, formal delegation of preventive tasks, standardization of care) are less likely to deliver sub-optimal care.

Introduction

Stroke continues to be the third leading cause of death, after heart disease and cancer, and is a major cause of long-term disability in industrialised countries.^{1,2} Given its significant impact on public health and the fact that there are no effective treatments for most types of stroke, preventive strategies are of utmost importance and offer the greatest potential for reducing the burden of this disease.³ Within the health care system, general practice plays a prominent role in stroke prevention. Of all health care providers, general practitioners (GPs) have the most frequent contact with their patients and, therefore, have easy access to individuals at risk of cardiovascular disease (CVD). It is for this reason that in primary care, GPs receive increasing support to improve the quality of CVD prevention.

Since the early 1990s, a more systematic approach towards prevention has been propagated by the Dutch Ministry of Health, Welfare and Sports and professional organisations such as the Dutch Association of General Practitioners and the Dutch College of General Practitioners.⁴ In addition to advocating a more proactive approach towards CVD prevention, aspects of practice organisation like systematic data recording and retrieval of patients at risk, delegation of preventive activities to support staff, and standardization of care by using evidence-based clinical practice guidelines were formulated.^{4,5} Since that time, GPs have invested time and other resources to develop and implement practice structures to systematically enhance the quality of CVD/stroke prevention in general practice. The latter changes in practice organization have become part and parcel of the overall quality improvements policies and programmes for systematic quality assurance and improvement in general practice in the Netherlands.⁶ Implementation of quality systems and adequate practice organisation for CVD prevention are considered to be important for the implementation and integration of systematic prevention.⁷ Until now, the implementation of quality systems has generally focused on the development and implementation of national practice guidelines, the development of feasible assessment tools, obligatory peer review in small groups and continuous medical education courses.^{8,9}

It has not yet, however, been demonstrated whether structural adaptations in practice organisation measurably improve the GP's quality of preventive care delivery compared with colleagues with practices with less organised systems for preventive care delivery. In this study, we investigated the relationship between aspects of practice organisation relevant for stroke prevention in general practice, and sub-optimal preventive care preceding the occurrence of stroke.

Methods

Design

The study was conducted within the framework of an audit study on quality of preventive care to prevent stroke in general practice in the city of Rotterdam and surrounding region (the Netherlands). Of the 77 GPs participating in this study, 69 GPs (response rate 90%) participated in the present study. After approval from the local Medical Ethics Committee, patients were selected from the two largest referral hospitals for stroke in the region. The study was restricted to patients aged under 80 years with a first-ever stroke. Patient records were searched to identify the patient's GP. Subsequently, for the 186 identified stroke patients, data were collected on the quality of preventive care to prevent stroke. The mean number of cases per GP was 2.7, with 24 GPs having 1 patient eligible for entry and 45 having more than two; the maximum number of cases per GP was seven. The participating GPs were comparable to other Dutch GPs for gender, age distribution, practice type (single and duo practices) and list size.¹⁰ Of all participating GPs, 70% started their current practice in the period 1970-1989 and 16% between 1990-1999.

Data collection

In the audit study, data on the process of care at patient level were collected by means of structured face-to-face interviews with the GP, using separate questionnaires for each stroke patient. At the time of the interview the GP used either hand written or electronic patient records to retrieve the patient's information. The questionnaire comprised questions related to patient characteristics, medical and family history of cardiovascular risk factors, and the detection and treatment of risk factors for stroke (e.g. hypertension, diabetes mellitus, transient ischemic attack and cardiac failure). Similarly, information on lifestyle-related risk factors (e.g. cigarette smoking, overweight, and alcohol consumption) was collected.

In addition to the interview, GPs received a postal questionnaire containing 77 prestructured questions on aspects of practice organisation (systematic recording of preventive activities, risk factors and risk groups, support staff and delegation of preventive activities, knowledge and application of clinical practice guidelines) and quality-related activities (continuous medical education (CME), formalised co-operation within GP practice, formalised co-operation with other health care providers). The questions were selected from literature, research conducted by the Centre for Quality of Care Research (University of Nijmegen, the Netherlands), and practice guidelines developed and implemented by the Dutch College of General

Practitioners. In addition, questions were included on the GP's personal characteristics (age, gender, year of qualification, teaching practice, working hours) and other practice characteristics (practice type, practice location, list size).

Assessment of quality of care

The quality of preventive care was based on the judgement of a six-member panel of experts, comprising 3 neurologists and 3 GPs, selected on the basis of their clinical expertise with respect to stroke prevention, experience in quality of care evaluation, academic or non-academic background and professional discipline. Six clinical practice guidelines relevant to stroke prevention (hypertension, diabetes mellitus, transient ischemic attack, peripheral vascular disease, cardiac failure and angina pectoris) were selected by the panel. The guidelines (evidence based) were developed and implemented by the Dutch College of General Practitioners, as part of a national guideline program operational since 1987.^{11,12} From each guideline, specific elements of care were identified and systematically converted into review criteria (n=65), allowing detailed measurement of GP's adherence.¹³

In a two-round evaluation, with a final plenary round, cases were assessed by the panellists (who were divided in sub-panels). Based on identified elements of sub-optimal care and seriousness of shortcoming in terms of 'minor' and 'major', the panellists allocated grades on a scale of 0 to 3. Only care related to GP's performance was included in the assessment. For 36 cases, the intersubpanel agreement was measured by Cohen's K statistic, which accounts for chance agreement.¹⁴ A value of +1.0 indicates complete agreement, 0.0 no agreement, and -1.0 complete disagreement. The intersubpanel agreement was $k=0.63$ (overall agreement on assigned grades between sub-panels was 74%).

In 55% of all cases, no sub-optimal care (grade=0) was identified by the expert panel, whereas in 44%, sub-optimal care was identified (grade 1-3) (Table 1). Deficiencies in hypertensive care and patients' cardiovascular risk profile assessment were found most frequently. The distribution of patients with sub-optimal care among the GPs is given in Table 2.

Analysis

Logistic regression analysis was used to investigate the relationship between the probability of patients to receive optimal or sub-optimal care and aspects of practice organisation for stroke prevention and GP characteristics.

TABLE 1. Final grades given by the expert panel.

		Cases (n=186)	%
Grading:	0 (No sub-optimal factors have been identified)	102	55
	1 (Sub-optimal factor(s) have been identified, but are unlikely to be related to the occurrence of stroke in this patient)	26	14
	2 (Sub-optimal factor(s) have been identified, and possibly have failed to prevent the stroke in this patient)	38	20
	3 (Sub-optimal factor(s) have been identified, and are likely to have failed to prevent the stroke in this patient)	18	10
	Dissensus	2	1

TABLE 2. Distribution of patients with sub-optimal care among GPs (n=69).

Number of stroke patients per GP	Number of GPs	Mean number of patients with sub-optimal care per GP
1	24	0.4
2	12	0.9
3	13	1.0
4	11	2.1
5	4	1.8
6	1	3.0
7	3	3.3
8	1	7.0

For many practices, data on several different patients were available that were all included in the analysis. However, care provided to patients from the same practice might be more alike than to patients from different practices due to the fact that they have their GP in common. These observations might therefore not be statistically independent. Statistical independence of observations is an important assumption of standard logistic regression analysis, where correlations between observations result in estimated confidence intervals that are too narrow and consequently in too optimistic estimates of statistical significance. We adjusted for the intracluster correlations by using the Generalised Estimating Equations (GEE) approach for logistic regression available in SAS version 8.0 (proc genmod). All patients, minus 2 (no reached consensus on final grading of quality of care) were

included in the analysis. Gradings of care delivery were dichotomised into a score of zero, indicating optimal care delivery, and a score of one, denoting the three grades (score 1, 2 or 3) of sub-optimal care. All results were adjusted for the confounding influences of patient characteristics (mainly the presence of hypertension).

Results

Practice organisation for stroke prevention

Overall, between 65% and 91% of the GPs reported on the implementation of at least one of the two conditions of delegation of preventive activities to the practice assistant (68%), participation in continuous medical education (65%), co-operation within practice teams (91%), and co-operation with other health care providers (71%). Sixty-nine percent of the GPs had implemented 3 of the 5 conditions for systematic recording of risk factors or risk groups. With respect to systematic recording of risk factors and risk groups, the majority of GPs had marked diabetic patients (83%), and had registered blood pressure measurements in their patient records (82%). Systematic recording of patients with an elevated risk of CVD and smoking status was done by less than half of the GPs (44% and 43%, respectively) (Table 3). However, 16% reported that they did not record smoking in their patients' records, even if discussed with the GP and found positive. Formal delegation of follow-up visits for hypertensive and diabetic patients to the practice assistant was done by about 50% of GPs. Of those who did not delegate follow-up visits of hypertensive patients on a regular basis, 28% never and 18% rarely delegated. A remarkably low percentage (42%) of GPs was involved in peer review activities.

Relationship between aspects of practice organisation and quality of care

(i) Systematic recording and formal task delegation

Three aspects of care were found to be significantly related to the quality of care delivery. A significant positive relationship was found between two aspects of systematic recording of preventive activities, risk factors and risk groups (Table 4). GPs who systematically recorded blood pressure measurements (OR 0.31; 95%CI 0.13-0.77) and marked diabetic patients in their patient records (OR 0.36; 95%CI 0.17-0.79), less often provided sub-optimal care. For systematic recording of cigarette smoking, however, a significant negative relation was observed. GPs not recording cigarette smoking systematically in patient records (OR 2.14; 95%CI 1.00-4.57) appeared to deliver better quality of care. With respect to formal

delegation of preventive task to the practice assistant, GPs who regularly delegate follow-up visits of hypertensive patients to the practice assistant, less often provided sub-optimal care (OR 0.48; 95%CI 0.25-0.92).

TABLE 3. GPs' self-reported implementation of quality systems (percentages).

Conditions	GPs (%)
Systematic recording	
Patients with elevated risk of cardiovascular disease	44
Blood pressure measurements	82
Marking patients with diabetes mellitus in patients' record	83
Smoking (if discussed with patient)	43
Use of recording cards or electronic prevention module	24
Formal delegation	
Delegate follow-up visits for diabetes patients to practice assistant	49
Delegate follow-up of hypertensive patients to practice assistant	54
Continuous Medical Education (CME)	
CME (cardiology)	31
CME (diabetes mellitus)	56
Co-operation within practice team	
Peer review	42
Formalised co-operation	82
Co-operation with other health care providers	
Co-operation with dietician	70
Co-operation with diabetes nurse	25

(ii) Other quality-related activities

Positive relationships (though not statistically significant) were found between formalised co-operation with dietician and diabetes nurse, and continuing medical education (diabetes mellitus and cardiology) and quality of care delivery. Surprisingly, for both aspects of practice organisation related to formalised co-operation within the practice team (peer review and formalised co-operation) the relationships with quality of preventive care were in the opposite direction; peer review related significantly (OR 2.2; 95%CI 1.09-4.44).

(iii) Guideline compliance

Self-reported compliance by GPs to clinical practice guidelines was significantly associated with quality of care (Table 5). Overall, GPs reporting compliance for more than two-third of the total number of guideline elements less often provided sub-optimal care (OR 0.43; 95%CI 0.23-0.82). In particular, higher rates of compliance to the hypertension guideline showed a strong positive relationship (OR 0.74; 95%CI 0.56-0.97).

TABLE 4. Relationship between practice organisation/quality systems and sub-optimal care delivery.

Conditions	Odds ratio	95% CI	P-value
Systematic recording:			
Patients with elevated risk of cardiovascular disease	0.82	(0.38–1.76)	0.61
Marking patients with diabetes mellitus in patients' record	0.36	(0.17–0.79)	0.01
Use of recording cards or electronic prevention module	0.63	(0.31–1.29)	0.21
Blood pressure measurements	0.31	(0.13–0.77)	0.01
Smoking (if discussed with patient)	2.14	(1.00–4.57)	0.05
Formal delegation:			
Delegate follow-up visits of diabetes patients	1.03	(0.54–1.97)	0.94
Delegate follow-up visits of hypertensive patients	0.48	(0.25–0.92)	0.03
Formalised co-operation with others:			
Co-operation with dietician	0.51	(0.24–1.08)	0.07
Co-operation with diabetes nurse	0.66	(0.35–1.22)	0.18
Continuous medical education (CME):			
CME (cardiology)	0.79	(0.36–1.73)	0.56
CME (diabetes mellitus)	0.53	(0.26–1.04)	0.06
Formalised co-operation within GP team:			
Peer review	2.20	(1.09–4.44)	0.03
Formalised co-operation	1.56	(0.54–4.48)	0.41

Note: adjusted for hypertensive patients

(iv) GP and other practice characteristics in relation to (sub)optimal care

There were no significant relationships between GP characteristics (gender, year of qualification, working hours, GP tutor) and other practice characteristics (location and list size), and care delivery (Table 6). However, GP's date of qualification and working hours (full-time or part-time) were positively related with the quality of care and could be considered borderline significant ($p=0.06$ and OR 0.29; 95%CI 0.08-1.47).

TABLE 5. Relationship between compliance with clinical practice guidelines and sub-optimal care.

Compliance	Odds ratio	95% CI	P-value
Total:			
> 75% compliance with guidelines	0.43	(0.23–0.82)	0.01
Clinical practice guideline:			
Hypertension	0.74	(0.56–0.97)	0.03
Diabetes Mellitus	0.88	(0.62–1.25)	0.48
Angina pectoris	1.19	(0.75–1.92)	0.46
Chronic heart failure	1.11	(0.79–1.54)	0.55
Transient Ischaemic Attack	1.57	(0.48–5.12)	0.46
Peripheral Vascular Disease	1.09	(0.39–3.05)	0.87

TABLE 6. Relationship between GP/practice characteristics and sub-optimal care.

GP / practice characteristics	Odds ratio	95% CI	P-value
General practitioner:			
Year of qualification			0.06
1960-1974	0.70	(0.31–1.59)	
1975-1984	1.57	(0.74–3.33)	
1985-1994 (reference)	1.00		
GP tutor	0.89	(0.46–1.72)	0.74
Workings hours (full-time)	0.29	(0.08–1.06)	0.06
Gender (female)	0.30	(0.06–1.47)	0.14
Practice:			
Type of practice:			0.17
Single-handed (reference)	1.00		
Duo practice	3.54	(1.16–10.79)	
Group practice	1.07	(0.23–5.04)	
Health centre	1.02	(0.36–2.89)	
Neighbourhood (not deprived)	0.69	(0.36–1.34)	0.27
List size (>2500 patients)	1.63	(0.88–3.02)	0.12

Note: adjusted for hypertensive patients.

Discussion

This study investigated the relationship between aspects of practice organisation, and the quality of stroke prevention in general practice. It shows that GPs with higher levels of integrated structures for stroke prevention (tailored information systems, formal delegation of preventive tasks, standardization of care i.c.

compliance to clinical practice guidelines) less often provided related sub-optimal care as measured through an audit study. In particular, systematic recording of preventive activities, risk factors and risk groups, formal delegation of preventive activities to the practice assistant, and knowledge and application of clinical practice guidelines, were associated with the GPs' preventive behaviour. No significant relationship was found between GP or other practice characteristics and quality of care.

Before further elaboration on the results, limitations of this study should be mentioned. Regarding the deficiencies in care delivery identified by the expert panel, both over-estimation and under-estimation of sub-optimal care may have occurred. For example, sub-optimal care might have been over-estimated because a) the panellists were aware of the severity of outcome (i.e. highly unfavourable) resulting in a more critical analysis of care, and b) the presence of legitimate reasons for non-conformance with the guideline, that were not included in the review criteria used by the panellists, may imply that correct clinical behaviour was in fact erroneously classified as sub-optimal care. On the other hand, sub-optimal care may have been under-estimated because of a) excluding the evaluation of original the diagnosis of risk factors in the majority of cases (diagnosis before the period of 2 years preceding the occurrence of stroke) and b) possible reporting of socially desirable behaviour by GPs when they did not adhere to a particular practice guideline. In balance, we expect that the number of stroke patients receiving sub-optimal care failing to prevent the occurrence of stroke is most likely to be under-estimated.

The question remains whether a relationship exists between the degree of under-estimation of sub-optimal care and the presence of a practice organisation relevant for stroke prevention. This would be the case if, for example, GPs who tend to overrate their actual professional performance, also overrate self-reported compliance to practice guidelines (leading to an over-estimation of the relationship between compliance and sub-optimal care delivery). In contrast to the availability of blood pressure measurements in patient records, we found that information on lifestyle-related risk factors was frequently unknown to the GP and, if known, it was often drawn from the GP's memory only. In those cases, GPs could report socially desirable behaviour when questioned,¹⁵ overrating their actual professional behaviour. The same could apply to overrating self-reported compliance to practice guidelines.

Regarding the relationship between recording of preventive activities, risk factors and risk groups and the quality of care delivery, our findings concur with those of other studies. Research findings indicate that for various CVD risk factors

such as cigarette smoking, overweight and hypertension (recording of blood pressure readings), the level of recording in general practice does not reach optimal levels.^{16,17} Others have reported on the positive relation between the organization of disease prevention in general practice and the recording behaviour of GPs. Practices with a better organised recording systems appeared to have higher levels of risk factor recording than those without.^{16,18,19} In accordance with other studies, we report that improved practice of recording risk factors for CVD, results in better quality of care to patients with a high risk of developing the disease.²⁰⁻²² These results confirm that adequate information about a patient's risk profile is essential in order to target preventive care effectively.

Systematic and regular delegation of preventive activities to the practice assistant is expected to improve quality of care as well.^{23,24} GPs with a higher rate of delegation to the practice assistant spend more time per patient, which is considered an important determinant for quality of clinical performance.²⁵ These studies support our finding that GPs with a higher rate of delegation of preventive activities to support staff less often provide sub-optimal care. Similar to other studies,²⁶ our results indicate that educational intervention and peer review to improve clinical behaviour of GPs in terms of improved diagnosis or blood pressure control, have little impact on care delivery. Most reviews show a limited effectiveness of traditional continuing medical education (CME) in improving the delivery of preventive services in general practice.²⁷ Apart from increasing the GP's awareness of a particular aspect of care, generally, traditional CME has not proven successful.²⁸⁻³² In our study, however, CME courses on diabetes were positively (but not significantly) related to care delivery. In a recent study on GP's clinical performance with respect to blood pressure control, Frijling et al. concluded that GP characteristics had little effect on clinical performance;³³ our study confirms this result. Further research is required to assess whether GP and/or practice characteristics influence the performance of GPs in CVD prevention.

Our findings support the assumption that policy initiatives to improve information systems for patient data recording and retrieval and delegation of preventive tasks can have a beneficial impact on the prevention of stroke. Despite the methodological shortcomings, compared to experimental designs, we think that our study also illustrates the merits of linking specific structural characteristics of practices to specific care processes as measured through an audit study. Because the audit study clearly demonstrated that there is room for improvement in the prevention of stroke, we recommend strengthening of the policies towards quality systems and practice organisations. If general practice aims to integrate modern preventive medicine in its professional domain, its working conditions should be

organised accordingly. The present study underscores the impact of several of the initiatives already taken and enforces their further implementation. Meanwhile, it seems worthwhile to evaluate the quality of the preventive activities of GPs on a regular basis. The prevention of stroke as evaluated in our study can be a good model for this.

References

1. Trénet A. *Stroke: Populations, Cohorts, and Clinical Trials*. Minnesota: Butterworth-Heinemann Ltd, 1993.
2. Looman SJ, Bots ML, Hofman A, Koudstaal PJ, Grobbee DE. Beroerte bij ouderen: prevalentie en opnamefrequentie: het ERGO-onderzoek (Stroke among the elderly: prevalence and frequency of hospital admission: the Ergo study). *Ned Tijdschr Geneesk* 1996;140:312-6.
3. Sacco RL, Benjamin EJ, Broderick JP, Dyken M, Easton JD, Feinberg WM, et al. American Heart Association Prevention Conference. IV. Prevention and Rehabilitation of Stroke. Risk factors. *Stroke* 1997;28:1507-17.
4. Bart J. Preventie door de huisarts (Prevention and the GP). *Medisch Contact* 1992;47:715-18.
5. National Association of General Practitioners LHV-Dutch College of General Practitioners NHG. Concept-voorstel inzake preventie in de huisartspraktijk (Draft proposal for prevention in general practice). Utrecht, 1992.
6. Grol R, Wensing M. Implementation of quality assurance and medical audit: general practitioners' perceived obstacles and requirements. *Br J Gen Pract* 1995;45:548-52.
7. Ministerie van WVC. Preventiebeleid voor de Volksgezondheid: praktische keuzen voor de jaren negentig (Ministry of Welfare, Public Health and Culture (WVC) Policy on Public Health Prevention: practical choices for the nineties). 's-Gravenhage: Tweede Kamer, vergaderjaar 1992-1993, 22 894, nr. 1, 1992.
8. Grol R. Quality assurance in general practice: the state of the art in Europe. *Fam Pract* 1994;11:460-4.
9. Grol R. Kwaliteitssystemen in de huisartsgeneeskunde: wat betekent dit voor de huisarts? (Quality systems in general practice: what does it mean for general practitioners?). *Huisarts en Wetenschap* 1993;36:106-12.
10. Netherlands Institute for Research in Primary Care (NIVEL). *Cijfers uit de registratie van huisartsen (Figures from general practitioners registration)*. Utrecht, 1993.
11. van der Velden K. *General practice at work*. Thesis. Department of Public Health. Rotterdam: Erasmus University Rotterdam, 1999.
12. Grol R, Thomas S, Roberts R. Development and implementation of guidelines for family practice: lessons from the Netherlands. *J Fam Pract* 1995;40:435-9.
13. Agency for Health Care Policy and Research. *Using clinical practice guidelines to evaluate quality of care*. (AHCPR Publication no. 95-0045) ed. Rockville, MD, 1995.
14. Fleiss JL. *Statistical methods for rates and proportions*. New York: Wiley, 1981.
15. Adams AS. Evidence of self-reported bias in assessing adherence to guidelines. *Int J Qual Health Care* 1999;11:187-92.
16. Maitland JM, Reid J, Taylor RJ. Two stage audit of cerebrovascular and coronary heart disease risk factor recording: the effect of case finding in screening programmes. *Br J Gen Pract* 1991;41:144-6.
17. Fullard E, Fowler G, Gray M. Promoting prevention in primary care: controlled trial of low technology, low cost approach. *BMJ* 1987;294:1080-2.
18. van Drenth BB, Hulscher ME, van der Wouden JC, Mokkink H, van Weel C, Grol R. Relationship between practice organization and cardiovascular risk factor recording in general practice. *Br J Gen Pract* 1998;48:1054-8.

19. Fleming DM, Lawrence MS, Cross KW. List size, screening methods and other characteristics of practices in relation to preventive care. *BMJ (Clin Res Ed)* 1985;291:869-2.
20. van den Hoogen JP, van Ree JW. Preventive cardiology in general practice: computer-assisted hypertension care. *J Hum Hypertens* 1990;4:365-7.
21. Ketola E, Sipila R, Makela M, Klockars M. Quality improvement programme for cardiovascular disease risk factor recording in primary care. *Qual Health Care* 2000;9:175-80.
22. Campbell SM, Hann M, Hacker J, Durie A, Thapar A, Roland MO. Quality assessment for three common conditions in primary care: validity and reliability of review criteria developed by expert panels for angina, asthma and type 2 diabetes. *Qual Saf Health Care* 2002;11:125-30.
23. de Haan J. De doktersassistente. Delegeren van taken in een huisartspraktijk (The practice assistant. Task delegation in general practice). Lelystad: Meditekst, 1986.
24. Nijfand A, de Haan J. Ondersteuning van de Britse huisarts (Support of British general practitioners). *Huisarts en Wetenschap* 1991;34:540-5.
25. van Berkenstijn LGM, Kastein MR, Lodder A. How do we compare with our colleagues? Quality of general practitioner performance in consultations for non-acute abdominal complaints. *Int J Qual Health Care* 1999;11:475-86.
26. Mashru M, Lant A. Interpractice audit of diagnosis and management of hypertension in primary care: educational intervention and review of medical records. *BMJ* 1997;314:942-6.
27. Hulscher ME, Wensing M, Grol R, van der Weijden T, van Weel C. Interventions to improve the delivery of preventive services in primary care. *Am J Public Health* 1999;89:737-46.
28. Grimshaw JM, I.T.Russell. Effect of clinical guidelines on medical practice: a systematic review of rigorous evaluations. *Lancet* 1993;342:1317-22.
29. Oxman AD, Thomson M, Davis DA, Haynes RB. No magic bullets: a systematic review of 102 trials of intervention to improve professional practice. *CMAJ* 1995;153:1423-31.
30. Grimshaw J, Freemantle N, Wallace S, Russell I, Hurwitz B, Watt I, et al. Developing and implementing clinical practice guidelines. *Qual Health Care* 1995;4:55-64.
31. Grol R. Research and development in quality of care: establishing the research agenda. *Qual Health Care* 1996;5:235-42.
32. Wensing M, Grol R. Single and combined strategies for implementing changes in primary care. *Int J Qual Health Care* 1994;6:115-32.
33. Frijling BD, Spies TH, Lobo CM, Hulscher MEJL, van Drenth B, Braspenning JC, et al. Blood pressure control in treated hypertensive patients: clinical performance of general practitioners. *Br J Gen Pract* 2001;51:9-14.

CHAPTER 5

DEPRIVATION AND SYSTEMATIC STROKE PREVENTION IN GENERAL PRACTICE: AN AUDIT AMONG GENERAL PRACTITIONERS IN THE ROTTERDAM REGION (THE NETHERLANDS)

Johan S. de Koning

Niek S. Klazinga

Peter J. Koudstaal

Ad Prins

Gerard J.J.M. Borsboom

Anna Peeters

Johan P. Mackenbach

Abstract

STUDY OBJECTIVE: To investigate differences in quality of preventive care provided by general practitioners (GPs) to patients at risk of stroke living in deprived and non-deprived neighbourhoods in the Rotterdam region.

METHODS: A 'deprivation score' was used to categorize neighbourhoods according to their deprivation status. Data on the process of patient care were collected by means of chart review and interviews with GPs. Cases of stroke ($n=188$) were retrospectively audited by an expert panel with guideline-based review criteria. To measure differences in quality of patient care between neighbourhoods, deprivation scores were related to scores for sub-optimal care.

RESULTS: After adjustment for socio-demographic characteristics, patients in deprived neighbourhoods had an increased risk (OR 1.95 (95%CI 0.98–3.90)) of having received sub-optimal preventive care if compared with patients in non-deprived neighbourhoods. This excess risk was limited to women (OR 3.57 (95%CI 1.39 – 9.16) vs OR 1.01 (95%CI 0.41–2.48) in men). Adjustment for socio-demographic characteristics and risk factor distribution did not change the OR for women to receive sub-optimal care significantly (OR 3.21 (95%CI 1.24 – 8.31)). Sub-optimal care originated mainly from deficiencies in follow-up of treated hypertensive and diabetes patients and evaluation of patients' cardiovascular risk profile. Among treated hypertensive women in deprived neighbourhoods who received sub-optimal care, the mean number of deficiencies related to follow-up was almost double that of the corresponding group in non-deprived neighbourhoods.

CONCLUSIONS: Quality of care to prevent stroke in general practice differs considerably between deprived and non-deprived neighbourhoods. Patients in deprived neighbourhoods, and women in particular, have almost twice the risk of receiving sub-optimal preventive care.

Introduction

In many industrialized countries, including the Netherlands, socio-economically disadvantaged individuals have a higher risk of cardiovascular morbidity and mortality and more often exhibit unfavourable cardiovascular risk profiles than those living in more fortunate circumstances.¹⁻⁸ Socio-economically disadvantaged groups also appear to have an increased risk of dying of stroke.⁹ A succession of studies have reported on this inverse relation between socio-economic status and cardiovascular disease risk factors and indicate that for almost all cardiovascular risk factors this relationship exists. For hypertension, one of the most important risk factors for stroke, studies reveal consistent and substantial evidence that prevalence and incidence rates are higher among individuals with a lower socio-economic status.¹⁻⁶ Little evidence, however, exists on the relationship with inadequate access and quality of preventive care. There are indications that access to and quality of primary care is poorer for those living in deprived areas, and that these variations may to some extent contribute to their relatively poor health.⁹

With regard to utilization rates of primary care services provided by general practitioners (GPs), individuals at the lower end of the socio-economic spectrum visit their GP more frequently than those living in more favourable circumstances.¹⁰⁻¹³ The latter suggests that, in general, limited or no barriers exist for poorer individuals to access the health care system. For cardiovascular disease prevention, however, differences in care are reported. Studies have indicated that cardiovascular disease prevention in general practice often reaches unsatisfactory levels,¹⁴⁻¹⁷ and that variation in utilization by population characteristics, such as deprivation, exists. Individuals with a lower socio-economic status appear to have a higher risk of not receiving appropriate screening for cervical cancer, breast cancer and risk factors for cardiovascular disease.^{18-20,21} There is, as yet, no information as to whether quality of preventive care provided by GPs to patients at risk of stroke differs between those living in deprived and non-deprived neighbourhoods. This study investigated whether differences in quality of preventive care provided by GPs to patients who over time developed a stroke exist between deprived and non-deprived areas.

Subjects and methods

Subjects

This study was conducted within the framework of an audit study on quality of stroke prevention in general practice in the city of Rotterdam and surrounding region (the Netherlands). Patients were selected from the two largest referral

hospitals for stroke in the region. The study was restricted to patients with a first-ever stroke meeting the following criteria for inclusion: (a) diagnosis of intracerebral haemorrhage or infarction according to the WHO definition of stroke,²² verified by an expert neurologist, (b) age between 39 and 80 years; (c) occurrence of stroke in the period 1996-1997; (d) stroke caused by cardiovascular disease and not by trauma, infection or malignancy; (f) GP of the patient practising in the southern part of Rotterdam or surrounding region; (g) patient registered with local GP for not less than two years; and (h) patient not living in a nursing home during the two-year period prior to stroke. Patient records were utilized to identify the patient's GP. Details on the selection of stroke patients and GPs have been described previously.²³ In total, 77 GPs (participation rate 81%) participated in the study and provided data on 188 stroke patients.

Data collection

Data on the process of care delivery were collected by means of structured face-to-face interviews with the GP, using separate questionnaires for each stroke patient. The interviews were conducted by a research assistant (scores of 'social deprivation' were allocated after the interview and, therefore, the interviewer was blinded to the patient's deprivation status). At the time of interview, the GP used either hand-written or electronic patient records to retrieve patient information. The questionnaire comprised questions related to patient characteristics, medical and family history of cardiovascular risk factors, and the detection and treatment of risk factors for stroke (e.g. hypertension, diabetes mellitus, transient ischemic attack (TIA) and cardiac failure). Information on lifestyle-related risk factors such as cigarette smoking, overweight, and alcohol consumption was also collected. Each patient gave permission to retrieve information from the medical record. No data were collected on the questionnaires from which individual patients or physicians could be identified.

Assessment of quality of care

The quality of preventive care was based on the judgement of a six-member panel of experts. The panellists, three neurologists and three GPs, were selected on the basis of their clinical expertise with respect to stroke prevention, experience in quality of care evaluation, academic or non-academic background and professional discipline. Six practice guidelines relevant to stroke prevention (hypertension, diabetes mellitus, transient ischemic attack (TIA), peripheral vascular disease, cardiac failure and angina pectoris) were selected by the panel. The guidelines (evidence based) were developed and implemented by the Dutch College of

General Practitioners, as part of a national guideline programme operational since 1987.^{24,25} From each guideline, specific elements of care were identified and systematically converted into review criteria ($n=65$), allowing detailed measurement of GP's adherence.²⁶

In a two-round evaluation, the panellists independently assessed, for each case, the quality of care delivery and its potential association with the occurrence of stroke. During the assessment process, panellists did not receive any information on the patient's deprivation status. Based on identified elements of sub-optimal care, responsible domains for non-adherence to practice guidelines (patient, GP, health facility), and seriousness of the shortcoming in terms of 'minor' and 'major', the panellists allocated grades on a scale of 0 to 3. Only care related to GP performance was included in the assessment. For 36 cases, the intersubpanel agreement was measured by Cohen's K statistic, which accounts for chance agreement.²⁷ A value of +1.0 indicates complete agreement, 0.0 no agreement, and -1.0 complete disagreement. The intersubpanel agreement was $k=0.63$ (overall agreement on assigned grades between sub-panels was 74%). In 56% of all cases, no sub-optimal care (grade=0) was identified by the expert panel, whereas in 44%, sub-optimal care was identified (grade 1-3). Deficiencies in hypertensive care and patients' cardiovascular risk profile assessment were found most frequently.

Analysis

At patient level, scores of 'social deprivation' were allocated on the basis of the patient's postcode of residence. In short, the scores include eight indicators which are generally associated with social deprivation (level of education, proportion of inhabitants on social welfare, proportion of newcomers, mobility, income, value of dwellings, proportion unemployed, mortality rate). From these indicators, deprivation scores are constructed by means of a principal components analysis. The scores are standardized to have a mean of zero and a standard deviation of one for the whole of Rotterdam. A detailed description of the method is provided elsewhere.²⁸

Multivariate logistic regression analysis was used to investigate the relationship between the probability of sub-optimal care delivery and deprivation status (deprived = <0 , vs non-deprived = >0). For many GPs, data on more than one patient were available. These patients are likely to respond in a similar manner and are therefore not statistically independent; an important assumption of standard logistic regression analysis. Correlations between observations result in estimated confidence intervals that are too narrow, and consequently in too optimistic estimates of statistical significance. We adjusted for the intracluster correlations

using the Generalized Estimating Equations approach for logistic regression available in proc genmod from SAS version 8.0. An interaction term was added to the model to measure the role of socio-demographic characteristics (age, sex, marital status, and ethnicity) in the association between deprivation and quality of care. The gradings of (sub)optimal care were dichotomized into a score of zero, indicating optimal care delivery, and a score of 1, denoting the three grades (score 1, 2 or 3) of sub-optimal care.

Results

Study population

The group of GPs was comparable to the Dutch GPs in general with regard to age and sex, practice type (single and duo practices) and list size.²⁹⁻³¹ The mean number of stroke patients per GP was 2.4, with 33 GPs (43%) having more than two cases. The maximum number of patients from one GP was eight. Among the non-respondents, the average number of stroke patients was higher (3.7). The main reason given by non-respondents for not participating in the study was lack of time and interest. Of all participating GPs, 71% had started their current practice between 1970 and 1989, and 16% between 1990 and 1999. The majority of GPs (63%) worked in single-handed practices, which closely corresponds to the three main cities in the Netherlands, Amsterdam, Rotterdam and The Hague (64%). However, the number of GPs working in group practices was substantially higher than the average for these cities (13% vs 2.5%).³² Among the stroke patients included in the study, 46% female and 54% male, the percentage of women in deprived neighbourhoods was higher than in non-deprived neighbourhoods (51% vs 34%).

Association between quality of care and deprivation status

Of the patients living in deprived neighbourhoods ($n=108$), 53% received sub-optimal care. This percentage was lower, 38%, for patients living in non-deprived neighbourhoods ($n=80$) (Crude Odds Ratio 1.85 (95%CI 0.96 – 3.59)) (Table 1). Adjustment for age, sex, marital status and ethnicity, did not alter the odds ratio significantly (OR 1.95 (95%CI 0.98 – 3.90), $p=0.051$) (Table 2). The latter indicates that, compared to patients living in non-deprived neighbourhoods, patients in deprived neighbourhoods have almost a doubled risk of receiving sub-optimal care.

TABLE 1. Variation in quality of preventive care between deprived and non-deprived neighbourhoods (numbers, percentages).

	Quality of care		
	Optimal care	Sub-optimal care	
Non-deprived neighbourhood	67 (62%)	41 (38%)	108 (100%)
Deprived neighbourhood	38 (48%)	42 (52%)	80 (100%)
	105 (56%)	83 (44%)	188 (100%)

Crude OR: 1.85 (95%CI 0.96-3.59), $p=0.07$.

TABLE 2. Relationship between quality of care and neighbourhood deprivation status, adjusted for socio-demographic characteristics (odds ratios).

	Men and women	
	Crude OR (95%CI)	Adjusted OR (95%CI)
Neighbourhood:		
Non-deprived	1.00 (ref.)	1.00 (ref.)
Deprived	1.85 (0.96–3.59)	1.95 (0.98–3.90)
Sex:		
Men		1.00 (ref.)
Women		1.43 (0.76–2.70)
Age:		
40-69		1.00 (ref.)
70-89		0.80 (0.40–1.56)
Marital status:		
Married		1.00 (ref.)
Not married		0.96 (0.50–1.86)
Ethnicity:		
Native Dutch		1.00 (ref.)
Migrants		0.53 (0.19–1.48)

Subsequently, we looked at the possible role of age, sex, marital status and ethnicity as effect modifiers (interactions) in the association between deprivation status and quality of care. For age, marital status, and ethnicity, the interactions were statistically not significant, whereas for sex the interaction was statistically significant ($p=0.04$). After adjustment for age, marital status and ethnicity, the odds ratio for women in deprived neighbourhoods receiving sub-optimal care was 3.57 (95%CI 1.39 – 9.16) and for men 1.12 (95%CI 0.46 – 2.72).

Finally, we investigated the possible confounding role of risk factor prevalence in the association between quality of care and deprivation status. After adjustment for the number of risk factors for stroke, the odds ratio for patients in deprived and

non-deprived neighbourhoods (men and women combined) receiving sub-optimal care did not change significantly; 1.95 (95%CI 0.98 – 3.90) to 1.74 (95%CI 0.87 – 3.46). For women only, the odds ratio changed from 3.57 (95%CI 1.39 – 9.16) to 3.21 (95%CI 1.24 – 8.31) (Table 3). After adjustment for hypertension, the odds ratio for women in deprived neighbourhoods receiving sub-optimal care was 2.92 (95%CI 1.12 – 7.58). Neither risk factor prevalence nor hypertension alone explained differences in quality of care significantly.

TABLE 3. Relationship between quality of care and neighbourhood deprivation status (adjusted odds ratios).

	Men and women		Women	
	Adjusted for socio-demographic characteristics OR (95%CI)	Adjusted for socio-demographic characteristics and risk factors OR (95%CI)	Adjusted for socio-demographic characteristics OR (95%CI) ^a	Adjusted for socio-demographic characteristics and risk factors OR (95%CI)
Neighbourhood:				
Non-Deprived	1.00 (ref.)	1.00 (ref.)	1.00 (ref.)	1.00 (ref.)
Deprived	1.95(0.98–3.90)	1.74 (0.87–3.46)	3.57 (1.39–9.16)	3.21 (1.24–8.31)
Number of risk factors:				
≤1 risk factor		1.00 (ref.)		1.00 (ref.)
>1 risk factors		2.71 (1.35–5.42)		1.71 (0.79–3.70)

^a Interaction for women in the association between deprivation status and quality of care.

Forms of sub-optimal care

In total, 91 consensus-based deficiencies in care were identified by the panellists ($n=83$ patients). The mean number of deficiencies among patients with sub-optimal care was higher in deprived neighbourhoods (1.3 deficiencies per patient vs 0.9 deficiency per patient) (Table 4). The majority of deficiencies (56%) related to hypertension care, whereas 42% of the deficiencies clustered around follow-up of treated hypertensive and diabetes patients. For treated hypertensive women in deprived neighbourhoods who received sub-optimal care, the mean number of deficiencies related to follow-up was almost double (0.9 deficiency per patient vs 0.5 deficiency per patient) than in the corresponding group of patients in non-deprived neighbourhoods. Compared to women in non-deprived neighbourhoods receiving sub-optimal care, among women in deprived neighbourhoods, 2.5 times

more deficiencies in follow-up of hypertension, diabetes and evaluation of women's cardiovascular risk profile were identified (1.0 deficiency per patient vs 0.4 deficiency per patient).

TABLE 4. Distribution of identified deficiencies in care among men and women in deprived and non-deprived neighbourhoods.

Element of care	Deprived neighbourhoods			Non-deprived neighbourhoods		
	Men	Women	Total	Men	Women	Total
Hypertension guideline:						
Detection and confirmation	5	3	8	4	4	8
Laboratory evaluation	-	-	-	2	-	2
Pharmacologic therapy	1	-	1	-	1	1
Follow-up (quarterly)	4	13	17	3	5	8
Follow-up (annually)	1	3	4	2	-	2
Diabetes guideline:						
Follow-up (quarterly)	2	4	6	1	-	1
Transient Ischaemic Attack guideline:						
Referral to specialist	3	1	4	1	1	2
Treatment and follow-up	-	1	1	-	-	-
More than one guideline:						
Lifestyle advice	2	1	3	1	3	4
Evaluation of cardiovascular risk profile	1	6	7	5	1	6
Records (documentation)	2	1	3	-	-	-
Miscellaneous	1	-	1	1	1	2
Total number of deficiencies	22	33	55	20	16	36
Patients with sub-optimal care	16	26	42	24	17	41
Total number of patients	40	40	80	61	47	108

Risk factor distribution

Figure 1 presents the distribution of risk factors for stroke between patients in deprived and non-deprived neighbourhoods. Overall, patients in deprived neighbourhoods have significantly more risk factors for stroke than patients in non-deprived neighbourhoods (78%, more than one risk factor vs 65%, more than one risk factor, $p=0.03$). For women a similar distribution was observed (77%, more than one risk factor vs 63%, more than one risk factor), however, this relation did not reach statistical significance ($p=0.12$). Compared with patients in non-deprived neighbourhoods, patients in deprived neighbourhoods had hypertension more

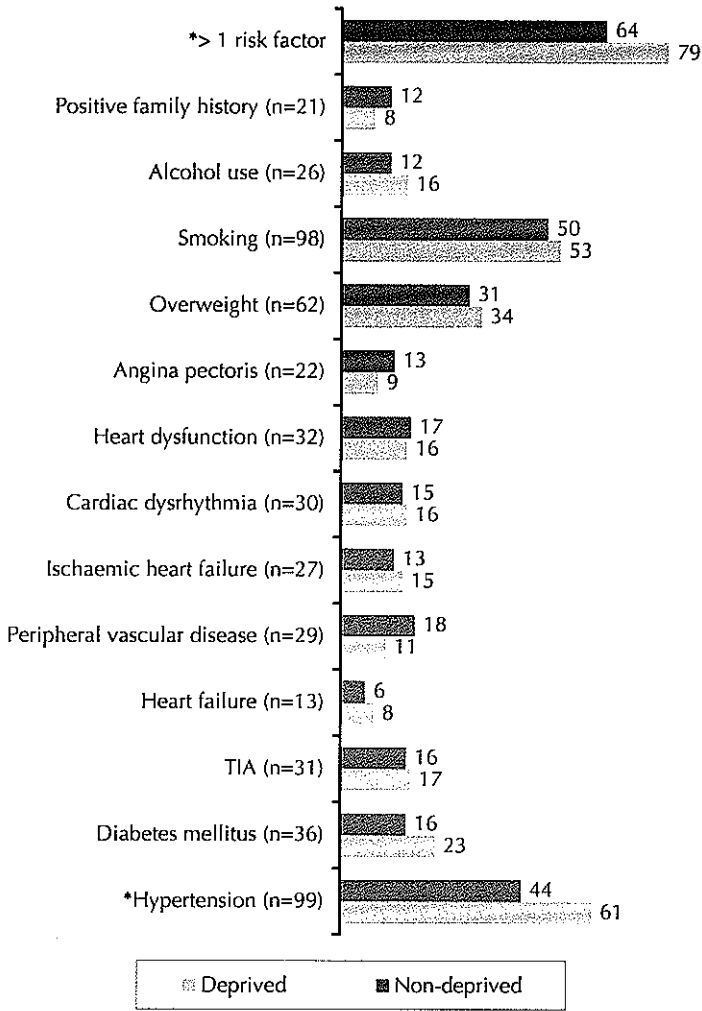


FIGURE 1. RISK FACTOR DISTRIBUTION. Percentage of risk factors for stroke among patients living in non-deprived and deprived neighbourhoods (* $p < 0.05$).

often (61% vs 44%, $p=0.04$). Compared with women in non-deprived neighbourhoods, women in deprived neighbourhoods had hypertension significantly more (80% vs 49%, $p=0.01$). As has been previously described, the increased risk in women in deprived neighbourhoods of receiving sub-optimal care did not change significantly if adjusted for risk factor prevalence and hypertension. The remaining risk factors for stroke were distributed fairly equally.

Discussion

This study shows that quality of care to patients who, over time, develop a stroke differs considerably between neighbourhoods, in that patients in deprived neighbourhoods have almost twice the risk of receiving sub-optimal care. This excess risk of receiving sub-optimal care was limited to women. It was found that the increased risk of receiving sub-optimal care originated mainly from deficiencies in follow-up of treated hypertensive and diabetes patients.

In interpreting these results, the following issues need to be considered. With regard to deficiencies in care delivery identified by the expert panel, there are reasons to expect over-estimation, as well as under-estimation of sub-optimal care. Sub-optimal care might have been over-estimated because the panellists had knowledge of the severity of outcome (highly unfavourable), resulting in a more critical analysis of care. Secondly, additional legitimate reasons for non-conformance to the guideline that were not included in the measurement instrument (review criteria) used by the panellists might exist. Therefore, correct clinical behaviour could have been wrongly classified as sub-optimal care. On the other hand, however, sub-optimal care might have been under-estimated as a result of, first, the exclusion of evaluation of diagnostic assessment in the majority of cases and, second, reporting of socially desirable behaviour by GPs in cases where they did not adhere to a particular practice guideline. All together, it is expected that the number of stroke patients receiving sub-optimal care is most likely to be under-estimated. No information on deprivation status was provided to the panellists, and, therefore, this cannot have influenced the final judgement of care.

Past research has indicated that consultation characteristics in general practice such as utilization rates and consultation duration are influenced by practice location. First, with respect to the utilization of GP services, studies on socio-economic determinants and consultation rates in general practice found that low education level, social isolation and increasing poverty predicted higher GP consultation rates.^{12,33} If that is the case, one might expect patients in deprived areas, if they are seen more frequently by the GP, to have a higher chance of

receiving better quality preventive care, especially in the area of patient follow-up (quarterly and annually). Yet, our findings as well as those of other studies on quality of preventive care, indicate the contrary. Second, with respect to consultation duration, which is an important proxy of quality of general practice care,^{34,35} studies have shown that GPs spent significantly less time with patients living in deprived areas, who may thus receive less health care.^{36,37} Given the shorter consultation time spent per patient, one may conclude that patients in deprived areas only receive care that requires shorter consultation time. In a study on quality of chronic disease management (diabetes, asthma, angina), for example, it was found that, in comparison with practices with five-minute booking intervals for consultation, practices with 10-minute booking intervals for consultation provided better quality care.³⁸ It is hypothesized that shorter consultation duration in general practice, most probably, will have a stronger negative effect on preventive care (focus on care of symptoms and signs).

The main finding of this study, that patients in deprived neighbourhoods more often receive sub-optimal care to prevent stroke, suggests that quality of preventive care provided by GPs is indeed influenced by environmental factors. This result is in agreement with other studies on quality of preventive care and the influence of deprivation. In a recent study from the UK on predictors of high quality care in general practice, Campbell *et al.* found that deprivation status predicted poorer uptake of preventive care.³⁸ Preventive care was poorer in practices located in socio-economically deprived areas. Interestingly, this result was found only for preventive care, which is regarded to be strongly influenced by patients' actions. For other areas of care, in which practices had the main control, no differences were found.

In studies on cardiac rehabilitation in clinics or hospitals, essential in reducing the risk of acute myocardial infarction and other fatal health outcomes, it was found that social deprivation was the most significant factor associated with poor uptake.^{39,40} In addition, socio-economically deprived patients enrolled in cardiac rehabilitation programmes were less likely to complete the programme. With respect to quarterly follow-up of patients with diabetes, Coyder *et al.* found that diabetes patients living in more deprived areas had a reduced likelihood of review in general practice.⁴¹ In the present study, more deficiencies were identified in quarterly follow-up of diabetes patients in deprived neighbourhoods, as compared to diabetes patients in non-deprived neighbourhoods as well.

We could not assess the reason why women in deprived neighbourhoods have an increased likelihood of receiving sub-optimal care. Nevertheless, studies on women's health, help-seeking behaviour and medical care utilization have

indicated some of the possible causes explaining these results. In contrast to the facts, most women continue to believe that, instead of cardiovascular disease, cancer is their greatest health threat.^{42,43} For many years, healthcare providers excluded women as a population at significant risk for cardiovascular disease.⁴⁴ In recent years, however, progress has been made in increasing awareness among GPs and women themselves about women's health and cardiovascular disease, but unfortunately, until now they have continued to be less well-informed on this topic.^{45,46} In a study on women and cardiovascular disease and the need to increase women's awareness, Robertson reported that women learn about risk factors outside the physician's office.⁴³ The author illustrates this by saying that women included in this study, if they were screened for blood pressure, were often astonished to learn they had high blood pressure and that it did not cause any symptoms.

Knowing the importance of patient education in cardiovascular disease prevention, especially in situations where patients at risk of cardiovascular disease are not pro-actively reminded or invited for consultation, one expects differences in the use of preventive care between men and women in deprived and non-deprived areas. In a study on the influence of income, education, and work status on women's well-being, Mead *et al.* found that women with low educational attainment were less likely to use preventive services.⁴⁷ Similar conclusions were drawn in a study on screening for breast cancer,⁴⁸ where variation in the uptake of breast cancer screening was closely related to social deprivation status. Pertinent to our discussion are the results of a study on patients who fail to return for consultation after they have made a follow-up appointment with the GP.⁴⁹ According to the author, socio-demographic characteristics play an important role in patients who miss appointments in general practice. They found that the likelihood (threefold increase) of someone missing at least one appointment was independently associated with being female and living in a deprived area (being a young adult as well). The latter suggests that patient factors play an important role in the quality of preventive care that is delivered to women at high risk of cardiovascular disease in deprived neighbourhoods. The relative contributions of the healthcare system, health care provider and patient, however, remain unclear.

It is concluded that socio-economic status influences the quality of care to prevent stroke in general practice. Patients at risk of stroke living in poorer areas, and women in particular, receive a lower quality of preventive care. In order to improve preventive care in general practice and to promote equality in opportunities for health, measures for improvement should proportionally target the socio-economic disadvantaged more. This study identified not only variations in

preventive care delivery to patients from different socio-economic areas, but also provides insights which could function as a starting point to remedy processes and structures that cause such patterns of care.

References

1. van Rossum C. Socioeconomic inequalities in cardiovascular disease in an aging population (Thesis). Institute of Public Health. Rotterdam: Erasmus University Rotterdam, 1999.
2. Bennett S. Socio-economic inequalities in coronary heart disease and stroke mortality among Australian men. *Int J Epidemiol* 1996;25:266-75.
3. Kunst AE, Looman CW, Mackenbach JP. Socio-economic mortality differences in The Netherlands in 1950-1984: a regional study of cause-specific mortality. *Soc Sci Med* 1990;31:141-52.
4. Townsend P, Davidson N, Whitehead M. *Inequalities in Health (The Black Report & The Health Divide)*. London: Penguin Books, 1988.
5. James WP, Nelson M, Ralph A, Leather S. Socio-economic determinants of health. The contribution of nutrition to inequalities in health. *BMJ* 1998;316:308-9.
6. Hoeymans N, Smit HA, Verkley H, Kromhout D. Cardiovascular risk factors in relation to educational level in 36000 men and women in the Netherlands. *Eur Heart J* 1996;17.
7. Phillimore P, Beattie A, Townsend P. Widening inequality of health in northern England. *BMJ* 1994;308:1125-8.
8. Shewry MC, Smith WCS, Woodward M, Tinstall-Pedoe H. Variation in risk factors by social status: results from the Scottish heart health study. *Br J Gen Pract* 1992;42:406-10.
9. Kaplan GA, Keil EK. Socioeconomic factors and cardiovascular disease; a review of the literature. *Circulation* 1993;88:1973-98.
10. Central Bureau of Statistics. *Sociaal-economische status, gezondheid en medische consumptie (Socio-economic status, health and medical consumption)*. 's Gravenhage: SDU uitgeverij/CBS publikaties, 1991.
11. Carr-Hill RA, Rice N, Roland M. Socio-economic determinants of rates of consultation in general practice based on fourth national morbidity survey of general practices. *BMJ* 1996;312:1008-12.
12. Scaife B, Gill P, Heywood P, Neal R. Socio-economic characteristics of adult frequent attenders in practice: secondary analysis of data. *Fam Pract* 2000;17:298-304.
13. Dunlop S, Coyte PC, McIsaac W. Socio-economic status and the utilisation of physicians' services: results from the Canadian National Population Health Survey. *Soc Sci Med* 2000;51:123-33.
14. Fahey T, Lancaster T. The detection and management of hypertension in the elderly of Northamptonshire. *J Publ Health Med* 1995;17:57-62.
15. Trilling JS. The urgent need to improve hypertension care. *Arch Fam Med* 2000;9:794-801.
16. Du X, Cruickshank K, McNamee R, Saraee M, Sourbutts J, Summers J, et al. Case-control study of stroke and quality of hypertension control in north west England. *BMJ* 1997;314:272-6.
17. Payne JN, Milner PC, Saul C, Browns IR, Hannay DR, Ramsay LE. Local confidential inquiry into avoidable deaths from stroke and hypertensive disease. *BMJ* 1993;307:1027-30.
18. Giles WH, Anda FR, Jones DH, Serdula MK, Merritt RK, DeStefano F. Recent trends in the identification and treatment of high blood cholesterol by physicians. Progress and missed opportunities. *JAMA* 1993;269:1133-8.
19. Bostick RM, Sprafka JM, Virnig BA, Potter JD. Predictors of cancer prevention attitudes and participation in cancer screening examinations. *Prev Med* 1994;23:816-26.
20. Makuc DM, Freid VM, Kleinman JC. National trends in the use of preventive health care by women. *Am J Publ Health* 1989;79:21-6.

21. Wiggers JH, Sanson-Fisher R. Practitioner provision of preventive care in general practice consultations: association with educational and occupational status. *Soc Sci Med* 1997;44:137-46.
22. WHO Special Report. Stroke-1989. Recommendations on stroke prevention, diagnosis, and therapy. Report of the WHO Task Force on stroke and other cerebrovascular disorders. *Stroke* 1989;20:1407-31.
23. de Koning JS, Klazing NS, Koudstaal PJ, Prins A, Borsboom GJJM, Mackenbach JP. Stroke prevention in general practice: role of practice organization and adherence to practice guidelines. Submitted for publication.
24. van der Velden K. General practice at work. Thesis. Department of Public Health. Rotterdam: Erasmus University Rotterdam, 1999.
25. Grol R, Thomas S, Roberts R. Development and implementation of guidelines for family practice: lessons from the Netherlands. *J Fam Pract* 1995;40:435-9.
26. Agency for Health Care Policy and Research. Using clinical practice guidelines to evaluate quality of care. (AHCPR Publication no. 95-0045) ed. Rockville, MD, 1995.
27. Fleiss JL. Statistical methods for rates and proportions. New York: Wiley, 1981.
28. Das P, Lith HCv, Stolk C. Achterstandsscores van Rotterdam 1998 en 1980-1998 (Deprivation scores of Rotterdam 1998 and 1980-1998. Rotterdam: Centrum voor Onderzoek en Statistiek (COS) (Centre for Research and Statistics), 1998.
29. Netherlands Institute for Research in Primary Care. Volksgezondheid Toekomst Verkenning 1997 (Public Health Future Exploration). Bilthoven: Netherlands Institute for Research in Primary Care (NIVEL), 1997.
30. Netherlands Institute for Research in Primary Care (NIVEL). Cijfers uit de registratie van huisartsen (Figures from general practitioners registration). Utrecht, 1993.
31. Wieggers T, Harmsen J. Rapportage Arbeidsmarkt Zorgsector (Report of Labour market Health sector). Utrecht: NIVEL, 1997.
32. Verheij RA. De huisarts in de grote stad (The GP in large cities). Utrecht, 1992.
33. van der Meer JB, Mackenbach JP. Low education, high GP consultation rates: the effect of psychosocial factors. *J Psych Res* 1998;5:587-97.
34. Carr-Hill R, Jenkins-Clarke S, Dixon P, Pringle M. Do minutes count? Consultation lengths in general practice. *J Health Serv Res Policy* 1998;3:207-13.
35. Campbell JL, Ramsay J, Green J. Practice size: impact on consultation length, workload, and patient assessment of care. *Br J Gen Pract* 2001;51:644-50.
36. Wiggers J, Sanson-Fisher R. Duration of general practice consultations: association with patient occupational and educational status. *Soc Sci Med* 1997;44:925-34.
37. Stirling AM, Wilson P, McConnachie A. Deprivation, psychological distress, and consultation length in general practice. *Br J Gen Pract* 2001;51:456-60.
38. Campbell SM, Hann M, Hacker J, Burns C, Oliver D, Thapar A, et al. Identifying predictors of high quality care in English general practice: observational study. *BMJ* 2001;323:784-7.
39. Pell J, Pell A, Morrison C. Retrospective study of influence of deprivation on uptake of cardiac rehabilitation. *BMJ* 1996;313:267-8.
40. Melville MR, Packham C, Brown N, Weston C, Gray D. Cardiac rehabilitation: socially deprived patients are less likely to attend but patients ineligible for thrombolysis are less likely to be invited. *Heart* 1999;82:373-7.
41. Goyder EC, McNally PG, Botha JL. Inequalities in access to diabetes care: evidence from a historical cohort study. *Qual Health Care* 2000;9:85-9.
42. Giardina E. Call to action: cardiovascular disease in women. *J Womens Health* 1998;1:37-43.
43. Robertson RM. Women and cardiovascular disease: the risk of misperception and the need for action. *Circulation* 2001;103:2318-20.
44. Mosca L, Manson JE, Sutherland SE, Langer RD, Manolio T, E. B-C. Cardiovascular Disease in Women: A Statement for Healthcare Professionals From the American Heart Association. *Circulation* 1997;96:2468-82.
45. Howes DG. Cardiovascular disease and women. *Lippincotts Prim Care Pract* 1998;2:514-24.

CHAPTER 5

46. Poduri A. Cardiovascular risk factors in economically disadvantaged women: a study of prevalence and awareness. *J Natl Med Assoc* 1998;90:531-6.
47. Mead H, Witkowski K, Gault B, H H. The influence of income, education, and work status on women's well being. *Womens Health Issue* 2001;11:160-72.
48. Gatrell A, Garnett S, Maddocks A, Kirwan M. Uptake of screening for breast cancer in south Lancashire. *Public Health* 1998;112:297-301.
49. Neal RD, Lawlor DA, Allgar V, Colledge M, Ali S, Hassey A, et al. Missed appointments in general practice: retrospective data analysis from four practices. *Br J Gen Pract* 2001;471:830-2.

CHAPTER 6

ROLE OF ‘CONFOUNDING BY INDICATION’ IN ASSESSING THE EFFECT OF QUALITY OF CARE ON DISEASE OUTCOMES IN GENERAL PRACTICE: A CASE-CONTROL STUDY

Johan S. de Koning

Niek S. Klazinga

Peter J. Koudstaal

Ad Prins

Gerard J.J.M. Borsboom

Johan P. Mackenbach

Submitted for publication

Abstract

STUDY OBJECTIVE: This case-control study was conducted with the aim to assess the effect of guideline adherence for stroke prevention on the occurrence of stroke in general practice. Here we report on the problems related to a previously unreported variant of confounding by indication, that may be common in quality of care studies.

METHODS: Stroke patients (cases) and controls were recruited from the general practitioner's (GP) patient register, and an expert panel assessed the quality of care of cases and controls using guideline-based review criteria.

RESULTS: A total of 86 patients was assessed. Compared to patients without shortcomings in preventive care, patients who received sub-optimal care appeared to have a lower risk of experiencing a stroke (OR 0.60; 95% CI 0.24 to 1.53). This result was partly explained by the presence of risk factors (6.1 per cases, 4.4 per control), as reflected by the finding that the OR came much closer to 1.00 after adjustment for the number of risk factors (OR 0.82; 95% CI 0.29 to 2.30). Patients with more risk factors for stroke had a lower risk of sub-optimal care (OR for the number of risk factors present 0.76; 95% CI 0.61 to 0.94). This represents a previously unreported variant of 'confounding by indication', which could not be fully adjusted for due to incomplete information on risk factors for stroke.

CONCLUSIONS: At present, inaccurate recording of patient and risk factor information by GPs seriously limits the potential use of a case-control method to assess the effect of guideline adherence on disease outcome in general practice. We conclude that studies on the effect of quality of care on disease outcomes, like other observational studies of intended treatment effects, should be designed and performed such that confounding by indication is minimized.

Introduction

There is a long tradition of studying at population level the quality of medical care provided to patients who died from conditions amenable to medical intervention. This type of study (so-called 'in-depth' or 'audit' study), aims to identify deficiencies in medical care that may have contributed to death. It was first systematically carried out on maternal death, and later on other causes of avoidable death.¹⁻⁸ This method can be applied to other potentially avoidable conditions, e.g. those that could be avoided by appropriate preventive care. The general approach is to document in detail the process of care provided to a single patient preceding the occurrence of an adverse event, followed by an assessment of the quality of care by an expert panel, either with or without the use of explicit criteria.⁹⁻¹²

An important limitation of this type of study, without control subjects, is its inability to fully establish a causal relationship between identified deficiencies in care and the adverse outcome, and to determine to what extent identified deficiencies are associated to the occurrence of such an event. Identified deficiencies in care are expected to indicate only to a certain extent an increase in risk of an adverse health outcome, while the probability of having an adverse outcome can be calculated only if we compare the care provided to patients who suffered an adverse outcome with that of patients who did not suffer such an event. For this reason it has been proposed to perform a case-control study with patients with an adverse event as 'cases' and a comparable group of patients without an adverse outcome as 'controls'.^{13,14}

We performed a case-control study with the aim to assess the effect of guideline adherence for stroke prevention on the occurrence of stroke in general practice. Unfortunately, we encountered various obstacles in the design and conduct of this study, in particular related to the recruitment of cases and controls, in availability of information on the care delivery process in the GP's data registration system, and in controlling for differences other than differences in the quality of care. The aim of this paper is to highlight the problems related to a previously unreported variant of confounding by indication, that may be common in quality of care studies.

Observational studies of intended treatment effects are at risk of 'confounding by indication'.¹⁵⁻¹⁷ Confounding by indication refers to an extraneous determinant of the outcome parameter that is present if a perceived high risk or poor prognosis is an indication for intervention. This means that differences in care, for example, between cases and controls may partly originate from differences in indication for medical intervention such as the presence of risk factors for particular health

problems. We hypothesise that this may not only apply to indications for medical intervention but also for guideline adherence and quality of care. In comparing retrospectively the quality of care between patients with and without a stroke, stroke patients may have received more preventive care because more indications for preventive interventions were present. Because differences in indications for preventive intervention correspond with the probability of an adverse outcome (more indications will be associated with a higher risk of an adverse outcome), when comparing care between cases and controls it is necessary to control for these differences. If one omits to control for confounding by indication, it is expected that more and probably better care, correlates with a higher risk of stroke. In quality of care research, there is, as yet, little information regarding the role of confounding by indication in studies that investigate the effect of quality of care on disease outcomes.

Data and Methods

Sample

From the Dutch national GP register, a random sample was taken of 58 GPs working in Rotterdam and the surrounding region. The study was restricted to patients with a first-ever stroke meeting the following criteria for inclusion: (a) diagnosis of intracerebral hemorrhage or infarction according to the World Health Organization (WHO) definition of stroke,¹⁸ (b) age between 39 and 80 years, (c) occurrence of stroke in the period 1996-1997, (d) stroke caused by cardiovascular disease (CVD) and not by trauma, infection or malignancy, (e) presence of hypertension, (f) GP of the patient practising in the southern part of Rotterdam or surrounding region, (g) patient registered with local GP for not less than two years, and (h) patient not living in a nursing home during the two-year period prior to stroke. Cases and controls were selected from the GPs' patient register, using health outcome (stroke) and risk factor (e.g. hypertension) entries. For each case, two controls were randomly selected and matched with the cases in terms of overall distribution on sex, age, and hypertension (most important risk factor for stroke).

Data collection

In a pilot study among 32 GPs, the quality of care measurement instruments (audit procedure and questionnaire) was tested. GPs participating in the pilot study did not participate in this study. Data on the process of care, two years prior to the occurrence of stroke (for controls from January 1995 to January 1997), were collected by means of structured face-to-face interviews with the GP, using separate

questionnaires for each stroke patient. GPs were interviewed between March and October 1999. At the time of interview, GPs used either hand-written or electronic patient records to retrieve patient information. In case information was not available in the patient's record, information was drawn from the GP's memory. For each question, the type of data source was registered. The questionnaire comprised questions related to patient characteristics and family, and medical history of CVD and risk factors, and the detection and treatment of cardiovascular risk factors such as hypertension, diabetes mellitus, transient ischemic attack (TIA) and cardiac failure. Similarly, data were collected on lifestyle-related risk factors such as smoking status, overweight, and excessive alcohol intake.

Expert panel and assessment method

The quality of preventive care and its potential to prevent stroke was assessed and valued by a six-member panel of experts. The panellists (three neurologists and three GPs) were selected on the basis of their clinical expertise with respect to stroke prevention, experience in quality of care evaluation, academic or non-academic background and professional discipline. Six practice guidelines relevant to stroke prevention (hypertension, diabetes mellitus, TIA, peripheral vascular disease, cardiac failure and angina pectoris) were selected by the panel.¹⁹ These guidelines, based on scientific evidence, broad consensus, and clinical evidence, are developed and implemented by the Dutch College of General Practitioners as part of a national guideline program operational since 1987.^{20,21} From each guideline, the panellists identified specific elements of care and systematically converted these into review criteria (n=65), allowing detailed measurement of GP's adherence.¹¹ All these criteria were used to construct the patient questionnaire.

In a two-round evaluation, with a final plenary round, cases were assessed by the panellists (panellists were divided in sub-panels). Each sub-panel assessed a specific number of cases. Based on identified elements of sub-optimal care and seriousness of shortcoming in terms of 'minor' and 'major', the panellists allocated grades on a scale of 0 to 3 (Table 1). For controls, however, the panellists had to ask themselves the question: if this patient had experienced a stroke, would the identified sub-optimal care have failed to prevent this stroke?

The two-round process was focussed on detecting consensus among the panellists (providing the same grade), and no attempt was made to force the panellists to consensus. The intersubpanel agreement was $k=0.63$ (overall agreement on assigned grades between sub-panels was 74%).

TABLE 1. Grades of (sub)optimal care given by the expert panel (in both groups all patients are hypertensive).

Grading		Cases		Controls	
		n	%	n	%
0	No sub-optimal factors have been identified	12	43	18	31
1	Sub-optimal factor(s) have been identified, but are unlikely to be related to the occurrence of stroke in this patient	8	29	18	31
2	Sub-optimal factor(s) have been identified, and possibly have failed to prevent the stroke in this patient	4	14	18	31
3	Sub-optimal factor(s) have been identified, and are likely to have failed to prevent the stroke in this patient	4	14	4	7
Sub-optimal care Grading 1, 2, 3		16	57	40	69
Total Grading 0, 1, 2, 3		28	100	58	100

Analysis

Analysis of the data was done by using simple cross-tabulations, and by using logistic regression analysis to model the chance of getting a stroke as a function of the presence of sub-optimal care (as ascertained by the panel), age and sex, and risk factors for stroke.

Results

GP Participation and recruitment of cases/controls

The rate of participation was 62% (36 GPs). The main reason for GPs not to participate in the study was lack of time and interest (68%). Participating and non-participating GPs did not differ significantly in age, practice type, and date of qualification. Ninety-two percent of the GPs used electronic GP information systems. Among cases and controls there was a nonsignificant difference in mean age, however, cases were slightly older than controls (67 versus 65 years). Initially, before we excluded patients 'without' hypertension, GPs identified and selected 50 cases and 58 controls (1.4 case and 1.6 control per GP). Expected number of cases was 2.5 stroke patients per GP per year.²² After excluding patients without hypertension, 28 cases and 58 controls with hypertension entered the study.

Availability of data

Overall, data for verification of the initial diagnosis of stroke, assessment of GPs' guideline adherence, and judgement of the causality of the relationship between non-adherence and the occurrence of stroke could be collected from the patient

records. However, information on risk factors such as family history of CVD, body weight (overweight), excessive alcohol intake, and smoking was less easily obtained. Depending on the type of risk factor, in 8-56% of all cases, information on risk factors was unknown to the GP (8% in patients with overweight, 11% in patients smoking cigarettes, 17% in patients with excessive alcohol consumption, and 56% in patients with a family history of CVD). In 41-58% information was taken from the GP's memory, instead of the patient register.

Indications for confounding by indication

In 43% of the cases and 31% of the controls, no sub-optimal care could be identified (grade 0), whereas in 57% and 69%, respectively, sub-optimal care was identified (grade 1, 2 or 3). Thus the Odds Ratio for a case to receive sub-optimal care was 0.60 (95%CI 0.24 – 1.53) compared to a control (Table 1). Compared with controls receiving sub-optimal care, the number of shortcomings in care per case receiving sub-optimal care was higher (28/16=1.7 versus 41/40=1.0) (Table 2). The percentage of shortcomings in hypertensive care, however, was considerably higher among controls (90% versus 57%, respectively). The latter, apparently, correlates with the fact that controls less often have risk factors other than hypertension (see next paragraph).

The mean number of risk factors among cases (6.1 per patient) was higher than among controls (4.4 per patient) (Figure 1). This relationship is statistically borderline significant ($p=0.096$), and could be an explanation for the somehow surprising result found earlier, that is, that cases receive sub-optimal care less often than controls. Multivariate logistic regression analysis supports this result (Table 3). Once again, the analysis indicates that cases receiving sub-optimal care (grade 1, 2, or 3) had a lower risk of stroke (crude OR 0.60). If adjusted for sex and age distribution, the odds ratio does not change significantly (adjusted OR 0.64). Subsequently, in an attempt to investigate the possible role of confounding by indication we adjusted for risk factor prevalence. Indeed, with an adjusted OR of 0.82 (95% CI 0.29-2.30), it seems that risk factor prevalence to some extent explains why patients receiving sub-optimal care have a lower risk of stroke. Patients with a higher number of risk factors for stroke, indeed have a lower risk of sub-optimal care (OR for the number of risk factors present 0.76; 95% CI 0.61-0.94). As expected, higher numbers of risk factors per patient also increases the risk of stroke (OR for the number of risk factors present 1.34; 95% CI 1.10-1.62).

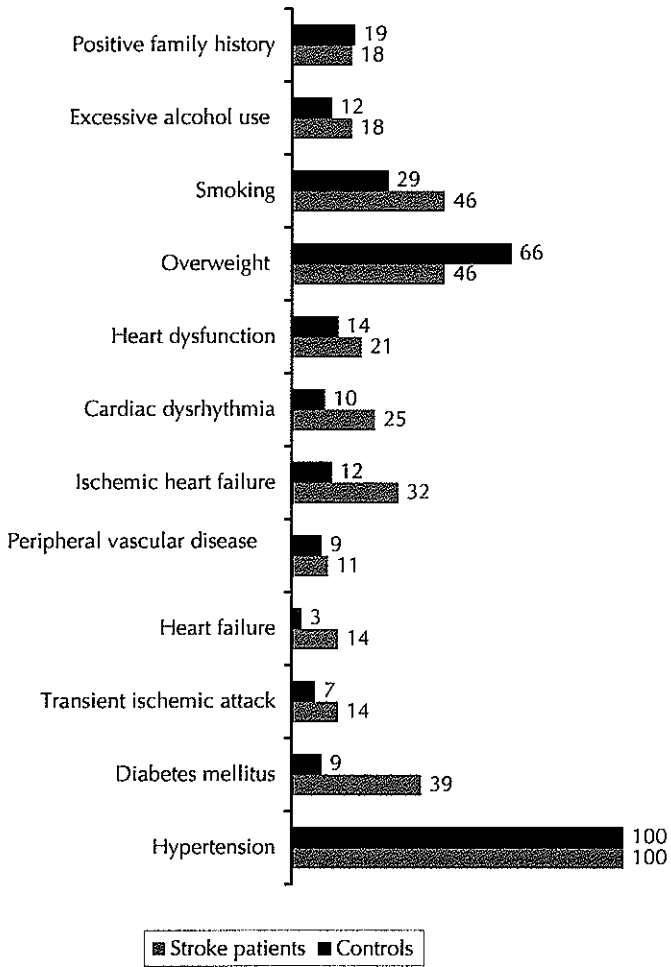


FIGURE 1. RISK FACTOR DISTRIBUTION. Prevalence (%) of risk factors for stroke among stroke patients (n=28) and controls (n=58). Total number of risk factors among stroke patients is 172, and among controls 277. Mean number of risk factors per case is 6.1, and for controls 4.4.

TABLE 2. Guideline-derived elements of care used to indicate shortcomings in care among stroke patients and controls.

Practice guideline	Elements of care	Cases	Controls
Arguments derived from hypertension guideline	Detection of hypertension	1	2
	Confirmation diagnosis hypertension	2	1
	Pharmacologic therapy	2	1
	Follow-up (quarterly)	8	17
	Follow-up (annually)	3	16
Arguments derived from diabetes guideline	Follow-up (quarterly)	4	3
	Laboratory evaluation	1	0
	Referral to eye specialist	1	0
Arguments derived from TIA guideline	Treatment (therapy and follow-up after TIA)	1	1
Arguments derived from more than one practice guideline	Advice to quit smoking	2	0
	Dietary advice (overweight)	1	0
	Evaluation of cardiovascular risk profile	2	0
Total number of shortcomings		28	41
Total number of patients with shortcomings		16	40

Each patient could have more than one element of sub-optimal care. Transient Ischemic Attack (TIA).

TABLE 3. Relationship between quality of care and the occurrence of stroke: odds Ratio (95% CI).

	MODEL 1	MODEL 2	MODEL 3
Care			
Optimal	1.00 (ref.)	1.00 (ref.)	1.00 (ref.)
Sub-optimal	0.60 (0.24-1.53)	0.64 (0.25-1.65)	0.82 (0.29-2.30)
Sex			
Male		1.00 (ref.)	1.00 (ref.)
Female		0.90 (0.36-2.30)	0.61 (0.22-1.72)
Age		1.03 (0.98-1.08)	1.03 (0.98-1.08)
Risk factors			0.76 (0.61-0.94)

To control for risk factors, the numbers of risk factors per patient were included in the regression model.

Discussion

This study demonstrated confounding by indication in a case-control study analysing the association between guideline adherence and the occurrence of stroke in general practice. It also provided insight into the possibilities for controlling for this confounding bias. We learned that, at present, difficulties in patient recruitment and data retrieval seriously limit the potential use of a case-control method to assess the relationship between guideline adherence for stroke prevention and stroke in general practice.

We found that in specific domains data were incomplete and not readily available in the patient records. As a consequence, in many cases GPs were unable to identify stroke patients from their patient register, which most likely introduced under-reporting of stroke patients. As compared to national frequencies (2.5 stroke patients per GP per year),²² GPs participating in our study identified less stroke patients, 1.7 stroke patient per GP. The same applies to information on patients' family history of CVD and lifestyle-related risk factors, which was inaccurate and in many cases not available in the patient's register. The latter finding is consistent with previous work on the accuracy of information on CVD risk factors in GPs' patient records,²³⁻²⁵ indicating that data from GP's record on lifestyle-related risk factors of CVD are frequently incomplete or absent. Incomplete information on risk factors for stroke is a serious threat to the validity of the results of case-control studies investigating the relationship between process of care and health care outcome. It complicates evaluation of GP's adherence to recommended guidelines, and makes it difficult, if not impossible, to control for confounding by indication. Apart from that, information on risk factors that was available in the patient records is presumably not 100% valid.

Strong indications for the existence of confounding by indication were found, albeit different from how it is usually described in literature. Confounding by indication, which is conceived as a substantial problem in observational studies of treatment efficacy, usually refers to a situation in which patients who are more in need both receive more care have a higher risk of adverse health outcome.¹⁵ In our study, we show that confounding by indication can also cause patients with an adverse health outcome (stroke) to appear to receive better quality of care.

A more detailed analysis showed, similar to results found in previous studies, that this result partly emanates from a higher prevalence of risk factors for stroke among patients suffering stroke at a later stage in life, which not only increases the risk of stroke but also GPs' compliance to guidelines. We hypothesize that, on average, patients with more risk factors for stroke receive more attention or visit

their GP more frequently, which in turn facilitates guideline adherence (e.g. compliance to quarterly follow-up of treated hypertensive patients) and at the same time results in better quality of care. Controlling for (recorded) risk factors reduced the counter-intuitive result by approximately one half, and we hypothesise that incomplete registration of risk factors for stroke explains why the risk of stroke in stroke-prone or high-risk patients associated with sub-optimal care remained below 1.00, even after controlling for risk factors. We hope that our paper draws the attention of quality of care researchers to this previously unreported variant of confounding by indication, that may lead to biased associations between process measures of quality of care and care outcomes.

References

1. Parrish LF. A return to maternal mortality studies: a necessary effort. *Am J Obstet Gynecol* 1985;152:379-86.
2. Calman KC. Report on confidential inquiries into maternal deaths in the United Kingdom 1988-1990. London: Department of Health, 1994.
3. Wood B, Catford JC, Cogswell JJ. Confidential paediatric inquiry into neonatal deaths in Wessex, 1981 and 1982. *BMJ* 1984;288:1206-8.
4. Northern Regional Health Authority Coordinating Group. Perinatal mortality: a continuing collaborative regional survey. *BMJ* 1984;288:1717-20.
5. Macfarlane A. Perinatal mortality surveys. *BMJ* 1984;289:1473-4.
6. Eskes M, Alten DV, Treffers PE. The Wormerveer study: perinatal mortality and non-optimal management in a practice of independent midwives. *Eur J Obstet Gynecol Reprod Biol* 1993;51:91-5.
7. Rothwell RP, Rea HH, Sears MR, Beaglehole R, Gillies AJ, Holst PE, et al. Lessons from the national asthma mortality study: circumstances surrounding deaths. *NZ Med J* 1987;100:10-3.
8. Delvin HB, Lunn JN. Confidential inquiry into perioperative deaths. *BMJ* 1986;292:1622-3.
9. Dubois RW, Brook RH, Rogers WH. Adjusted hospital death rates: a potential screen for quality of medical care. *Am J Publ Health* 1987;77:1162-6.
10. Donabedian A. The quality of medical care. Methods for assessing and monitoring the quality of care for research and for quality assurance. *Science* 1978;200:856-63.
11. Agency for Health Care Policy and Research. Using clinical practice guidelines to evaluate quality of care. (AHCPR Publication no. 95-0045) ed. Rockville, MD, 1995.
12. Palmer RH, Donabedian A, Povar CJ. Striving for quality in health care: an inquiry into policy and practice. Michigan: Health Administration Press, 1991.
13. Greenland S, Watson E, Neutra RR. The case-control method in medical care evaluation. *Med Care* 1981;8:872-8.
14. Baker F, Curbow B. The case-control study in health program evaluation. *Eval Progr Plan* 1991;14:263-72.
15. Selby JV. Case-control evaluations of treatment and program efficacy. *Epidemiol Rev* 1994;16:90-101.
16. Miettinen OS. The need for randomization in the study of intended effects. *Stat Med* 1983;2:267-71.
17. Salas M, Hofman A, Stricker BHC. Confounding by indication: an example of variation in the use of epidemiologic terminology. *Am J Epidemiology* 1999;149:981-83.
18. WHO Special Report-1989. Recommendations on stroke prevention, diagnosis, and therapy. Report of the WHO Task Force on stroke and other cerebrovascular disorders. *Stroke* 1989;20:1407-31.

CHAPTER 6

19. Geijer RMM, Burgers JS, van der Laan JR, Wiersma TJ, Rosmalen CFH, Thomas S. NHG-Standaarden voor de huisarts (Dutch College of General Practitioners' guidelines). Utrecht: NHG, 1999.
20. van der Velden K. General practice at work. Thesis. Department of Public Health. Rotterdam: Erasmus University Rotterdam, 1999.
21. Grol R, Thomas S, Roberts R. Development and implementation of guidelines for family practice: lessons from the Netherlands. *J Fam Pract* 1995;40:435-9.
22. Bergman L, van der Meulen JHP, Limburg M, Habbema JDF. Costs of medical care after first-ever stroke in The Netherlands. *Stroke* 1995;26:1830-6.
23. Maitland JM, Reid J, Taylor RJ. Two stage audit of cerebrovascular and coronary heart disease risk factor recording: the effect of case finding in screening programmes. *Br J Gen Pract* 1991;41:144-6.
24. Mant J, Murphy M, Rose P, Vessey M. The accuracy of general practitioner records of smoking and alcohol use: comparison with patient questionnaires. *J Public Health Med* 2000;22:198-200.
25. van Drenth BB, Hulscher ME, van der Wouden JC, Mookink H, van Weel C, Grol R. Relationship between practice organization and cardiovascular risk factor recording in general practice. *Br J Gen Pract* 1998;48:1054-8.

CHAPTER 7

FEASIBILITY OF PRACTICE-BASED AUDIT TO MEASURE THE QUALITY OF STROKE PREVENTION IN GENERAL PRACTICE: A PILOT STUDY

Johan S. de Koning
Niek S. Klazinga
Johan P. Mackenbach

Abstract

STUDY OBJECTIVE: This study investigates the feasibility of a practice-based audit method that intends to give general practitioners (GPs) the opportunity to critically and systematically assess the quality of stroke prevention delivered to patients who developed a stroke.

METHODS: An audit method that was used in a research project was taken as a starting point to develop a practice-based audit method. To investigate the feasibility of this audit method in practice, a field test was carried out among 15 GPs working in two health centres in Rotterdam.

RESULTS: After GPs were introduced to the audit method and instrument, all GPs said they had understood its structure and activities, and believed they could perform a systematic and detailed assessment of care. GPs (n=15) appreciated the detailed, comprehensive and orderly description of the step-by-step approach, and indicated that all sections in the audit instrument provided sufficient information. No problems were reported with respect to identifying stroke patients from the patient registers. Also, in completing the patient questionnaire GPs did not encounter structural problems. Thirteen GPs managed to identify shortcomings in care systematically. The majority of GPs (n=12) said they did not experience difficulties in applying medical review criteria in simple cases with no or small numbers of risk factors for stroke. However, in complex patients, 12 GPs felt they could not always apply review criteria adequately. In all cases, GPs provided final judgements of care. GPs experienced barriers were: a) the time needed to perform the audit, b) the overall time span of the audit, c) its labour intensiveness, and d) a lack of audit support.

CONCLUSIONS: The findings of this pilot study suggest that measuring quality of stroke prevention by means practice-based audit in general practice is feasible and could be acceptable, providing that a favourable environment for audit is present. Organisational modifications of the audit process and audit support in terms of manpower, information technology, and training were mentioned to make the audit more feasible and acceptable in general practice.

Introduction

Attention to quality of care has become an important health care issue. Since the mid 1990s, policymakers, managers in health care organisations and providers of care themselves are more than ever interested in measuring, quantifying, and improving the quality of patient care. Part of this interest has been stimulated by the increasing need to know more about how resources, often scarce, are being used to deliver care and, in the end, how it affects health of those needing care. Undeniably, in primary care, general practitioners (GPs) are also being confronted with the increasing interest and demand to ensure and improve quality. This interest in quality of care has led to the development of various methods for performance-based quality assessment in general practice.^{1,2}

One of the approaches to improving quality of care is clinical audit. In many western countries, this form of quality improvement activity has become firmly established in routine practice for health professionals. Increasingly it is becoming a sophisticated process and a crucial tool in quality improvement activities within organisational and service performance at all levels in the health care system. It is recognised as a central part of the mechanisms aimed to promote clinical effectiveness and to enhance the quality of patient care.

Clinical audit can be defined as *'a systematic, critical analysis of the quality of medical care, including the procedures used for diagnosis and treatment, the use of resources, and the resulting outcome and quality of life for the patient'*.³ The literature on audit is vast and the methods used are diverse; however, there is one sure foundation on which audit can be built: the principal aim is to improve the quality of patient care. Clinical audit intends to seek to encourage the systematic and critical analysis of clinical practice and to provide a structure that encourages health professionals to reflect upon their own professional behaviour. Studies have reported on the benefits of audit with respect to improvements in professional attitude, service delivery and patient care.⁴ With respect to improvements in practice of health professionals and patient outcomes, audit has the potential of being effective in changing professionals' performance, especially if targeted at areas of care where audit is likely to effect change.⁵ Also, with respect to health professionals' attitude, those involved in audit activities experience improvements in communication between individual and groups of professionals, promoting communication and teamwork that could function as an impetus to learn from colleagues. Clinical audit has an established positive impact on professional satisfaction, staff enthusiasm and knowledge.^{4,6}

In general practice, audit of individual cases is usually done by peer review with colleagues, self audits and/or other competence and performance assessment methods, mostly relying on implicit judgement of appropriate clinical practice.⁷ Procedures of this 'implicit' review involve judgement or assessment of quality at varying levels of generality; scores may be assigned to records of care, or judgements made of how well individual GPs deal with a particular patient. A more 'explicit' and precise method is that of clinical audit based on guideline-derived review criteria. This type of audit evaluates care against pre-formulated valid, reliable and acceptable criteria, derived from evidence-based clinical guidelines, compiling available scientific evidence and expert opinion into specifications for the processes of patient care. Clinical audit based on evidence-based clinical guidelines is a method that combines the best scientific evidence with professional education and quality of care assessment, which can be effective in improving the quality of clinical performance.⁸

Compared to investigating the quality of care of a random selection of patients, clinical audit of 'adverse outcomes' takes advantage of the fact that these events are in some way significant or critical. When it comes to encouragement to improve quality, the strength of using adverse outcomes in quality assessment and improvement activities is that, generally, individuals learn much from their own mistakes. For this reason it has a strong potential to be successful in changing professional behaviour over that of more conventional auditing. Adverse events can, as individual instances of care, provide an information-rich and compelling case for action and improvement, and in aggregate they can be used to identify and explore important variations in performance.⁹

This paper reports the findings of a pilot study on the feasibility of a practice-based audit method that was developed from a research-oriented audit study on the quality of stroke prevention in general practice. The aim of this study was to investigate whether GPs adequately detect, treat and control risk factors for stroke in high-risk and stroke-prone patients in general practice. It was a retrospective case-based audit with guideline-based review criteria and final judgement of sub-optimal care by an expert panel.¹⁰

Methods

During an introductory meeting with a group of experts from the Dutch College of General Practitioners (NHG), the research team presented and discussed the feasibility of the research-oriented audit method in general practice. Members of the expert group were selected on the grounds of their clinical expertise with regard

to stroke prevention and cardiovascular disease, and experiences with quality of care evaluation. They provided information with regard to methodological and practical aspects of audit in Dutch general practice (e.g. organisational structures of general practice, availability of resources, key contacts, GP attitudes, logistical considerations, issues related to day-to-day practice). Several meetings were scheduled in which the expert group and the research team worked together to develop both the audit methodology and the audit instrument. After the research team had completed a final draft of the audit instrument, a final evaluation of the instrument was performed by the expert group. At this point, they examined the feasibility of the method and judged whether a) the various audit phases were constructed adequately, b) the audit activities were clear, conceivable, comprehensive, in logical sequence, and in line with GPs' (expected) knowledge and skills with respect to quality of care assessment, and c) the method was applicable in terms of the practice organisational logistics. After approval by the expert group, GP practices were approached and asked to participate in the pilot study. Information on GP practices eligible for participation in this study was provided by the expert group.

To evaluate the feasibility of the practice-based method, all GPs received a written evaluation form. The evaluation form addressed questions related to: a) experiences and attitude towards quality of care assessment in general practice, b) judgement of the structure, clarity and comprehensibility of the audit instrument, c) experiences with the audit process, and d) overall experience and learning process. Additionally, GPs discussed the audit results and their audit experiences with the research team after they had finished the pilot (after the plenary session). Results of these discussions are included in the analysis.

From a research-oriented to a practice-based audit method

To convert the research-oriented audit method into a practice-based audit method, significant modifications had to be made. These modifications particularly applied to the identification and selection of stroke patients, retrieval of information on the care delivery process, and the actual assessment of the quality of patient care. For example, in the research project, stroke patients were identified and selected from two main referral hospitals for stroke in Rotterdam. Of these patients, hospital records were used to identify the patient's GP. This procedure had to be adjusted in the practice-based audit where GPs themselves are expected to identify and select stroke patients from their own patient registers. Another example in which the method needed adjustment was the procedure that was used to actually assess the quality of care delivered by the GP. In the research project, it was an external

panel of experts specifically composed for this study (three neurologists and three GPs), that carried out the assessment. This time, however, GPs themselves are expected to systematically assess the quality of preventive care and its relation to the occurrence of stroke. The latter requires detailed explanation of all processes and skills needed to perform a such task, and thus a clear step-by-step approach has to be provided. Hence, instructions on how to systematically apply the various audit procedures had to be written, and an overall audit structure applicable by GPs in daily practice had to be developed.

Practice-based audit method

Before starting the audit, GPs need to be well prepared. During a regular practice team meeting, the audit is introduced to the team members, a group of participants is formed, a co-ordinator and chairman appointed and audit tasks are allocated. Thereafter, to familiarise participants with the various audit procedures and identify and, if possible, clarify ambiguities and solve problems, participants study the audit materials and conduct a pilot. During this pilot the complete audit procedure is performed for which GPs use two patient samples (included in the audit instrument).

In the audit, the quality of care assessment is based on stroke patients identified and selected from their own patient registers. GPs collect, retrospectively, data on the process of preventive care during a two-year period preceding the occurrence of stroke (occasionally they need to collect information on the care delivery process before the two-year period preceding the occurrence of stroke). For each stroke patient, GPs have to complete a patient questionnaire. The questionnaire comprises questions related to patient characteristics and medical history with regard to cardiovascular risk factors, family history of cardiovascular disease, detection and treatment of cardiovascular risk factors such as hypertension, diabetes mellitus, transient ischaemic attack and cardiac failure. Similarly, data are collected on lifestyle-related risk factors such as smoking status, body weight (overweight), and excessive alcohol intake. This questionnaire is constructed such that all 65 review criteria can be assessed.

Next, GPs are asked to perform an assessment of (possible) shortcomings in preventive care and their relation to the occurrence of stroke. To do this, they use a set of medical review criteria that was developed and used by a multidisciplinary panel of experts in the research project. The complete set of medical review criteria is based on six clinical practice guidelines developed by the Dutch College of General Practitioners (based on scientific evidence, broad consensus, and clinical evidence), allowing GPs to measure in detail their adherence to guidelines.

Based on the information that was entered in the questionnaire and the review criteria, GPs identify aspects of sub-optimal care, judge the seriousness of shortcomings (minor vs. major), and grade sub-optimal care and its possible relation with the occurrence of the stroke. This process is done by means of a two-round evaluation process, with a final plenary round. To detect agreement in grading the quality of care, GPs are divided into sub-panels, each consisting of two GPs. In the first and second round, cases are evaluated by each GP separately. If, within a sub-panel, the GPs assigned equal grades to a particular case, no further evaluation was needed. If no consensus was reached, a second evaluation was done. During this round, GPs received a copy of their own grading form and a copy of that of the other GPs. This extra information was used when GPs re-assessed the case. If no consensus decision was reached during the second evaluation round, the case was discussed in a final and plenary round. Consensus was considered to be reached when both GPs (of one sub-panel) provided the same grade, or when opposite adjacent grades were given during the first and second evaluation round (e.g. 1-0 grade in 1st round, 0-1 grade in 2nd round).

During the plenary session, the overall audit results are presented and participants discuss the individual cases. For example, when presenting the audit results, information is given on the final grades of care, aspects of sub-optimal care and the main bottlenecks in care delivery. Cases for which the GPs did not reach an agreement on the final grade are re-assessed and further discussed. Finally, the audit results with respect to the quality of patient care, successes and failures, will be summarised in a final report. This report functions as a starting point for future quality improvement actions. In section 2 of the Appendix ('User guide for practice based audit') the complete practice-based audit method is presented, indicating the five main audit phases, each consisting of three or more steps.

Results

Study population

In total, 15 GPs practising in two health centres in Rotterdam participated in the pilot study. The mean age of male (n=6) and female (n=9) practitioners was 44 and 37 years, respectively.

GPs' experience and attitude towards systematic quality assessment

Only 4 GPs participated in earlier quality of care research studies or projects. The majority (n=13) reported to have little knowledge of systematic quality assessment and improvement methods to improve patient care. However, despite their limited

knowledge and experiences in this field, almost all GPs (n=13) considered education and skills training in systematic quality assessment and improvement in general practice important, and agreed that it should be an integrated and essential part of routine care in their practice. Two GPs reported that they did not consider activities for systematic quality assessment and improvement in general practice to be essential; *“In my work as a GP, patients for whom I try to do my utmost best to provide them with good quality care have highest priority at any time. Improving professional performance is an intrinsic drive which comes naturally, it does not need complex and time-consuming exercises. Therefore, time spent on other activities not directly related to patient care, like medical audit, does not have priority”*.

GPs' judgement of the audit instrument

Initially, after GPs had received and studied the audit instrument, 13 GPs classified the audit method as described in the audit instrument as rather complex, lengthy and not always user-friendly. Two examples of initial responses; *“It has been a long time since I went to medical school studying complex methodologies and diseases, how do I manage this scientific exercise?”* (reported by three GPs), *“this is how I usually conceive quality of care activities, complex, time-consuming, and for those not having busy office schedules”* (reported by five GPs). After being introduced to the audit method (first meeting with the practice teams), the number of GPs who initially experienced the instrument to be complex and not user-friendly decreased from 13 to 4. However, 13 GPs maintained their idea that the instrument was lengthy. After the preparation phase, all GPs believed they could perform a systematic and detailed assessment of care. All GPs said that they understood the audit method.

With respect to the audit objectives formulated in the manual, 12 GPs said they were in agreement. Two GPs, however, reported that they were unrealistic and not achievable in daily practice. All GPs (n=15) appreciated the detailed, comprehensive and orderly description of the step-by-step approach, and agreed that the various sections provided sufficient information to perform the audit. Three GPs, however, believed that the review criteria were too scientific and the introduction to the review criteria too long. The grading form, as well as the introduction on how to complete the form were clear to all GPs. No remarks were made with respect to both case examples for the pilot audit presented in the final section of the instrument.

Assessment of care

With respect to the identification of stroke patients, both audit co-ordinators managed to select a sufficient number of patients (two patients per GP) from the central patient register. They did not report any difficulties in identifying stroke patients from the patient registers. In both practices, the audit co-ordinators asked the practice assistant to identify and retrieve records of stroke patients from the register. Application of the patient inclusion criteria was done by the co-ordinators themselves.

Almost all GPs (n=13) experienced some difficulties in completing the patient questionnaire. It was reported that, at times, the questions could be confusing. For example, the majority of questions address aspects of care that relate to a two-year period preceding the occurrence of the stroke. It was not always clear to the GP whether or not they had to complete questions for this particular period only. Frequently, GPs included information covering a time span longer than two years preceding the occurrence of stroke. In some cases, aforementioned obscurity made the assessment complicated and confusing. In turn, if questions did address care processes prior to the two-year period preceding the occurrence of stroke, GPs did not always enter this information. Nonetheless, only minor errors, discrepancies or uncertainties in the patient questionnaire were identified by GPs, most of which could be adjusted or removed by applying textual adjustments. No structural problems in completing the patients questionnaire were reported by the GPs, it was mentioned that support by audit facilitators would help them in completing the patient questionnaire. However, despite their call for more support and training, analysis indicated that in most cases GPs (n=14) were capable to complete the patient questionnaire systematically and in great detail.

Thirteen GPs reported that they had succeeded to identify shortcomings in care systematically. Twelve GPs said they did not experience difficulties in applying medical review criteria in simple cases with no or small numbers of risk factors for stroke. In complex patients receiving care for more than one risk factor for stroke, however, GPs (n=12) felt they could not always apply review criteria adequately. Identification of shortcomings in care was experienced as the most difficult task in the audit process. At this point, 10 GPs reported that the process of identifying shortcomings in care, for which they had to go through the questionnaire and the complete set of medical review criteria, should be simplified (e.g. quick references, information technology).

All GPs managed to provide a final judgement on the quality of care delivered to the patient and its relation to the occurrence of stroke. Gradings of care in the first assessment round, however, were given with some uncertainty. Particularly in

cases of sub-optimal care delivery, GPs felt uncomfortable about criticising a colleague's professional behaviour. Providing a second grade in case of dissensus was found to be much easier.

All GPs (n=15) evaluated the plenary session to be essential, not only for receiving feedback on audit results (gradings, areas of sub-optimal care and improvement), but also for sharing experiences about what had happened during the audit process (achievements and problems). Sharing experiences during the audit process did not happen frequently due to time constraints.

Experienced barriers

In spite of the fact that 11 GPs considered the audit method to be feasible in general practice, the majority of GPs (n=14) expressed concerns about the time needed to conduct the audit. Fourteen GPs believed the time intervals between the first, second, and final assessment round were too long (time between first and last round was 12 weeks). Because of this long time span, participants lost focus and needed to invest extra time to regain knowledge and skills after each round. Also, as time passed, GPs reported to face growing and conflicting demands on their workload, which in the end made them fail to prioritise the audit. It was suggested that by shortening the audit to a single day only, or two to three consecutive evenings (n=7), the audit would be more effective. In that way, GPs would remain actively involved and not lose interest, which in the end would improve the audit results.

Although GPs reported that the audit method was not complex, the thoroughness of the assessment process (n=8) and some of the managerial/organisational aspects (n=11) were seen as possible obstacles to success. Activities like distributing audit materials, coding questionnaires, photocopying questionnaires and grading forms, were experienced as being a labour-intensive process (n=10). Twelve GPs reported that additional training in audit techniques, and hands-on help at time of the audit, would certainly help GPs to improve their audit performance. Audit support by means of information technology, i.e. developing an electronic audit systems, was expected to reduce the administrative burden.

Nine GPs considered home assignments not to be motivating and to slow down the audit process. The explanation given was that auditing cases by oneself, generally in the evening, was not encouraging. Performing the assessment at work, preferably together with your colleagues (group exercise), was expected to be more stimulating.

GPs' learning experiences

GPs (n=12) reported that the audit gave them an opportunity to critically assess their own care and that of their colleagues, and it helped them to reflect upon care they provide to their patients. The majority believed that assessing care by means of medical audit is an effective way to improve one's own professional performance (n=12). It certainly improved communication and trust among each other (n=5), enhanced teambuilding/spirit (n=11), and indicated gaps in knowledge and skills (n=6). Six GPs reported that, besides disclosing areas of sub-optimal care delivery, this audit disclosed operational features that require modification of existing practice procedures in order to improve quality of patient care. Some of the issues mentioned were problems in communication, explicitness of practice procedures, and inappropriate use of resources. Thirteen GPs mentioned they would like to perform a second or third audit, but on a different topic. However, asking them whether they would recommend this type of audit to other colleagues, 12 GPs said they did not recommend this audit in its present form.

KEY FINDINGS

	GPs
GPs appreciated the detailed, comprehensive and orderly description of the step-by-step approach, and indicated that all sections in the audit instrument provided sufficient information	15
No structural problems were reported in identifying stroke patients from the GPs' patient registers and completing the patient questionnaire	15
GPs managed to identify shortcomings in care systematically	13
No difficulties were experienced in applying medical review criteria in simple cases with no or small numbers of risk factors for stroke	12
GPs could provide final judgements of care	15
The overall time span of the audit was too long	14
Without additional hands-on help by audit facilitators and electronic audit support, the audit is a labour-intensive process	10
The audit provided GPs an opportunity to critically assess their own care and that of their colleagues, it helped them to reflect upon care they provide to their patients.	12

Consensus procedure and final gradings of care

In 27% (8/30) of the patients, GPs reached consensus in the first assessment round. This percentage increased to 83% (25/30) in the second assessment and reached 100% (30/30) in the final round. With respect to grading the quality of care and its relation to the occurrence of stroke, in 40% (12/30) of the patients GPs did not identify shortcomings in preventive care (grade=0). In 30% (9/30) of the patients shortcomings were identified, but the GPs concluded that there was no relationship between identified shortcomings and the occurrence of stroke (grade=1). In 23% (7/30) and 7% (2/30) of the patients, respectively, shortcomings in care were identified that possibly (grade=2) or likely (grade=3) failed to prevent stroke. In all cases, GPs did reach consensus on a final grade. According to the GPs, there was sufficient information to audit all cases.

Conclusion

This study investigated the feasibility of a practice-based audit method that intends to give GPs the opportunity to critically and systematically assess the quality of stroke prevention delivered to patients who developed a stroke. On the whole, this pilot study showed that, first, the audit instrument provides a clear step-by-step guidance and overview of all necessary audit-related aspects, and, second, measuring the quality of care in stroke prevention by means of retrospective case-based clinical audit in general practice is feasible, providing the environment for audit is favourable.

For a clear understanding of the findings, the following remark on the study has to be made. In this study, the audit was performed voluntarily in well-motivated practices with GPs who were interested in performing such experiment and interested in receiving feedback on their own performance. It is expected that in less motivated practices, the results will be less positive. Most probably, obligatory audit of this type would show different results.

Whether this form of audit can be successfully implemented in practice will, clearly, not only depend on the feasibility and acceptability of the audit method itself. Availability of time or mechanisms to provide protected time for audit, continued audit support (e.g. external facilitator or trained colleague), and the integration of information technology to collect, link, process and analyse data will be important aspects to reduce the burden of audit and increase the likelihood of its success.

References

1. Brook RH, McGlynn EA, Shekelle PG. Defining and measuring quality of care: a perspective from US researchers. *Int J Qual Health Care* 2000;12:281-95.
2. Rethans JJ, Westin S, Hays R. Methods for quality assessment in general practice. *Fam Pract* 1996;13:468-76.
3. Department of Health. Working for patients. London: HMSO, 1989.
4. Johnston G, Crombie IK, Davies HT, Alder EM, Millard A. Reviewing audit: barriers and facilitating factors for effective clinical audit. *Qual Health Care* 2000;9:23-36.
5. Thomson O'Brien MA, Oxman AD, Davis DA, Haynes RB, Freemantle N, Harvey EL. Audit and feedback: effects on professional practice and health care outcomes. *The Cochrane Library* 2001.
6. Westcott R, Sweeney G, Stead J. Significant event audit in practice: a preliminary study. *Fam Pract* 2000;17:173-9.
7. Grol R, Wensing M. Implementation of quality assurance and medical audit: general practitioners' perceived obstacles and requirements. *Br J Gen Pract* 1995;45:548-52.
8. Wensing M, Van der Weijden T, Grol R. Implementing guidelines and innovations in general practice: which interventions are effective? *Br J Gen Pract* 1998;48:991-7.
9. Walshe K. Adverse events in health care: issues in measurement. *Qual Health Care* 2000;9:47-52.
10. de Koning JS, Klazinga NS, Koudstaal PJ, Prins A, Dippel DWJ, Heeringa J, et al. Quality of stroke prevention: results of an audit study among general practitioners. (*Preventive Medicine*, in press).



CHAPTER 8

GENERAL DISCUSSION

8.1 Introduction

This thesis has described several studies related to the quality of care in stroke prevention in general practice and methods of its assessment. Based on a retrospective case-based audit study conducted among GPs working in the Rotterdam area, we studied the quality of care in stroke prevention and its relationship with the occurrence of stroke. We also investigated the implementation of practice organisational structures necessary for systematic stroke prevention, compliance with relevant practice guidelines, and the relationship between these latter aspects and the quality of preventive care provided by the GPs. Besides investigating practice structures and ways GPs manage patient care, we looked at determinants of quality of stroke prevention in the practice environment. We tried to answer the question whether differences in quality of preventive care exist between patients at risk of stroke living in deprived and non-deprived neighbourhoods. To gain insight in areas of sub-optimal care and to identify opportunities for quality improvement of stroke prevention in general practice, we developed and applied a research-oriented retrospective case-based audit with guideline-based review criteria and final judgement of care by an expert panel. On the basis of this method, we developed a practice-based audit instrument intended to enable GPs to critically and systematically assess the quality of stroke prevention delivered to their own patients. Finally, we investigated the feasibility of applying a case-control method for assessing the effect of guideline adherence for stroke prevention on the occurrence of stroke in general practice. This thesis also reports on the problems that occur when controlling for confounding biases, particularly that of confounding by indication.

In this final chapter we recapitulate the main findings of our studies. Some methodological issues concerning the applied research methods are addressed, particularly those related to the audit study. Further, we integrate and discuss the main findings of the separate studies and place these in a broader perspective. Finally, the implications of our study results for GPs, professional organisations, policy makers and researchers in the field of quality of care research are addressed.

8.2 Main findings and summary

In chapter 2, the quality of stroke prevention was measured on the basis of a retrospective case-based audit using guideline-based review criteria and final judgement of sub-optimal care by an expert panel. It was found that more than half of the stroke patients received optimal preventive care provided by their GP. In 45% of the patients, the panellists identified shortcomings in patient care. In one

third of the group (31%), patients received sub-optimal care that was judged to have possibly or likely failed to prevent the occurrence of stroke. It was concluded that sub-optimal care delivered by the GPs had a clear effect on the occurrence of stroke. The main areas of sub-optimal care were found in the domain of hypertension and diabetes control and in the assessment of a patient's risk profile for cardiovascular disease (CVD). With respect to the management of hypertension and diabetes, most frequent cited deficiencies in care were related to insufficient quarterly follow-up of treated hypertensive and diabetes patients and insufficient numbers of blood pressure measurements to confirm the diagnosis.

By means of postal questionnaire we investigated the extent to which recommended aspects of practice organisation necessary for systematic stroke prevention are implemented in practice, as well as how and to what extent these aspects are related to practice and GP characteristics. Overall, it was found that the implementation of practice organisation for systematic stroke prevention in general practice is moderate to low. Moreover, we observed a large disparity in the implementation levels of the various aspects of practice organisation that support CVD prevention in GP practices. For example, with respect to CVD risk factor recording, GPs by and large did record blood pressure measurement (85%) and did mark diabetic patients (86%) in their patient records. Nonetheless, keeping a record of patients with an elevated risk of CVD and the patient's smoking status (51%) is done to a much lesser extent. GPs reported that they often did not record patient's smoking status, even if the patient is known to be a smoker. Furthermore, GPs delegate follow-up visits for treated hypertensive and diabetic patients to the practice assistant in only about 50% of eligible patients. Almost 25% of GPs do not delegate any preventive activities to the practice assistant. As for guidelines acquaintance, half the group of GPs reported to be well informed on stroke-related guidelines, particularly diabetes and hypertension guidelines. In practice, however, compliance with the recommendations described in these guidelines is comparatively low.

In this study significant relationships were found between practice characteristics (e.g. practice type, GPs' working hours, employment rate of practice assistant, and practice location) and GPs' actual recording and delegation behaviour. Our results show that GPs practising in single-handed practices or working full-time less often record preventive activities and information about a patient's risk status. The same applies for delegation of preventive activities to the practice assistant; GPs in single-handed practices less often delegate preventive activities. At this point, we questioned whether the presence or absence of aspects of practice support systems for stroke prevention indeed influences the quality of

stroke prevention provided to patients in general practice. To address this question we used the audit results to investigate whether the probability of sub-optimal care delivery was related to the presence of prevention support systems in general practice. An important finding of this study is that GPs with a more adequate practice organisation for stroke prevention and higher levels of self-reported compliance with clinical practice guidelines, less often delivered sub-optimal care to high-risk or stroke-prone patients. Record keeping and delegation of preventive activities to the practice assistant clearly has a positive impact on the quality of care delivery process: frequent recording and delegation of preventive activities serve to enhance the GP's professional performance (less sub-optimal care). The same applies to compliance with clinical practice guidelines. GPs who reported adherence with more than 75% of the key elements of stroke-related guidelines less often deliver sub-optimal patient care.

Although researchers found that variation in utilisation of preventive care can be explained by population characteristics such as social deprivation, indicating that individuals with a lower socio-economic status have a higher risk of not receiving appropriate screening of preventable diseases, up to now there was little evidence as to whether the quality of stroke prevention to high-risk or stroke-prone patients differed between deprived and non-deprived neighbourhoods. In this study we found that the quality of stroke prevention in general practice differs significantly between patients living in deprived and non-deprived neighbourhoods. Compared to patients living in non-deprived neighbourhoods, patients in deprived neighbourhoods have a higher risk to receive sub-optimal preventive care. Patients in deprived neighbourhoods, and women in particular, appeared to have almost twice the risk of receiving sub-optimal preventive care. Thus, it appeared that socio-demographic characteristics and patient factors do play an important role when it comes to the quality of prevention in general practice. It is interesting, however, that not only patient factors but also GP factors influence preventive practices.

Using the research-oriented audit method described in Chapter 2 as a starting point, we developed a practice-based audit method and instrument to measure the quality of stroke prevention in general practice (Appendix I). In a pilot study the method and instrument were tested in a field study which showed that GPs were capable and motivated to critically and systematically perform this quality of care assessment exercise. The majority of GPs did not experience practical problems with respect to patient identification and data retrieval, managed to identify shortcomings in care systematically, reported not to experience difficulties in applying medical review criteria, and could provide final judgements of the quality

of care. However, with respect to the audit instrument itself, most GPs experienced it as being complex, lengthy and not always user-friendly. Overall, the pilot study showed that, firstly, the audit instrument provides a clear step-by-step guidance and an overview of all necessary audit-related aspects and, secondly, that measuring the quality of care in stroke prevention by means of a retrospective case-based clinical audit in general practice is feasible. Availability of time or mechanisms to provide protected time for audit, continued audit support (e.g. external facilitator or trained colleague), and the integration of information technology to collect, link, process and analyse data were considered important aspects to reduce the burden of audit and increase the likelihood of success.

In order to investigate the feasibility of applying a case-control method to assess the effect of guideline adherence for stroke prevention on the occurrence of stroke in general practice, we performed a case-control study. Unfortunately, during the course of this study, various obstacles in the design and conduct of the study were encountered, particularly problems related to recruitment of cases and controls, availability of information on the care delivery process in the GP's data registration system, and in controlling for differences other than differences in the quality of care. For example, it was found that in specific domains data were incomplete and not readily available in the patient records. Consequently, because GPs were often unable to identify stroke patients from their patient register underreporting of stroke patients occurred. The same applied to information on patients' family history of CVD and lifestyle-related risk factors, often inaccurate and often not available in the patient's register. Strong indications for the existence of confounding by indication were found, albeit different from how it is usually described in the literature (i.e. patients who are more in need receive both more care and have a higher risk of adverse health outcome). In our study, we found a previously unreported variant of confounding by indication for which we could not control for: patients with an adverse health outcome (stroke) received better quality of care. Based on this finding it was concluded that, at present, inaccurate recording of patient and risk factor information by GPs seriously limits the potential use of a case-control method to assess the effect of guideline adherence on disease outcome in general practice.

8.3 Methodological considerations

Before we can draw any conclusions from the findings of this study, the limitations and strengths need further consideration. As some of these have already been

discussed in the previous chapters, this section will provide a more general discussion on the methodological issues related to the audit study.

8.3.1 Recruitment of GPs

Bias due to non-response can be a serious threat to the internal validity of both quantitative and qualitative studies. Response bias and/or low response rates lead to inadequate representation for statistical interpretation, hampering extrapolation of study results to the whole population. The latter particularly applies to quality of care research, since voluntary participation in this type of research is often difficult to obtain. Additionally, response bias and low response rates are serious barriers to the completion of quality of care studies.

Compared with the baseline response rate in the case-control study (62%), we managed to obtain a comparatively high baseline response rate (81%) in the audit study. We believe that the high response rate is due to the recruitment strategy we applied in this study. Particularly for general practice, where participation in research projects is not always welcomed by GPs, it is important to incorporate certain aspects in the recruitment strategy that optimises interest and preparedness of potential participants. In this study, GPs received information on patients that were allocated by the investigators in advance (GPs were identified and recruited through patient records of stroke patients referred to the principle referral hospitals for all strokes that occurred within the respective district). Blinded to the investigators, this information contained data on patients' name and address, medical history, risk factors for stroke and patient care received during his or her stay in hospital. The information was made available to the GP (copy of hospital discharge letter) and enclosed in the invitation letter. Second, assessment of the quality of care provided to patients who developed a serious adverse outcome, that is a stroke, most likely increased the GPs' interest to participate. Care providers are probably more concerned with, and interested in, investigating care processes that might have resulted in adverse events rather than care processes with no unfavourable outcome. Third, because patients were identified in advance, GPs did not have to identify and recruit patients from their own patient registers. GPs consider pre-selection of cases an advantage since it reduces the amount of time that normally has to be spent by participants; this increases willingness to participate in research projects. Fourth, the letter of invitation was sent by a well-respected neurologist. This study showed that including all the latter principles in a recruitment strategy leads to an increased level of interest and commitment of GPs to participate in such a quality of care research project.

There are indications that some bias in GP response might have occurred. Even though there were no significant differences between participating and non-participating GPs with regard to age, practice type, and date of qualification, the mean number of stroke patients referred to hospital by non-respondents was higher than by respondents (3.1 patients per GP versus 2.5 patients per GP, respectively). This suggests that, most probably, reasons other than the frequently cited lack of interest and busy office schedules that leave no time for research underpinned their decision. It is plausible that GPs felt uncomfortable about reporting possible shortcomings in care that might have failed to prevent the occurrence of a bad outcome, and that assessing the quality of their own care might bring about unexpected results. Additionally, feelings among non-respondents that the study results would be used to collect evidence of non-conformity with recommended standards of care that in the end would be part of a punitive process, or simply to identify "bad apples", might have existed. Overall, we expect that some of these reasons might have influenced GPs' decision not to participate in this quality of care study, which in the end resulted in an underestimation of the quality of stroke prevention as measured in this study.

8.3.2 Method of data collection

Quality of care studies require sound and convenient data-collection methods to acquire the necessary patient information and information on the care delivery process. Various data collection methods are available to quality of care researchers, but many of them do not allow to retrieve the information that provides a reliable and comprehensive picture of the actual care provided and patient circumstances. Whether the quality of care assessment based on information retrieved from patient records is valid and reliable is questionable.¹ Particularly in preventive care or counselling activities, data abstraction from medical records appears to underestimate the quality of care, because the information that is recorded is not sensitive enough to measure what truly goes on during a patient consultation.

To avoid validity problems and enable medical records to be used to assess the quality of stroke prevention, the review criteria against which quality of stroke prevention was assessed included aspects of care that were relevant and generally to be found in patient records. It was expected that information would not be readily available in the patient records for certain aspects of care. Accordingly, to maximise the validity of the data collection method, we decided not only to collect data from the medical record, but also to conduct face-to-face interviews with the GP. A written pre-structured questionnaire that was completed at the time of the

interview. In this way, information on family history of CVD and lifestyle-related advice that frequently was not recorded in the medical record could be gleaned from the GP's memory. Although less reliable, including information from the GP's memory in the quality of care assessment enabled the investigators to obtain extra information about the care delivery process. Using both information sources we expected to determine whether the processes of care provided to high-risk or stroke-prone patients represented processes that are thought or known to be associated with the achievement of good health outcomes. With respect to the availability of data, the panellists reported that in almost all cases information was sufficient to investigate the quality of stroke prevention and its relationship with the occurrence of stroke. Even so, information on lifestyle-related advice and lifestyle-related risk factors (cigarette smoking, alcohol consumption and overweight) continued to be low. The latter was a serious threat to the validity of the results of the case-control study.

8.3.3 *Medical review criteria*

To assess GPs' conformity with the recommendations described in guidelines related to stroke prevention, we established evidence-based review criteria. Evidence-based review criteria are systematically developed statements that can be used retrospectively to assess the appropriateness of specific health-care decisions, services, and outcomes. Each criterion relates to a measurable aspect of care, which allows investigators to investigate whether the element of care it relates to did or did not happen. These review criteria were the elements against which quality of stroke prevention was assessed in this study. The method we applied to develop the review criteria was adapted from the Agency for Health Care Policy and Research (AHCPR).²

Compared to implicit judgement or assessment of health care quality, in which professionals use their knowledge and expertise to make a judgement on the appropriateness of care processes, explicit methods of assessing care using guideline-derived review criteria are more precise and can be carried out by non-professionals. A disadvantage of explicit review, however, is the oversimplification and often clinical irrelevance of this method.³ In our study we combined both methods; the expert panel assessed the quality of care using both implicit and explicit criteria. Although the review criteria were the elements against which quality of stroke prevention was assessed, judgement of the severity of sub-optimal factors, final grading of care, and its relation to the occurrence of stroke was mainly done in the minds of the panellists (implicit judgement). In this way, we reduced

the risk of oversimplification, improved its clinical relevance, and thus maximised the validity and reliability of the study results.

In this study, the quality of care assessment was predominantly related to the technical quality, in other words, the quality of care that is provided by the care provider. It refers to the assessment of clinical activities directly related to patients that involve professional activities such as physical check-ups, blood pressure measurements, and so on. Since general practice care in itself is often very complicated, assessing the quality of care mainly on the basis of its technical aspects has some shortcomings. Ideally, a comprehensive assessment of the quality of patient care should consider both the quality of care provided by the health care provider as well as an assessment of patients' perspectives about the care they receive. As definers and evaluators of quality, patients offer valuable contributions to quality assessment. Particularly patients with chronic diseases are best able to evaluate the quality of care, since they have frequent contact with health care providers and therefore many experiences with care delivery. For various reasons (mainly practical in origin), we decided not to collect data from the patients to assess their perspectives of the care they received.

For most of the guideline recommendations, the panellists succeeded in developing guideline-derived medical review criteria. An important characteristic of these review criteria is the formulation of situations in which GPs have a legitimate reason not to follow the recommendations. Formulating this so-called 'acceptable alternative' was not an easy task. We believe that the review criteria developed in this study might not have covered every possible combination of circumstances during the care delivery process in which GPs justly made a decision to opt for actions other than those described in the review criteria. We expect that the latter situation may have introduced an overestimation of sub-optimal care.

8.3.4 Panel procedure

The audit procedure used in the audit study was adapted from the RAND panel method. The procedure consisted of a two-round evaluation, with a final plenary round, in which the quality of care was assessed by an external panel of experts especially composed for this exercise. Our results confirm that this method is reliable in producing a good agreement on rating the quality of care among the investigators.^{4,5} Reliability of the instrument relates to the ability of the method to detect real differences over time, and between different users and between practices where it is used (it is the extent to which the procedure for quality assessment will give the same result when repeated).

In our study, we tested the inter-rater reliability by using two couples, each consisting of one GP and one neurologist, to assess the quality of care that was provided to the same patient. Subsequently, final grades given to the case were compared for agreement. This was done by Cohen's kappa statistic, which takes account of the level of chance agreement.⁶ Interpretation of the kappa statistics is as follows: <0.20 is taken as poor agreement, 0.21-0.40 fair, 0.41-0.60 moderate, 0.61-0.80 good and 0.81-1.00 very good agreement. The intersubpanel agreement of the audit procedure was good ($k = 0.63$), with an overall agreement on assigned grades between sub-panels of 74%.

External validity refers to the generalisability of the study results and not only depends on the representativeness of the sample, but in this study also on the method that is applied to measure the quality of patient care. The results of our audit study are comparable with the results of other studies on the relationship between the risk of stroke and the quality of control of hypertension in routine general practice.^{7,8} In a locally based confidential inquiry into avoidable factors in deaths from stroke and hypertensive disease, Payne et al. found that 29% of death was associated with avoidable factors in care.⁸ The investigators applied a consensus-based audit method in which two experts assessed whether avoidable factors in care were present and whether the identified sub-optimal factors contributed to death of the patient. Their conclusion was that, in identifying shortcomings in care of patients dying of hypertension-related disease, the audit method could be applied successfully. In their study, patients were identified through GPs and hospitals in a particular health authority. We selected patients from the two main referral hospitals for stroke in the region and did not use a sample of the total population of GPs practising in the Netherlands. Therefore, the results of our study cannot easily be generalised.

8.4 Interpretation of the results

8.4.1 *Quality of care and stroke prevention in general practice*

In more than half the stroke patients included in the study, GPs provided patient care according to defined care processes that are thought or known to be associated with the achievement of good outcomes. Forty-four percent of the patients did not receive care that conformed with the recommended processes of care described in the guidelines. One third of the patients received care that possibly or likely failed to prevent stroke. Particularly care in the domain of hypertension control and the assessment of patient's risk profiles for CVD and healthy lifestyle advice appeared to be sub-optimal.

Some of our results are not new and have been reported earlier by others. For example, with respect to hypertension, our finding that hypertension control in primary care is sub-optimal has been known for the past two decades. Studies have repeatedly reported on the so-called 'rule of halves' (half the people with high blood pressure are not known, half of those known are not treated, and half of those treated are not controlled), indicating that the management of hypertension is characterised by under diagnosis, misdiagnosis, under-treatment, over-treatment and misuse of medication.^{9,10} Similarly, to a much lesser extent, it is known that patient's CVD risk profile assessment and the provision of healthy lifestyle advice by GPs is not always delivered at optimal rates.¹¹⁻¹⁵ An important difference from these studies, however, is that we managed to investigate the quality of care for almost the full range of preventive care aspects related to stroke prevention. A number of established risk factors for stroke were incorporated in the quality assessment procedure and provided us with more insight into which areas of care in stroke prevention are sub-optimal. The latter aspect is an additional value of this study.

Additionally, and importantly, we investigated not only the nature and frequency of shortcomings in preventive care provided by GPs to high-risk or stroke-prone patients, but also the relationship between identified shortcomings and the occurrence of stroke, as judged by an expert panel. We know of two studies that reported similar results. In a population-based matched case-control study Du *et al.* found that in 21% of stroke patients the occurrence of stroke was attributable to inadequate hypertension control in routine general practice.⁷ Similar results were reported by Payne *et al.*, in which 29% of deaths from hypertensive or cerebrovascular disease were associated with avoidable factors in care; in their study, shortcomings were identified predominantly in the area of follow-up of hypertensive patients.⁸ Both studies investigated the quality of hypertensive care in relation to death from stroke or hypertensive disease. Evidently, in our study we identified other areas of sub-optimal preventive care delivery that played a role in the failure to prevent the occurrence of stroke.

In addition to investigating the quality of care in stroke prevention and its relation to the occurrence of stroke, we investigated whether differences in preventive care delivery exist between GPs working in deprived and non-deprived neighbourhoods. This study showed that the quality of care provided to patients at risk of stroke differs considerably between neighbourhoods, in that patients in more deprived neighbourhoods have almost twice the risk of receiving sub-optimal care (excess risk of receiving sub-optimal care limited to women). Other studies have shown that consultation characteristics in general practice, such as utilisation rates

and consultation duration, are influenced by socio-economic determinants; low education level, social isolation and increasing poverty predict higher GP consultation rates,^{16,17} but, at the same time, GPs spent significantly less time with patients living in deprived areas, who may thus receive less health care.^{18,19} Given the shorter consultation time spent per patient, one may conclude that patients in deprived areas only receive care that requires shorter consultation time, and that shorter consultation duration, most probably, has a negative effect on preventive care (focus on care of symptoms and signs). The relationship between practice deprivation status and the uptake of preventive services in general practice has been investigated earlier. In a study from the UK on predictors of high quality care in general practice, Campbell *et al.* found that deprivation status predicted poorer uptake of preventive care.²⁰ In studies on cardiac rehabilitation in clinics or hospitals, essential in reducing the risk of acute myocardial infarction and other fatal health outcomes, it was found that social deprivation was the most significant factor associated with poor uptake.^{21,22} Unfortunately, our study did not allow to assess the reason why women in deprived neighbourhoods have an increased likelihood of receiving sub-optimal care. Nevertheless, studies on women's health, help-seeking behaviour and medical care utilisation have indicated some of the possible causes that explain our result: most women continue to believe that, instead of CVD, cancer is their greatest health threat,²³⁻²⁵ women are less well-informed about CVD and their risk to it,^{24,26,27} and women with low educational attainment were less likely to use preventive services.²⁸⁻³⁰ Further research could provide better insight in the mechanisms that explain why women in more socially-deprived neighbourhoods have an excess risk of receiving sub-optimal preventive care.

8.4.2 *Explanations for sub-optimal preventive care*

Explanations for sub-optimal care in stroke prevention, particularly care to patients with hypertension, are complex and multifactorial. There are many important factors that compete and have a strong influence on the GP's preventive behaviour. For example, studies have reported that attitudes towards prevention and self-efficacy expectations are predictors of intentions to practice prevention.³¹⁻³³ Reluctance towards prevention, considering it as an annoying part of daily practice or beyond the scope of one's responsibility makes it unlikely that a GP will deliver optimal preventive care.³⁴⁻³⁶ Fifty to seventy percent of the Dutch GPs doubt whether it is the responsibility of general practice to provide these services, whether it is acceptable to provide these services, and whether general practice has the proper practical means to perform these activities.³⁷ Moreover, a substantial number

of GPs doubt whether preventive actions are indeed effective. GPs recognise the enormous difficulties patients face in adopting new habits and maintaining them long enough to achieve meaningful health benefits.³⁸

Another important element that influences GPs' preparedness to deliver recommended preventive care is the importance of patient demands and expectations in the choice of treatment. GPs tend to place more weight on the patient's agenda and want to maintain a good relationship with the patient and family rather than applying a rational strategy based on clinical evidence. Requirements of clinical effectiveness frequently clash with the preferences or circumstances of the individual patient. The inability to reconcile patient preferences with guideline recommendations is an additional barrier to guideline recommended care. Patients may be resistant or perceive no need to adhere to guideline recommendations.³⁹ Added to this discussion is the complexity of general practice care, due to its interpersonal, human and psychosocial nature. Guidelines often fail to take into account this complexity and care-related aspects determining the quality of patient care. Thus, it is not surprising that optimal guideline compliance rates and anticipated benefits are rarely fully realised in the everyday setting. Studies increasingly report that the scope and nature of the evidence and recommendations made available to the GP have limited applicability.^{40,41}

With respect to guideline related barriers, there are important characteristics of clinical guidelines that influence the use of guidelines.⁴² Low compliance could be related to how recommendations are formulated in clinical practice guidelines. Generally, they are produced based on the results of clinical studies in selected populations and in standard settings and, for this reason, can not and do not apply to daily practice. Moreover, guidelines should be compatible with existing values and thus should not be too controversial, should not demand too much change in existing routines, should be precisely defined with specific advice on actions and decisions, should be based on straightforward scientific evidence and should not demand additional resources in terms of finance, personnel and instruments. Further, do GPs share the importance of evidence-based medicine? Important to this discussion is that GPs frequently report that rigid and uncritical adherence to guidelines threatens their professional autonomy.⁴³ GPs feel that the introduction of guidelines increases the risk of medico-legal exposure and that government authorities and other professional bodies can misuse them.

Finally, low compliance could be related to the quality of the guideline and the strategy followed for its dissemination and implementation. Successful use of clinical practice guidelines needs a combination of different dissemination and implementation strategies. Although these strategies have received much

consideration by the Royal Dutch College of General Practitioners, the question remains whether their approach is effective. Nowadays, a variety of implementation strategies have been developed and made available to health care organisations and providers; nevertheless, whether these strategies are effective and indeed lead to successful guideline implementation remains to be seen. The effectiveness of many types of implementation strategies presently available is still under investigation.

8.4.3 Practice-based audit of adverse events

We managed to convert the audit method used in the research project into a practice-based audit method and to develop an instrument that enables GPs to critically and systematically assess the quality of care delivered to their patients who developed a stroke. All GPs appreciated the detailed, comprehensive and orderly description of the methods' step-by-step approach, and indicated that all sections in the audit instrument provided sufficient information. With respect to its application in practice, no problems were reported in identifying stroke patients from the patient registers or in completing the detailed patient questionnaire. Most of the GPs managed to identify shortcomings in care systematically, were able to apply the medical review criteria adequately, and could provide final judgements of the quality of care and their possible relationship with the occurrence of stroke. However, GPs did report concerns with respect to the amount of time that was needed to conduct the audit and a lack of audit support. For example, almost all GPs believed the time intervals between the assessment rounds were too long which, in their opinion, caused them to lose interest. Also, in the course of time, GPs reported that they faced growing and conflicting demands on their workload. Furthermore, lack of adequate and continued support by external facilitators or trained colleagues, and the lack of an electronic audit support system to efficiently collect, link, process and analyse data, were seen as possible barriers to adequately perform all audit activities. These barriers are, however, not new and have been described in the literature.

The support of clinical audit has not been unanimous. Even those health care providers enthusiastic about the integration of clinical audit in medical practice have recognised its disadvantages. In a review on barriers to and facilitating factors for effective clinical audit, Jonhston et al. describe the importance of physicians' perceptions of the disadvantages of audit, barriers that hinder effective audit, and factors that promote audit and lead to success.⁴⁴ The authors report that a lack of audit support, good quality information systems, and poor audit design are perceived barriers in achieving successful integration of audit in professional

practice. With respect to the barriers to audit described in this study and those mentioned by the GPs in the pilot study, there certainly is overlap. Particularly lack of time to do the audit and the resulting conflict between the immediate demands of treating patients and the longer benefits of audit, were mentioned as a problem in both studies. GPs reported that when they had limited time to perform audit activities, resulting in quick and incomplete assessment of care and limited time for feedback, audit was not expected to be effective in optimising the quality of stroke prevention.

In general, conventional audit (paper-based audit) is characterised by its labour-intensiveness and time-consuming process,⁴⁵ and requires time and intellectual input from the GP. Because GPs have a busy office schedule it is important to reduce the overall workload and the time that is needed to perform an audit. One of the solutions to make audit more enjoyable and less time-consuming is to develop tailored electronic systems to support audit. Activities such as data retrieval, identification of deficiencies in care, the assessment of the quality of care and its interpretation, can be facilitated and supported by a well functioning and optimal use of an electronic data management system. Another advantage of electronic audit is that it is faster than manual audit.⁴⁵ Electronic audit support certainly speeds up administrative procedures such as the distribution of questionnaires and grading forms to the audit co-ordinator and participating GPs; electronic supported audit shortens the interval between the assessment rounds. Also, rapidity in audit prevents GPs from losing interest, makes the audit exercise more attractive, and helps to reduce the failure of audit to achieve quality improvement. The latter is expected to be a key factor to success of the audit, because loss of interest due to long time intervals was a disadvantage mentioned by most participants in the pilot study. A disadvantage of integrating audit in electronic audit support systems, however, is that GPs need sufficient computer skills.

What we learned is that practices clearly need greater levels of support than we were able to provide in the pilot study. GPs reported that additional training in audit techniques, and hands-on help at time of the audit, would have helped them to improve their audit performance. Studies indicate that lack of education and training in audit methods, and access to skilled and proactive support staff,^{46,47} diminish the feasibility of practice-based audit. Therefore, assistance provided by colleagues trained in audit techniques, external quality assurance, research or audit staff, and formalised structures for audit would be required.

8.4.4 Practice organisation and quality of care

Our study reports that the implementation of practice organisational structures that support systematic CVD prevention in general practice is moderate to low, and that there is no consistent approach by GPs towards its implementation. Other Dutch studies on the organisation of preventive services in general practice have reported similar results, describing moderate implementation levels of tailored information systems, formal delegation of preventive tasks, standardisation of care i.e. compliance with clinical practice guidelines in practices.^{48,49} Bearing in mind the period of investigation of the former studies, we can conclude that Dutch general practice continues to be insufficiently equipped to implement large-scale preventive services. Further, with respect to the relationship between practice characteristics (practice type, GPs' working hours, employment rate of practice assistant, practice location) and recording and delegation practices, this study found strong associations between both aspects. We found a positive significant relationship between the GP characteristics and GPs' recording and delegating behaviour: GPs practising in single-handed practices or GPs working full-time less often record information about a patient's risk status and less often delegate preventive activities. Another study on the relationship between practice management and GP performance in general practice, also reported on the relationship between delegation of preventive activities and practice characteristics.⁵⁰ Although in our study we established a positive relationship between delegation of preventive activities and group practices only, the other study observed a positive relationship between both group practices and health centres and task delegation. The latter, we assume, results from insufficient numbers of GPs working in health centres that were included in our study. Nevertheless, taking into consideration both study results, GPs working in a formal setting with more than one GP, do delegate more. This can be explained by the fact that, in single-handed practices, GPs usually have one practice assistant who is most of the time dealing with telephone calls and other administrative tasks and has no time for other tasks such as examination and follow-up of CVD patients. Practice assistants working in group practices or health centres, manage and share tasks and responsibilities more efficiently, enabling them to perform other clinical activities more frequently. Second, there is a positive impact of teamwork on CVD practice management. Teamwork to enhance preventive care in general practice (entailing co-ordination and delegation of tasks between care providers and practice staff), is an important feature of practice management.^{51,52} Preliminary results of a study on organisational determinants of CVD prevention in general practice by Lobo *et al.*

show that follow-up activities and record keeping in particular are strongly related to teamwork.

An important finding of our study is that GPs with a more adequate practice organisation for stroke prevention and higher levels of self-reported compliance with practice guidelines for stroke prevention less often delivered sub-optimal care to patients who developed a stroke over time. Recording and delegation of preventive activities to the practice assistant clearly has a positive impact on the quality of care delivery process. The same applies to compliance with practice guidelines. Although other studies report a positive relationship between systematic recording of preventive activities, risk factors and risk groups and the quality of care delivery,^{53,54} the exact relationship between structure and process is not entirely clear. It is generally assumed that by improving the practice organisation (structure) the actual performance of GPs will also improve. A better or more organised practice is seen to be equal to improved patient care, and poor or less organised practices result in lower standards of patient care. In a recent study on the relationship between practice management and clinical performance in general practice, Ram *et al.* found a clear but limited relationship between some aspects of practice management and clinical performance of GPs.⁵⁵ Among a large number of practice management dimensions, it was found that medical record keeping had a positive relationship with the actual performance of the GP. The answer to whether practice management related to CVD indeed has an impact on disease outcome is given in our study. Initiatives to improve patient recording and delegation of tasks can have a beneficial impact on the prevention of stroke.

8.4.5 Case-control method for quality of care assessment

The development of adequate approaches using non-experimental study methods to study the effectiveness of medical care interested researchers for many years. However, despite the potential of the case-control method to measure the relationship between process and outcome of care, problems related to the validity of the case-control results have led to certain reservations regarding the general utility of the method.⁵⁶ Existing techniques to control for these confounders are not optimal, in particular controlling for confounding by indication (Chapter 7).

Despite the relatively small and well-defined target population, GPs were not able to identify all stroke patients during the two-year period preceding the occurrence of stroke. GPs frequently used their memory to identify stroke patients from their registers. This introduced underreporting of cases, and probably introduced selection bias. Compared to national frequencies (2.5 stroke patients per GP per year),⁵⁷ GPs participating in the present study reported less stroke patients

(1.7 stroke patient per GP). Consistent with previous work on the accuracy of information on CVD risk factors in GPs' patient records, inaccurate information on patients' family history of CVD and lifestyle-related risk factors complicated the evaluation of GP's adherence to recommended guidelines, and made it difficult, if not impossible, to control for confounding by indication.⁵⁸⁻⁶⁰

8.5 Implications

Several conclusions can be drawn from our study results from both a public health and health service perspective. One of the main findings of this thesis is that, despite increased awareness and efforts to improve the quality of preventive care in general practice, the quality of preventive care provided by GPs to high-risk or stroke-prone patients is often sub-optimal. Although more than half of the stroke patients received optimal care, one third of the patients received sub-optimal care that possibly or likely failed to prevent stroke. It was concluded that it is likely that by improving preventive care delivery in general practice, a substantial reduction in stroke incidence could be achieved. GPs have the opportunity to provide effective preventive services, not only because of the availability of effective preventive interventions that can be offered to high-risk or stroke-prone patients, but also because of their key position in the Dutch health care system and the frequent contact GPs have with the patient over time. Therefore, besides the public health strategies that aim to achieve reductions in CVD in every individual in the population, general practice should accept its important role in CVD and stroke prevention by strengthening its efforts to further improve the quality of preventive care in this area.

With respect to the practice management routines and organisation of practice for stroke prevention, there is clearly room for improvement. We found that the implementation of organisational structures for stroke prevention (such as tailored information systems, formal delegation of preventive tasks, and standardisation of care) is moderate to low. Additionally, we observed that levels of implementation are influenced by GP and practice characteristics, and that absence of such structures for stroke prevention had a significant negative impact on the quality of care. GPs with lower levels of integrated organisational structures for stroke prevention are more likely to deliver sub-optimal care. To increase compliance with guidelines for stroke prevention, continuous effort is needed to further develop and improve quality systems in general practice that focus on improving practice organisation, particularly those aspects of practice organisation that are required for systematic stroke prevention. There is a need for intensive support and structured

policy activities by professional bodies at national and district level to provide assistance to GPs and support staff in implementing change in existing practice management routines and practice organisation.

Priority should be given to guideline development for the management and organisation of prevention in medical practice, and information technology that encourages co-operation between GPs, support staff and other health care providers, communication and recording of health care information. District programmes will play a key role in setting-up such structures for improvement (e.g. practice guidelines, educational packages, electronic support systems for prevention, practice management support, etc). The National Association and Dutch College of General Practitioners quality policy document 'Kwaliteit op Koers' (1999), describes various proposals with respect to the organisation of sustainable quality systems in general practice.

From this study we learned that improvements in quality of stroke prevention may require that GPs are encouraged to systematically record cardiovascular risk factors in the patient information systems, and to delegate more preventive tasks and responsibilities to the practice assistant. The recently published 'Future Policy of LHV, 2003-2006' (draft), describes the priority that is given by the National Association of General Practitioners and the Dutch College of General Practitioners to further develop and integrate electronic data information systems, i.e. electronic patient record and reminder systems, in general practice. Improved data management systems that will ultimately lead to higher recording levels of preventive activities, CVD risk factors and risk groups in patient records, are expected to improve the delivery of preventive services.

Furthermore, with respect to the role of practice assistants in prevention in general practice, there is certainly a need to strengthen it. The National Association and Dutch College of General Practitioners have acknowledged that practice assistants need to receive more tasks and responsibilities in systematic CVD prevention. Practice management and the organisation of medical care should be adjusted such that it enables and encourages practice assistants to perform prevention effectively. (e.g. separate preventive clinics for hypertensive and diabetes patients, smoking cessation interventions).

A significant relationship was observed between practice characteristics and the levels of recording and delegation; GPs working in single-handed practices or working full-time less often record risk factors for stroke and less often delegate preventive activities to the practice assistant. It is expected that general practice care will be increasingly provided through larger settings, in which GPs and support staff will establish formal structures of co-operation. Larger settings are

expected to encourage teamwork, and develop an open culture that facilitates and supports close co-operation between GPs and practice staff. The future policy of the National Association of General Practitioners and Dutch College of General Practitioners is to stimulate GPs to work in practices with more than one GP. They encourage GPs to work together and set up wider networks of co-operation and communication with other GPs and involve practice assistants in the wider scope of tasks that are currently performed by GPs. Larger settings also provide an opportunity to establish structures that facilitate the integration of efficient and modern practice and communication systems that will provide the basis for systematic prevention.

One of the tools to create a change in GPs' professional performance in stroke prevention is audit and feedback. This study showed that retrospective case-based audit with guideline-based review criteria can be a reliable and valid method to identify shortcomings in preventive care, enabling GPs to identify opportunities for improvement in stroke prevention and subsequently initiate quality improvement initiatives. However, well-defined plans to develop and implement clinical audit drawing on multi-level and professional support are a necessary prerequisite of clinical audit. GP professional bodies, practice managers and GPs should take the opportunity to further develop and implement this method of audit in medical practice and consider how best to use its generated knowledge to improve their preventive activities for which they are accountable. Important is that at national and district level this form of clinical audit is viewed as a method with the potential to systematically improve the quality of stroke prevention in general practice. To facilitate audit in general practice, clearly, barriers to improve the quality of care in stroke prevention need to be addressed systematically. Otherwise, GPs will face conflicting demands on their clinical workload and will fail to prioritise audit and integrate this activity in their routine practice.

Finally, we learned that practice location has a definite effect on quality of care in stroke prevention; GPs practising in socio-economic deprived areas more often deliver sub-optimal care to patients at risk of stroke. To improve preventive care in general practice and to promote equality in opportunities for health, measures for improvement should target the socio-economically disadvantaged more. This study identified not only variations in preventive care delivery to patients from different socio-economic areas, but also provides insights which could function as a starting point to remedy processes and structures that cause such patterns of care. To gain better insight in mechanisms that explain the relationship between socio-economic deprivation and quality of stroke prevention, further research is required. Meanwhile, the National Association of General

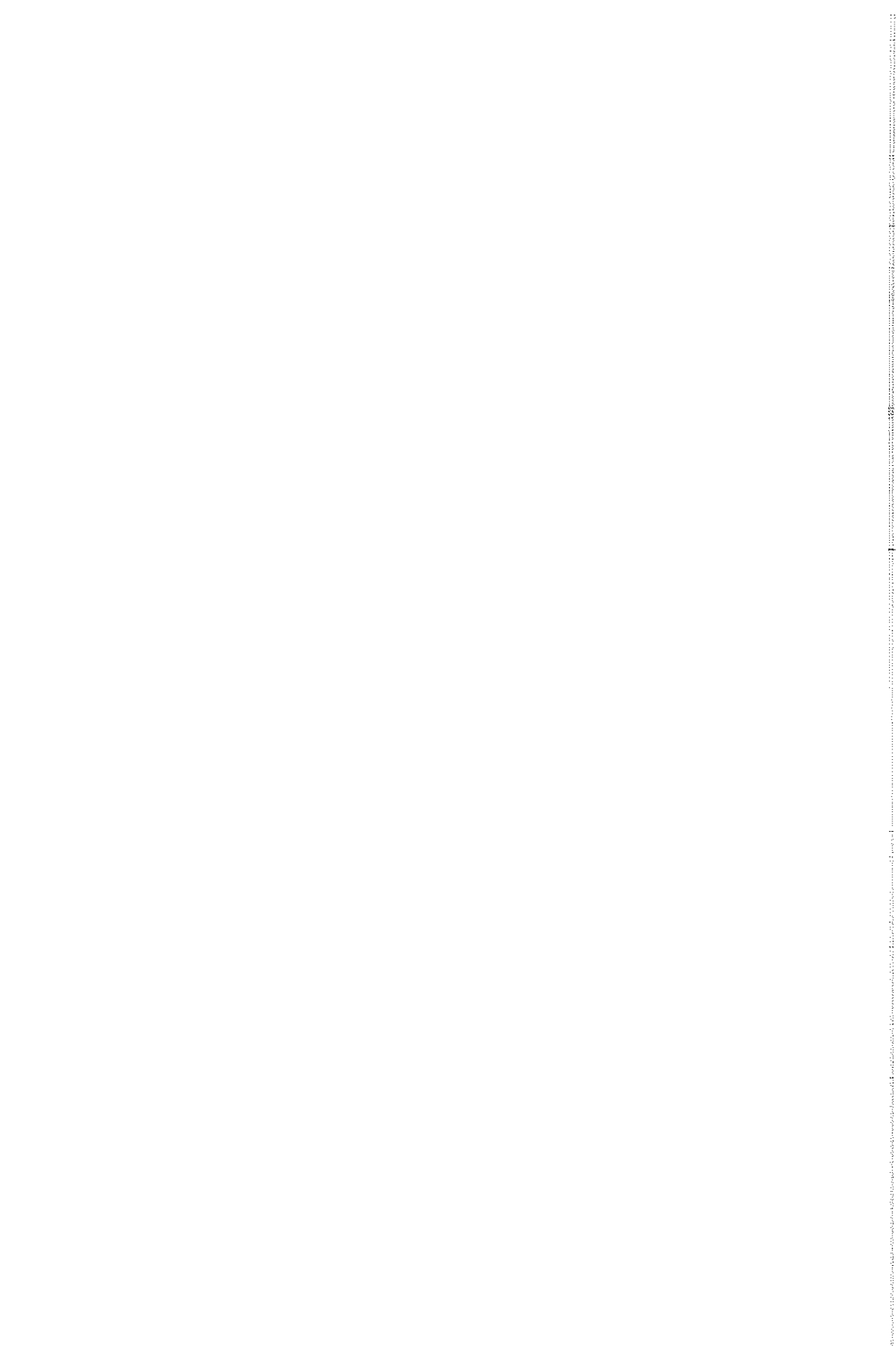
Practitioners and the Dutch College of General Practitioners should take initiatives to reduce inequalities and promote stroke prevention among GPs and patients in deprived areas. Since women have almost twice the risk of receiving sub-optimal preventive care, there is an urgent need for GPs to take an active role in identifying health behaviours that may affect the risk of CVD disease in women in deprived areas. GPs should continue to search for ways to encourage women in deprived areas to take action against CVD, to increase their awareness, and involve them in educational programs related to this topic.

References

1. Aaronson LS, Burman ME. Use of health records in research: reliability and validity issues. *Res Nurs Health* 1994;17:67-73.
2. Agency for Health Care Policy and Research. Using clinical practice guidelines to evaluate quality of care. (AHCPR Publication no. 95-0045) ed. Rockville, MD, 1995.
3. Berwick DM. Health services research and quality of care. Assignments for the 1990s. *Med Care* 1989;27:763-71.
4. Brook RH, McGlynn EA, Shekelle PG. Defining and measuring quality of care: a perspective from US researchers. *Int J Qual Health Care* 2000;12:281-95.
5. Campbell SM, Hann M, Hacker J, Durie A, Thapar A, Roland MO. Quality assessment for three common conditions in primary care: validity and reliability of review criteria developed by expert panels for angina, asthma and type 2 diabetes. *Qual Saf Health Care* 2002;11:125-30.
6. Fleiss JL. Statistical methods for rates and proportions. New York: Wiley, 1981.
7. Du X, Cruickshank K, McNamee R, Saraee M, Sourbutts J, Summers J, et al. Case-control study of stroke and quality of hypertension control in north west England. *BMJ* 1997;314:272-6.
8. Payne JN, Milner PC, Saul C, Browns IR, Hannay DR, Ramsay LE. Local confidential inquiry into avoidable deaths from stroke and hypertensive disease. *BMJ* 1993;307:1027-30.
9. Colhoun HM, Dong W, Poulter NR. Hypertension management: is England sticking to the rule of halves? Results from the health survey for England 1994. *J Hypertens* 1996;14:289.
10. Trilling JS. The urgent need to improve hypertension care. *Arch Fam Med* 2000;9:794-801.
11. Lewis CE. Disease prevention and health promotion practices of primary care physicians in the United States. *Am J Prev Med* 1988;4:9-16.
12. Jaen CR, Stange KC, Tumiel LM, Nutting P. Missed opportunities for prevention: Smoking cessation counseling and the competing demands of practice. *Fam Pract* 1997;45:348-54.
13. Stange KC, Flocke SA, Goodwin MA, Kelly RB, Zyzanski SJ. Direct observation of rates of preventive service delivery in community family practice. *Prev Med* 2000;31:167-76.
14. Solberg LJ, Kottke TE, Brekke ML. Variation in clinical preventive services. *Eff Clin Pract* 2001;4:121-6.
15. Lopez-de-Munain J, Torcal J, Lopez V, Garay J. Prevention in routine general practice: activity patterns and potential promoting factors. *Prev Med* 2001;32:13-22.
16. Scaife B, Gill P, Heywood P, Neal R. Socio-economic characteristics of adult frequent attenders in practice: secondary analysis of data. *Fam Pract* 2000;17:298-304.
17. van der Meer JB, Mackenbach JP. Low education, high GP consultation rates: the effect of psychosocial factors. *J Psych Res* 1998;5:587-97.
18. Wiggers J, Sanson-Fisher R. Duration of general practice consultations: association with patient occupational and educational status. *Soc Sci Med* 1997;44:925-34.
19. Stirling AM, Wilson P, McConnachie A. Deprivation, psychological distress, and consultation length in general practice. *Br J Gen Pract* 2001;51:456-60.

20. Campbell SM, Hann M, Hacker J, Burns C, Oliver D, Thapar A, et al. Identifying predictors of high quality care in English general practice: observational study. *BMJ* 2001;323:784-7.
21. Pell J, Pell A, Morrison C. Retrospective study of influence of deprivation on uptake of cardiac rehabilitation. *BMJ* 1996;313:267-8.
22. Melville MR, Packham C, Brown N, Weston C, Gray D. Cardiac rehabilitation: socially deprived patients are less likely to attend but patients ineligible for thrombolysis are less likely to be invited. *Heart* 1999;82:373-7.
23. Giardina E. Call to action: cardiovascular disease in women. *J Womens Health* 1998;1:37-43.
24. Robertson RM. Women and cardiovascular disease: the risk of misperception and the need for action. *Circulation* 2001;103:2318-20.
25. Mosca L, Manson JE, Sutherland SE, Langer RD, Manolio T. Cardiovascular Disease in Women: A Statement for Healthcare Professionals From the American Heart Association. *Circulation* 1997;96:2468-82.
26. Howes DG. Cardiovascular disease and women. *Lippincotts Prim Care Pract* 1998;2:514-24.
27. Poduri A. Cardiovascular risk factors in economically disadvantaged women: a study of prevalence and awareness. *J Natl Med Assoc* 1998;90:531-6.
28. Mead H, Witkowski K, Gault B, H H. The influence of income, education, and work status on women's well being. *Womens Health Issue* 2001;11:160-72.
29. Gattrell A, Garnett S, Maddocks A, Kirwan M. Uptake of screening for breast cancer in south Lancashire. *Public Health* 1998;112:297-301.
30. Neal RD, Lawlor DA, Allgar V, Colledge M, Ali S, Hassey A, et al. Missed appointments in general practice: retrospective data analysis from four practices. *Br J Gen Pract* 2001;47:830-2.
31. Drenthen T. Challenges to prevention in Dutch general practice. *Am J Clin Nutr* 1997;65:1943-5.
32. Frame PS. Health maintenance in clinical practice: strategies and barriers. *Am Fam Phys* 1992;45:192-200.
33. Bandura A. Social foundation of thought and action: a social cognitive theory. New York: Prentice-Hall, 1986.
34. Landelijke Huisartsen Vereniging LHV - Dutch College of General Practitioners NHG. Concept-voorstel inzake preventie in de huisartspraktijk (Draft proposal for prevention in general practice). Utrecht, 1992.
35. Conradi M, van Drenth BB, Hulscher MEJL, Grol R, van der Wouden JC. Preventie van hart- en vaatziekten in de huisartspraktijk. Belemmeringen in de praktijkorganisatie (Cardiovascular disease prevention in general practice. Barriers in practice organization). *Medisch Contact* 1992;47:1449-52.
36. Berden HJJM, Drenthen AJM. Prevention of cardiovascular disease in Dutch general practice. *Neth J Cardiol* 1993;4:220-4.
37. Hulscher MEJL, van Drenth BB, Mokkink HGA, van der Wouden JC, Grol R. Barriers to preventive care in general practice: the role of organizational and attitudinal factors. *Br J Gen Pract* 1997;47:711-4.
38. Stange KC, Woolf SH, Gjeltema K. One minute for prevention: the power of leveraging to fulfill the promise of health behavior counseling. *Am J Prev Med* 2002;22:320-3.
39. Cabana MD, Rand CS, Powe NR, Wu AW, Wilson MH, Abboud PA, et al. Why don't physicians follow clinical practice guidelines? A framework for improvement. *JAMA* 1999;282:1458-65.
40. Naylor CD. Grey zones of clinical practice: some limits to evidence-based medicine. *Lancet* 1995;345:840-2.
41. Owen P. Clinical practice and medical research: bridging the divide between the two cultures. *Br J Gen Pract* 1996;46:557-60.
42. Grol R, Dalhuijsen J, Thomas S, in 't Veld C, Rutten G, Mokkink H. Attributes of clinical guidelines that influence use of guidelines in general practice: observational study. *BMJ* 1998;317:858-61.

43. Tunis SR, Hayward RS, Wilson MC, Rubin HR, Bass EB, Johnston M, et al. Internists' attitudes about clinical practice guidelines. *Ann Intern Med* 1994;120:956-63.
44. Johnston G, Crombie IK, Davies HT, Alder EM, Millard A. Reviewing audit: barriers and facilitating factors for effective clinical audit. *Qual Health Care* 2000;9:23-36.
45. Lough JR, Willmot M, Murray TS. Supporting practice-based audit: a price to be paid for collecting data. *Br J Gen Pract* 1999;49:793-5.
46. Firth-Cozens J, Storer D. Registrars' and senior registrars' perceptions of their audit activities. *Qual Health Care* 1992;1:161-4.
47. Crombie IK, Davies HTO, Abraham SCS, Florey C. *The Audit Handbook*. Dundee: John Wiley & Sons, 1993.
48. van Ree JW. *Het Nijmeegs Interventie Project (Thesis) (The Nijmegen Intervention Project)*. Nijmegen: Katholieke Universiteit Nijmegen, 1981.
49. Verhaak PFM, Bosman JM, van der Velden, J. *Preventie: nationale studie van ziekten en verrichtingen in de huisartspraktijk (Prevention: national survey of morbidity and interventions in general practice)*. Utrecht: Nederlands instituut voor onderzoek van de eerstelijnsgezondheidszorg (NIVEL), 1991.
50. van den Hombergh P, Grol R, van den Hoogen HJM, van den Bosch WJHM. Assessment of management in general practice: validation of a practice visit method. *Br J Gen Pract* 1998;48:1743-50.
51. Dietrich AJ, Woodruff CB, Carney PA. Changing office routines to enhance preventive care. The preventive GAPS approach. *Arch Fam Med* 1994;3:176-83.
52. Calnan M, Cant S, Williams S, Killoran A. Involvement of the primary health care team in coronary heart disease prevention. *Br J Gen Pract* 1994;44:224-8.
53. Ketola E, Sipila R, Makela M, Klockars M. Quality improvement programme for cardiovascular disease risk factor recording in primary care. *Qual Health Care* 2000;9:175-80.
54. van den Hoogen JP, van Ree JW. Preventive cardiology in general practice: computer-assisted hypertension care. *J Hum Hypertens* 1990;4:365-7.
55. Ram P, Grol R, van den Hombergh P, Rethans JJ, van der Vleuten C, Aretz K. Structure and process: the relationship between practice management and actual clinical performance in general practice. *Fam Pract* 1998;15:354-62.
56. Greenland S, Watson E, Neutra RR. The case-control method in medical care evaluation. *Med Care* 1981;8:872-8.
57. Bergman L, van der Meulen JHP, Limburg M, Habbema JDF. Costs of medical care after first-ever stroke in The Netherlands. *Stroke* 1995;26:1830-6.
58. Maitland JM, Reid J, Taylor RJ. Two stage audit of cerebrovascular and coronary heart disease risk factor recording: the effect of case finding in screening programmes. *Br J Gen Pract* 1991;41:144-6.
59. Mant J, Murphy M, Rose P, Vessey M. The accuracy of general practitioner records of smoking and alcohol use: comparison with patient questionnaires. *J Public Health Med* 2000;22:198-200.
60. van Drenth BB, Hulscher ME, van der Wouden JC, Mokkink H, van Weel C, Grol R. Relationship between practice organization and cardiovascular risk factor recording in general practice. *Br J Gen Pract* 1998;48:1054-8.



SUMMARY

Stroke, in its various manifestations, is a major cause of death and disability in many western countries. Moreover, it is a major global health problem with a significant impact on public health. Because there is no effective treatment for most types of stroke, preventive strategies are of utmost importance and offer the greatest potential for reducing the burden of this disease. In the Netherlands, preventive treatment of the high-risk or stroke-prone patient is almost entirely done by health care providers in the primary care setting. GPs in particular have the opportunity to provide effective preventive services, not only because of the availability of effective preventive interventions that can be offered to high-risk or stroke-prone patients, but also because of their key position in the Dutch health care system and the frequent contact GPs have with the patient over time. Because general practice plays a key role in stroke prevention, provision of optimal preventive care by GPs is vital in reducing the impact of this disease.

This thesis addresses the quality of stroke prevention in general practice. The primary focus is on measuring the quality of stroke prevention provided by GPs to high-risk or stroke-prone patients, in order to identify areas of sub-optimal care and, subsequently, to identify opportunities for improvements. Investigated is the extent to which recommended aspects of practice organisation relevant for stroke prevention are implemented in general practice, the extent to which GPs comply with stroke-related practice guidelines, and whether a relationship exists between the quality of care delivery and the way in which the GP's practice is organised to promote systematic prevention. Additionally, this thesis investigates whether differences exist in the quality of preventive care provided to patients at risk of stroke between those living in deprived versus non-deprived neighbourhoods. Because other studies have indicated that patients in deprived areas have a higher risk of not receiving appropriate screening for cervical cancer and breast cancer, we investigated whether the same applies to stroke prevention provided by GPs to patients at risk of stroke. Also investigated was the feasibility of applying a case-control method to assess the effect of guideline adherence for stroke prevention on the occurrence of stroke in general practice, reporting particularly on the role of 'confounding by indication'. Finally, to support GPs and give them the opportunity to systematically assess the quality of stroke prevention in their own practice environment, we developed a practice-based audit method and instrument. The feasibility of this audit method in practice is explored in a pilot study, the results of which are presented in this thesis.

Chapter 1 of this thesis is an introductory chapter. It describes the concept of 'avoidable mortality' (i.e. adverse health events that could be prevented by timely and appropriate medical care), discusses the existing and recommended preventive strategies in primary care, and the importance of practice organisation necessary to deliver systematic stroke prevention to patients at risk of stroke in general practice. A brief introduction is given to the concept of quality of care, and the development and implementation of systematic quality assurance and improvement strategies in general practice that support systematic cardiovascular disease (CVD) prevention. Finally, the last section summarises the specific objectives of the different studies and provides an outline of this thesis.

In **Chapter 2** we investigated the quality of care in stroke prevention in general practice and its relationship with the occurrence of stroke. Based on practice guidelines of the Dutch College of General Practitioners, a panel of experts performed a retrospective case-based audit with guideline-based review criteria and final judgement of sub-optimal care. In total 77 GPs participated in this study, providing information on the delivery of preventive care preceding the occurrence of stroke in 193 stroke patients. It was found that more than half of the stroke patients (n=105) received optimal preventive care provided by their GP. In 45% of the patients, the panellists identified shortcomings in patient care. One third of the patients received sub-optimal care that was judged to have possibly or likely failed to prevent the occurrence of stroke. In the group of patients receiving sub-optimal care, the main areas of sub-optimal care were found in the domain of hypertension control (particularly insufficient quarterly follow-up), and in the assessment of patients' risk profiles for CVD. These aspects of care were frequently not delivered according to the guideline. This study shows that a substantial number of shortcomings in care can be identified. It is expected that improving the quality of care in stroke prevention in general practice will reduce the occurrence of stroke.

In **Chapter 3** we investigated the extent to which recommended aspects of practice organisation necessary for systematic stroke prevention are implemented in practice, as well as how and to what extent these aspects are related to practice and GP characteristics (e.g. practice type, GPs' working hours, employment rate of practice assistant, GPs' gender, and year of medical qualification). Data were collected by means of self-administered questionnaires. Overall, it was found that the implementation of practice organisation for systematic stroke prevention in general practice is moderate to low. Moreover, we observed a large disparity in the implementation levels of the various aspects of practice organisation that support CVD prevention in GP practices. For example, with respect to CVD risk factor recording, GPs by and large did record blood pressure measurements (85%) and

did mark diabetic patients (86%) in their patient records. Nonetheless, keeping a record of patients with an elevated risk of CVD and the patient's smoking status (51%) is done to a much lesser extent. GPs reported that they often did not record the patient's smoking status, even if the patient is known to be a smoker. Furthermore, GPs delegate follow-up visits for treated hypertensive and diabetic patients to the practice assistant in only about 50% of eligible patients. Almost 25% of GPs do not delegate any preventive activities to the practice assistant. Regarding acquaintance with guidelines, half the group of GPs reported to be well informed on stroke-related guidelines, particularly diabetes and hypertension guidelines. In practice, however, compliance with the recommendations described in these guidelines (self-reported) is comparatively low. In this study a significant relationship was found between practice characteristics and GPs' actual recording of preventive activities, information about a patient's risk status, and risk factors and delegation of preventive tasks to the practice assistant. Compared with GPs working part-time or practising in group practices, GPs working full-time or practising in single-handed practices less often record preventive activities, information about a patient's risk status, and risk factors. The same applies for delegation of preventive activities to the practice assistant; GPs in single-handed practices less often delegate preventive activities.

In **Chapter 4** we studied the relationship between aspects of practice organisation relevant for systematic stroke prevention in general practice, and sub-optimal preventive care delivery preceding the occurrence of stroke. To investigate this relationship, results of the audit study were compared with the results of the self-administered questionnaire addressing aspects of practice organisation necessary for systematic stroke prevention (Chapter 3). An important finding of this study is that GPs with a more adequate practice organisation for stroke prevention and higher levels of self-reported compliance with clinical practice guidelines, less often delivered sub-optimal care to high-risk or stroke-prone patients. Record keeping and task delegation to the practice assistant clearly has a positive impact on the quality of the care delivery process: frequent recording and delegation of preventive activities serve to enhance the GP's professional performance (less sub-optimal care). The same applied to compliance with clinical practice guidelines. GPs who reported adherence to more than 75% of the key elements of stroke-related guidelines less often deliver sub-optimal patient care.

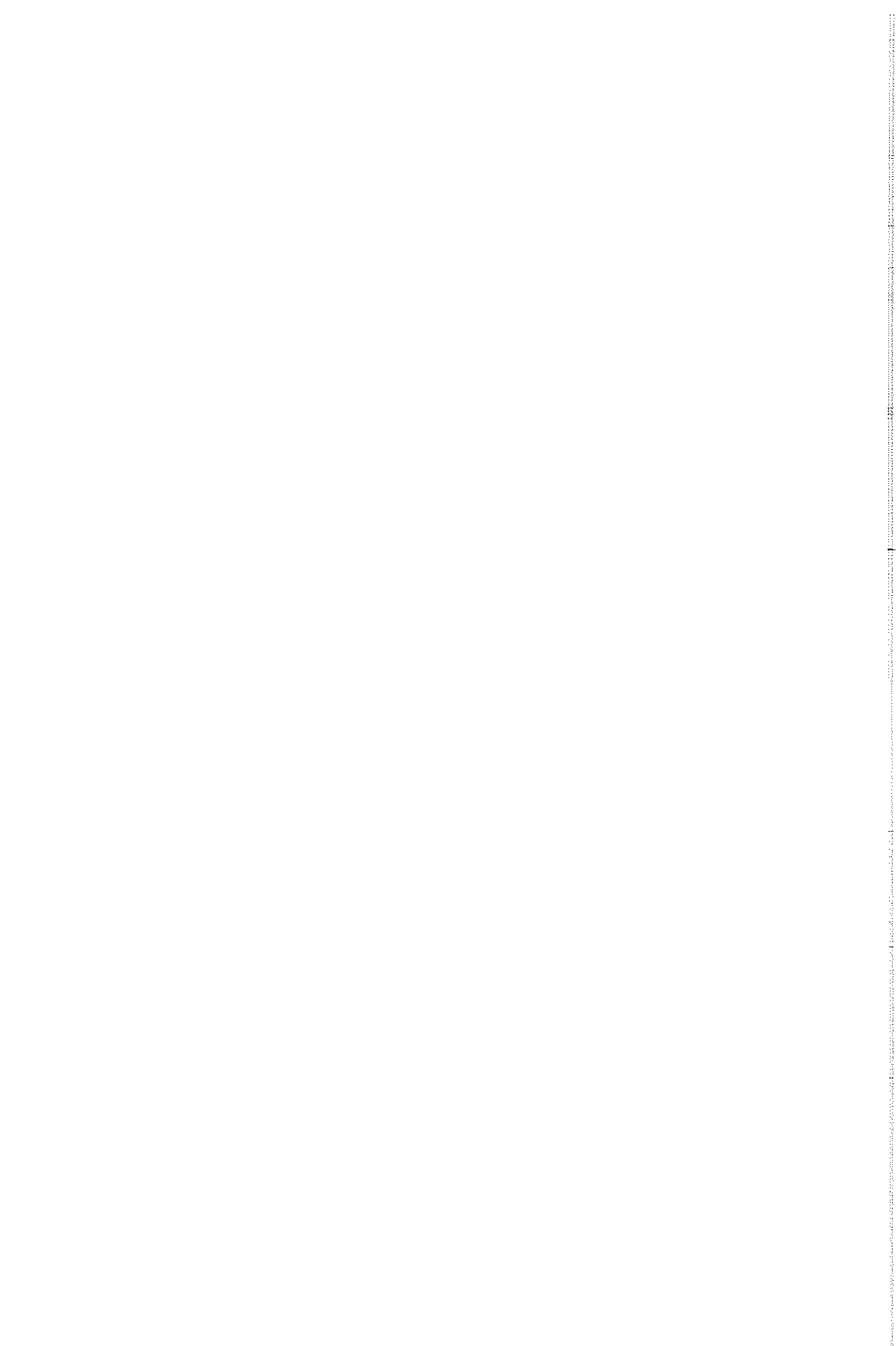
In **Chapter 5** we investigated whether differences exist in the quality of preventive care provided to high-risk or stroke-prone patients living in deprived versus non-deprived neighbourhoods in the Rotterdam region. After adjustment for socio-demographic characteristics, patients in deprived neighbourhoods appeared

to have an increased risk of having received sub-optimal preventive care compared with patients in non-deprived neighbourhoods. This excess risk applied exclusively to women. For women in deprived neighbourhoods who received sub-optimal care, the mean number of deficiencies was almost double that in the corresponding group of patients in non-deprived neighbourhoods. Deficiencies in care were particularly related to the management of hypertension and to the assessment of the patient's risk profile for CVD. The study identified not only variations in preventive care delivery to patients from different socio-economic areas, but also provides insights (e.g. the importance of GP and patient education in CVD prevention) which could function as a starting point to remedy processes and structures that cause such patterns of care.

In **Chapter 6** we describe a case-control study that was conducted to assess the effect of guideline adherence for stroke prevention on the occurrence of stroke in general practice. In this study we focus on the role of 'confounding by indication' in this type of investigation into quality of care, and report on the various obstacles encountered in the design and performance of the study (e.g. recruitment of cases and controls, availability of information on the care delivery process in GP data management systems, and in controlling for differences other than differences in the quality of care). It was found that in specific domains data were incomplete and not readily available in the patient records, hindering GPs in the identification of stroke patients from their patient register. Similarly, information on patients' family history of CVD and lifestyle-related risk factors was often inaccurate and in many cases not available. Strong indications for the existence of confounding by indication were found, albeit different from how it is usually described in the literature. In this study a previously unreported variant of confounding by indication was observed: patients with an adverse health outcome (stroke) received better quality of care. It was concluded that, at present, inaccurate recording of patient and risk factor information by GPs seriously limits the potential use of a case-control method to assess the effect of guideline adherence on disease outcome in general practice. The latter strongly correlates with the current practice of data recording of patient and care processes in general practice.

In **Chapter 7** we investigated the feasibility of a practice-based audit method that aims to give GPs the opportunity to critically and systematically assess the quality of stroke prevention delivered to patients who developed a stroke. The audit method described in Chapter 2 was taken as a starting point to develop a practice-based audit method. In a pilot study among 15 GPs practising in Rotterdam, the method and instrument (manual) were field-tested. All participating GPs appreciated the detailed, comprehensive, and orderly description of the audit

method and instrument (manual). However, it was experienced that at times the manual could be too complex or lengthy, and not always user-friendly. The majority of GPs managed to identify eligible stroke patients, retrieve information on the care process, systematically identify shortcomings in care, and provide a final judgement on the quality of care provided to the patients. However, in more complex patients, i.e. patients with several risk factors for stroke, GPs did not always perform the assessment adequately. GPs also experienced barriers that could limit the feasibility of this type of audit in general practice. For instance, lack of time needed to perform the audit, lack of audit support by persons trained in quality of care assessment, and the labour intensive character of the audit (caused by manual completion and sending forms) were cited as the main impediments. These factors will play an important role in the acceptance and actual application of this form of audit in daily practice. Mechanisms to provide protected time for audit, continued support during audit (e.g. external facilitator or trained colleague), and integration of information technology (electronic audit modules) are important aspects that could further increase the user-friendliness, acceptance, and feasibility of this audit method.



SAMENVATTING

Het cerebrovasculair accident (CVA) in zijn diverse verschijningsvormen is een belangrijke oorzaak voor sterfte en morbiditeit en heeft een grote invloed op de volksgezondheid en de gezondheidszorg in vele westerse landen. Omdat er geen effectieve behandelmethoden zijn voor de meeste vormen van het CVA spelen preventieve interventies een belangrijke rol en bieden zij bij uitstek een aanknopingspunt om de nadelige gevolgen die het CVA heeft te beperken. Preventieve interventies ter voorkoming van het CVA worden in Nederland voornamelijk uitgevoerd in de eerstelijnsgezondheidszorg. Met name de huisarts speelt hierbij een belangrijke rol. Niet alleen vanwege de beschikbaarheid van effectieve preventieve interventies voor patiënten met een verhoogd risico op het CVA (bijv. behandeling van hypertensie), maar ook vanwege de centrale positie die huisartsen in het Nederlands gezondheidszorgsysteem bekleden. Huisartsen hebben in vergelijking tot andere zorgverleners frequent en gedurende een langere periode in het leven contact met hun patiënten. Gezien de belangrijke rol van de huisarts in de preventie van hart- en vaatziekten is het leveren van kwalitatief goede preventieve zorg door huisartsen essentieel om sterfte, ziekte en handicap als gevolg van het CVA te minimaliseren.

Dit proefschrift richt zich op de kwaliteit van zorg ter preventie van het CVA in de huisartspraktijk. De primaire focus ligt op de beoordeling van de kwaliteit van zorg door huisartsen aan patiënten met een verhoogd risico op het krijgen van een CVA. Hierbij is het doel om tekortkomingen in, en vervolgens mogelijkheden tot verbetering van, het preventieve zorgproces te identificeren. Onderzocht wordt in welke mate aspecten van praktijkorganisatie die van belang zijn voor systematische preventie geïmplementeerd zijn in de huisartspraktijk, in welke mate huisartsen richtlijnen voor preventie naleven, en of de aan- of afwezigheid van mogelijke tekortkomingen in de zorg samenhangt met de aan- of afwezigheid van voornoemde aspecten van praktijkorganisatie. Vervolgens wordt nagegaan of er verschillen bestaan in de kwaliteit van de preventieve zorg door huisartsen werkzaam in achterstands- en niet-achterstandswijken. Uit studies is namelijk gebleken dat patiënten in achterstandswijken een grotere kans hebben op slechtere preventieve zorg ten aanzien van bijvoorbeeld borst- en baarmoederhalskanker. Wij hebben onderzocht of hetzelfde geldt voor de kwaliteit van zorg ten aanzien van de preventie van het CVA. Een ander aspect dat nader wordt onderzocht is de bruikbaarheid van het case-control design in het meten van het effect van kwaliteitszorg (zorgproces) op het ontstaan van het CVA (zorguitkomst). Met name

rapporteren wij over de rol van 'confounding by indication'. Om huisartsen de mogelijkheid te bieden zelfstandig in de eigen praktijk de preventieve zorg ter preventie van het CVA te beoordelen hebben wij een praktijkgerichte audit-methode en bijbehorend meetinstrument ontwikkeld. Om de praktische uitvoerbaarheid van deze methode te onderzoeken is een pilotstudie uitgevoerd. De resultaten van deze studie worden in dit proefschrift beschreven.

Hoofdstuk 1 van dit proefschrift is een introductiehoofdstuk. Het beschrijft onder andere het concept van vermijdbare sterfte en morbiditeit (ongunstige zorguitkomsten die voorkomen hadden kunnen worden door adequate en tijdige medische zorg), de aanwezigheid van bestaande en aanbevolen interventies voor de preventie van hart- en vaatziekten in de huisartspraktijk, en de invloed die een adequate praktijkorganisatie heeft op het verlenen van systematische preventie. Daarnaast worden in het kort verschillende kwaliteit-van-zorg- concepten besproken en beschrijven wij de ontwikkeling en implementatie van systematische kwaliteitsbewaking en -bevordering in de huisartspraktijk. In de laatste paragraaf worden de specifieke doelstellingen van de verschillende studies samengevat en wordt een overzicht gegeven van de opzet van dit proefschrift.

In **Hoofdstuk 2** hebben wij de kwaliteit van zorg ter preventie van het CVA en de relatie die zij heeft met het ontstaan van het CVA onderzocht. Aan de hand van richtlijnen van het Nederlands Huisartsen Genootschap (NHG) en daaruit afgeleide criteria voor optimale zorg, werd door een panel van deskundigen een retrospectieve audit uitgevoerd. In totaal namen 77 huisartsen deel aan de audit, hetgeen voor 193 CVA-patiënten gegevens opleverde over de preventieve zorg voorafgaand aan het ontstaan van het CVA. In meer dan de helft van de CVA-patiënten (n=105) werd door de huisarts optimale preventieve zorg aangeboden aan de patiënt. Bij 45% van de CVA-patiënten identificeerde het panel tekortkomingen in de zorg. Echter, bij 31% oordeelde het panel dat de geconstateerde suboptimale zorg mogelijk of waarschijnlijk had bijgedragen aan het ontstaan van het CVA. In de groep patiënten waarbij suboptimale zorg had bijgedragen tot het ontstaan van het CVA bleken tekortkomingen in de zorg voornamelijk betrekking te hebben op de opsporing, behandeling, en follow-up (driemaandelijke bloeddrukcontrole) van hypertensiepatiënten, en de beoordeling van het risicoprofiel voor hart- en vaatziekten bij patiënten met een verhoogd risico op het krijgen van een CVA. Deze zorgaspecten werden regelmatig niet volgens de richtlijn uitgevoerd. De resultaten van deze studie geven aan dat een substantieel aantal tekortkomingen in de preventieve zorg aanwijsbaar is, en dat suboptimale zorg door de huisarts een duidelijk effect heeft op het ontstaan van het CVA.

Aangenomen wordt dat verbetering van de kwaliteit van de preventieve zorg het aantal CVA's zou kunnen reduceren.

In **Hoofdstuk 3** is nagegaan in welke mate relevante aspecten van praktijkorganisatie voor systematische preventie van het CVA aanwezig zijn in de huisartspraktijk, en in hoeverre de aanwezigheid van een adequate praktijkorganisatie samenhangt met praktijk- en huisartskenmerken (bijv. praktijktype, werktijden, aanwezigheid van praktijkassistentie, geslacht, jaar van afstuderen). Gegevens over praktijkorganisatie en praktijk- en huisartskenmerken werden verzameld aan de hand van schriftelijke vragenlijsten. Uit deze studie blijkt dat de praktijkorganisatie van veel huisartsen op een aantal punten ontoereikend is voor de uitvoering van systematische preventie van hart- en vaatziekten. Verschillende aspecten van praktijkorganisatie zijn in wisselende mate aanwezig in de huisartspraktijk. Bijvoorbeeld, in vergelijking met de registratie van bloeddrukbepalingen (85%) en het markeren van patiënten met de risicofactor diabetes mellitus (86%) in het patiëntendossier, markeren huisartsen in mindere mate patiënten met verhoogde kans op hart- en vaatziekten en het rookgedrag van de patiënt (51%). Het rookgedrag van de patiënt wordt door de huisarts in veel gevallen niet geregistreerd, zelfs als blijkt dat de patiënt rookt. Het percentage huisartsen dat vervolgspraken voor patiënten met hypertensie en diabetes patiënten delegeert naar de praktijkassistent is slechts iets meer dan 50%. Bijna een kwart van de huisartsen geeft aan helemaal geen preventieve taken te delegeren naar de praktijkassistent. De helft van de huisartsen geeft aan goed op de hoogte te zijn van de richtlijnen voor preventie, met name de hypertensie en diabetes mellitus richtlijn. Echter, naleving van deze richtlijnen (zelfgerapporteerd) is relatief laag. Een significante relatie werd aangetoond tussen praktijkkenmerken en de wijze van registratie van preventieve activiteiten, risicogroepen en -factoren, en delegatie van preventieve taken. In vergelijking met parttime werkende huisartsen en huisartsen werkzaam in groepspraktijken, registreren fulltime werkende huisartsen en huisartsen werkzaam in solopraktijken preventieve activiteiten, risicogroepen en -factoren minder vaak in hun patiëntendossier. Hetzelfde geldt voor taakdelegatie; huisartsen in solopraktijken delegeren preventieve taken minder vaak naar de praktijkassistent.

In **Hoofdstuk 4** is beschreven in hoeverre de aan- of afwezigheid van verschillende aspecten van praktijkorganisatie samenhangt met de kans op suboptimale preventieve zorg door de huisarts. Om dit te onderzoeken zijn de resultaten uit de audit studie vergeleken met de resultaten van de praktijkenquête uit hoofdstuk 3. Een belangrijke bevinding van deze studie is dat huisartsen met een meer georganiseerde praktijkorganisatie voor systematische preventie van het CVA

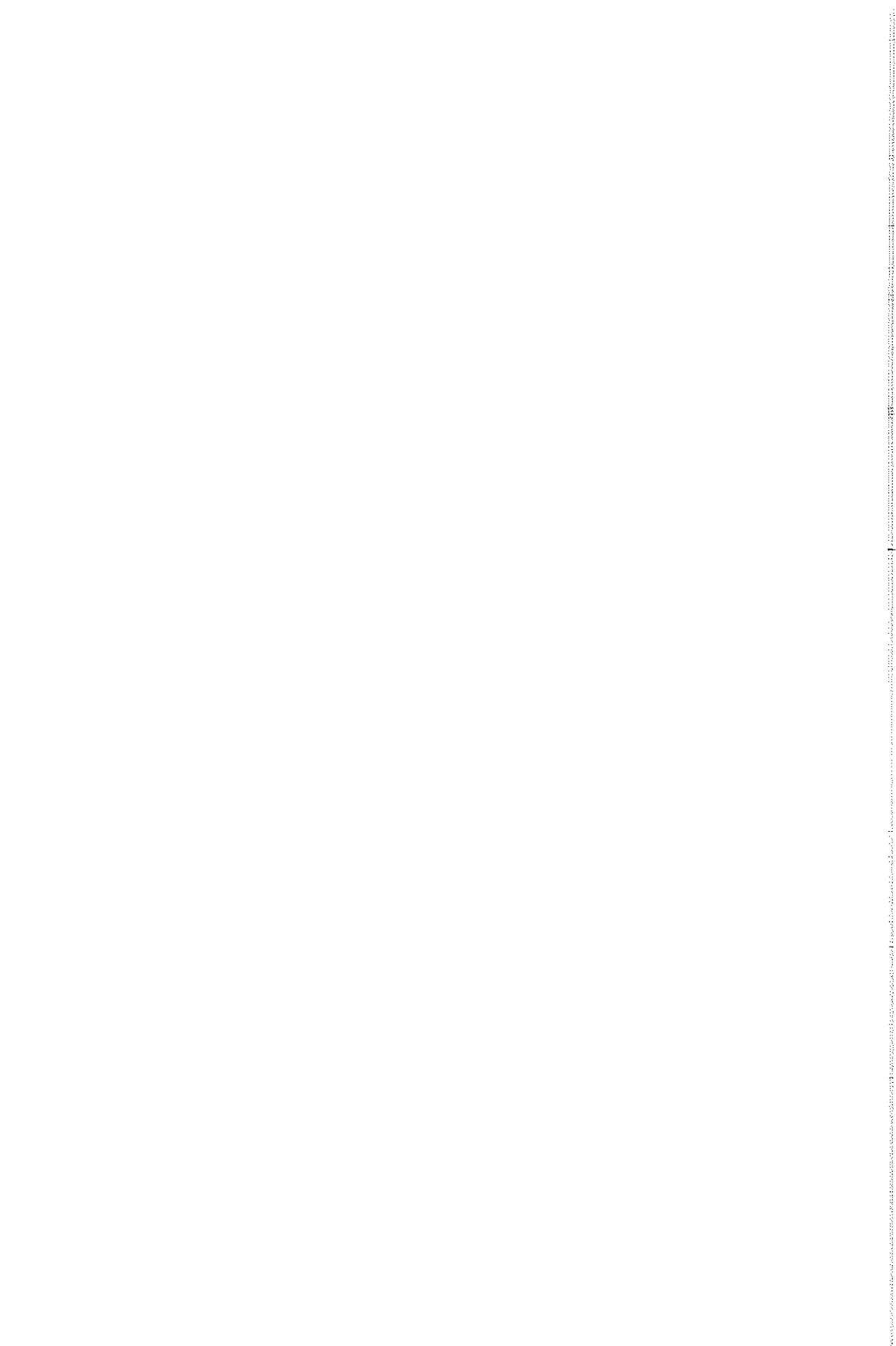
minder vaak suboptimale zorg leveren aan patiënten die later een CVA blijken te ontwikkelen. Registratie van preventieve activiteiten, risicogroepen en –factoren, en delegatie van preventieve activiteiten naar de praktijkassistent, hebben een duidelijk positieve invloed op de kwaliteit van de preventieve zorg. Huisartsen die meer registreren en delegeren leveren minder vaak suboptimale zorg. Hetzelfde geldt voor het volgen van richtlijnen. Huisartsen die aangeven zich in meer dan 75% te houden aan de aanbevelingen uit de richtlijnen voor preventie leveren minder vaak suboptimale zorg.

In **Hoofdstuk 5** wordt nagegaan of er verschillen bestaan in de door de huisarts geleverde preventieve zorg aan patiënten woonachtig in achterstands- en niet-achterstandswijken in Rotterdam en omgeving. Uit dit onderzoek blijkt dit het geval te zijn. Na controle voor sociaal-demografische kenmerken bleek dat patiënten in achterstandswijken bijna een tweemaal zo grote kans hebben op suboptimale preventieve zorg dan patiënten woonachtig in niet-achterstandswijken. Deze grotere kans op suboptimale zorg was hoofdzakelijk van toepassing op vrouwen. In de groep vrouwen woonachtig in achterstandswijken waarbij suboptimale zorg werd geïdentificeerd was het gemiddeld aantal tekortkomingen bijna tweemaal zo hoog als bij de corresponderende groep patiënten in niet-achterstandswijken. De tekortkomingen in de zorg bleken ook hier voornamelijk betrekking te hebben op de opsporing en behandeling van hypertensie en diabetes, en de beoordeling van het cardiovasculair risicoprofiel van de patiënt. Naast het identificeren van variaties in de zorg aan patiënten uit verschillende sociaal-economische buurten, levert onze studie inzichten op die als uitgangspunt kunnen dienen om de processen en structuren die ten grondslag liggen aan voornoemde resultaten gunstig te beïnvloeden.

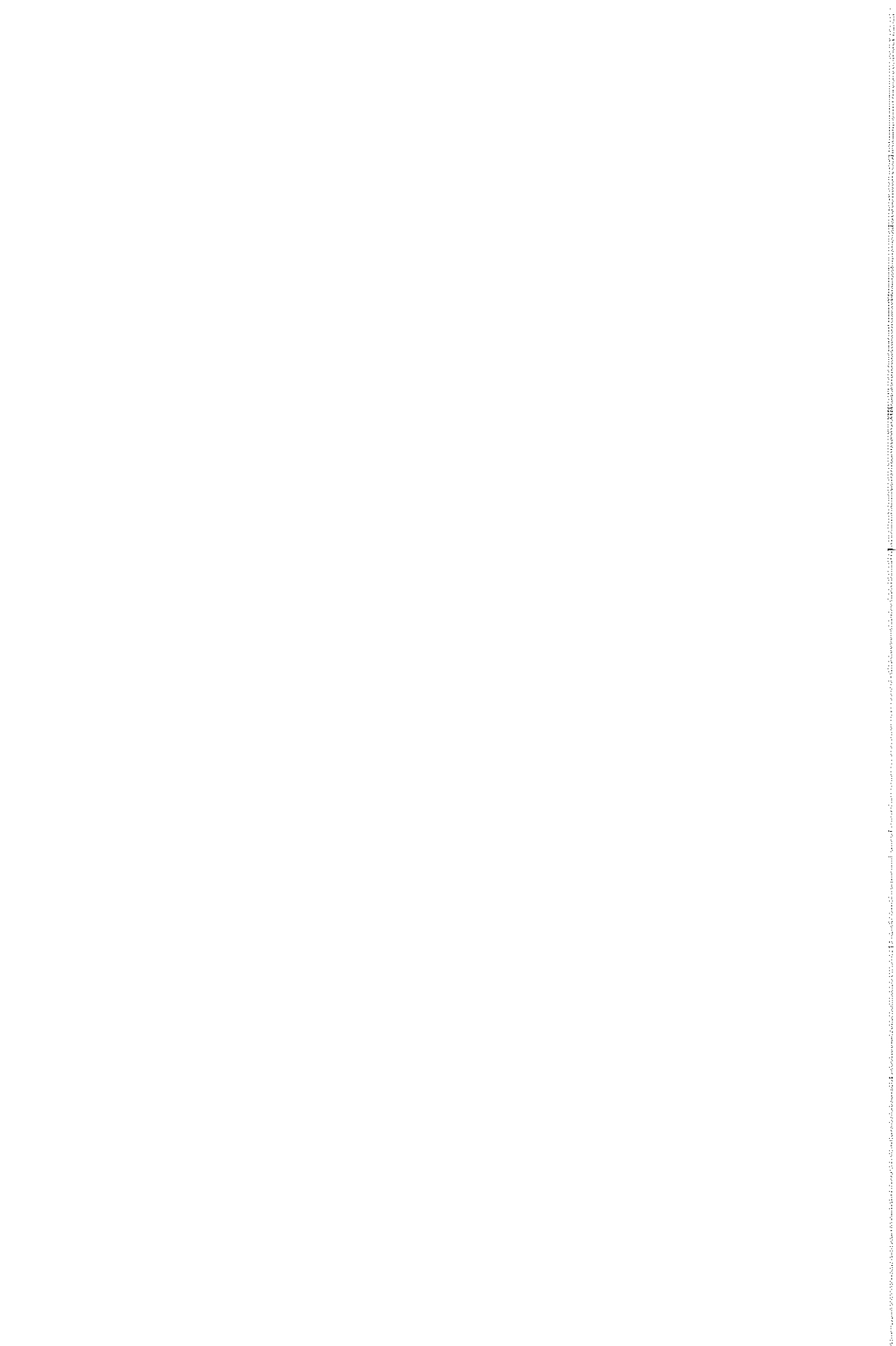
In **Hoofdstuk 6** wordt bestudeerd of het case-control design bruikbaar is voor het meten van het effect van kwaliteitszorg op het ontstaan van het CVA. In deze studie wordt met name gekeken naar de rol van ‘confounding by indication’ in dit type kwaliteit van zorg onderzoek, en rapporteren wij welke problemen wij zijn tegengekomen in de praktische uitvoering van het onderzoek (rekruteren van CVA-patiënten en controlepatiënten, beschikbaarheid van informatie over het zorgproces in het patiëntendossier van de huisarts, controle voor verschillen anders dan verschillen in de kwaliteit van zorg). Dit onderzoek laat onder andere zien dat gegevens die nodig zijn om op adequate wijze CVA-patiënten te kunnen identificeren, veelal niet aanwezig zijn in het patiëntendossier. Daarnaast is anamnestiche informatie over de familie-anamnese met betrekking tot hart- en vaatziekten en risicovolle leefgewoonten van de patiënt onvolledig en in veel gevallen niet aanwezig in het dossier. Duidelijke aanwijzingen werden gevonden

voor het bestaan van confounding by indication, overigens anders dan normaliter beschreven in de literatuur. In deze studie beschrijven wij een nog niet eerder beschreven vorm van confounding by indication, namelijk dat CVA-patiënten betere preventieve zorg krijgen dan patiënten zonder CVA. De conclusie van dit onderzoek is dat het case-control design voor het meten van het effect van kwaliteitszorg op het ontstaan van het CVA in de huisartspraktijk momenteel geen bruikbare onderzoeksmethode is. Dit hangt sterk samen met de wijze waarop op dit moment in de huisartspraktijk patiënten- en zorggegevens worden vastgelegd.

In **Hoofdstuk 7** beschrijven wij een auditmethode waarmee huisartsen eigenhandig de kwaliteit van zorg ter preventie van het CVA kunnen beoordelen. Deze methode is ontwikkeld op basis van de auditmethode beschreven in hoofdstuk 2 en is uitgetest in een pilotstudie onder 15 huisartsen werkzaam in Rotterdam. Alle deelnemende huisartsen waardeerden de gedetailleerdheid, alomvattendheid, en gestructureerde opzet van de auditmethode en bijbehorend meetinstrument (handleiding). Desondanks, waren zij ook van mening dat de handleiding op een aantal punten complex, te uitgebreid, en niet altijd gebruiksvriendelijk was. Het merendeel van de huisartsen bleek in staat te zijn geschikte CVA-patiënten te identificeren, zorggegevens te verzamelen, tekortkomingen in de zorg te identificeren, en een oordeel te geven over de uiteindelijke kwaliteit van de geleverde zorg. Echter, de beoordeling van de zorg aan complexe patiënten, met andere woorden patiënten met meerdere risicofactoren voor het CVA, werd niet altijd op een adequate wijze uitgevoerd. In alle gevallen werd echter wel een definitief oordeel over de geleverde zorg gegeven. Naast voornoemde resultaten werden door de huisartsen belangrijke barrières gerapporteerd die de toepasbaarheid van deze vorm van audit in de huisartspraktijk in de weg zouden kunnen staan. Onvoldoende beschikbare tijd voor audit, geringe ondersteuning door deskundigen gedurende de audit, en een te complexe logistieke procesgang (voornamelijk veroorzaakt door het handmatig invullen en het veelvuldig doorsturen van vragenlijsten en formulieren) waren de voornaamste belemmerende factoren. Deze factoren spelen een belangrijk rol in de acceptatie en feitelijke toepassing van deze vorm van audit in de dagelijkse praktijk. Mechanismen voor het beschikbaar stellen van tijd voor audit, continue ondersteuning gedurende de audit (bijv. door kwaliteits-medewerkers van het NHC, door collegae getraind in audit) en integratie van informatietechnologie (elektronische auditmodules) zijn belangrijke aspecten om de gebruiksvriendelijkheid, acceptatie, en toepasbaarheid van deze auditmethode te vergroten.



APPENDIX

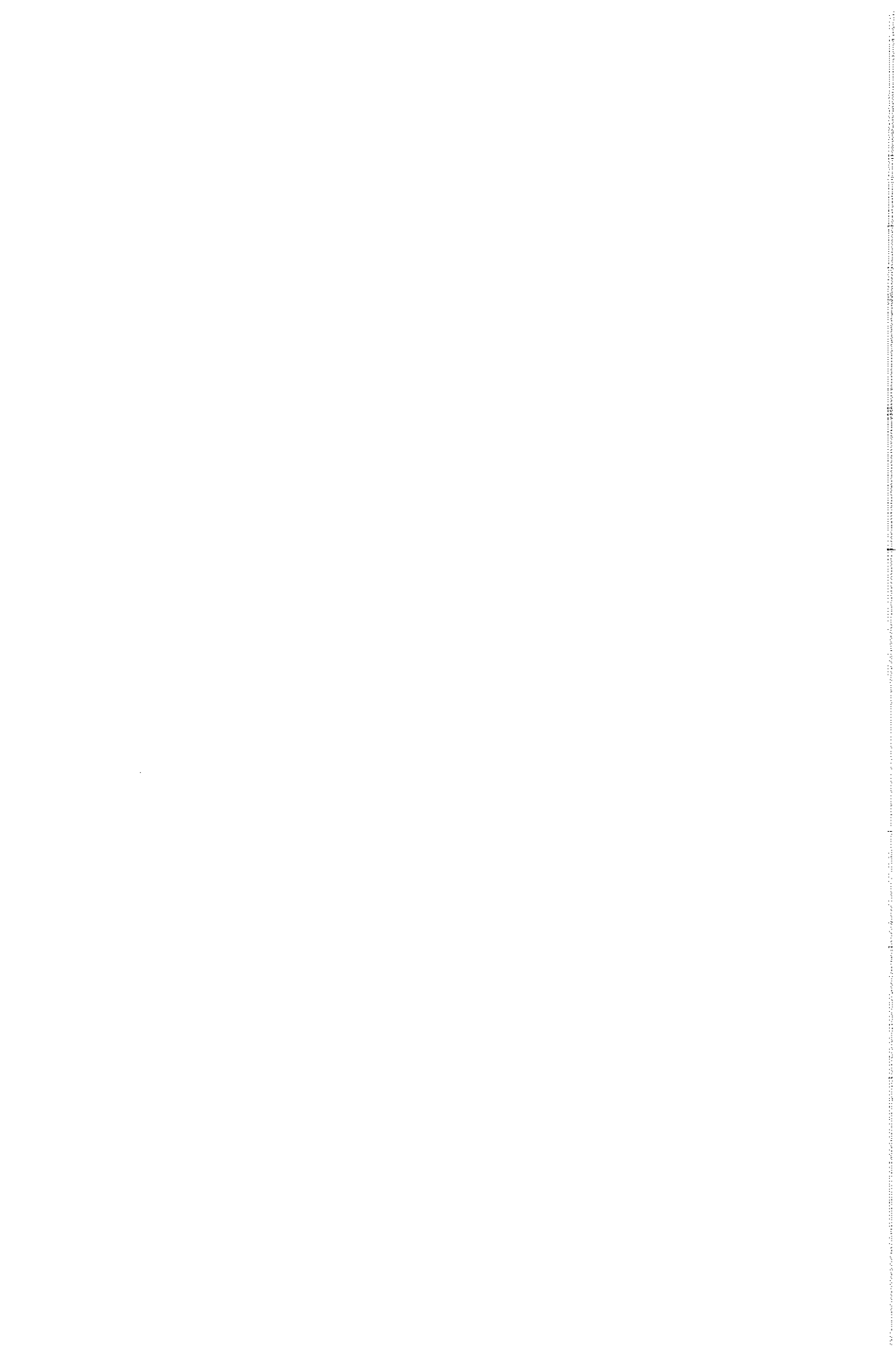




QUALITY OF CARE IN STROKE PREVENTION

USER GUIDE FOR PRACTICE-BASED AUDIT

Department of Public Health
Erasmus MC
University Medical Center Rotterdam



CONTENTS

1. BACKGROUND	156
2. AIM AND STRUCTURE	157
3. USER INSTRUCTIONS	160
4. QUALITY OF CARE ASSESSMENT	160
4.1 Preparation	160
4.2 Pilot	163
4.3 Audit	165
4.4 Plenary session	170
5. REPORT AND PLAN FOR IMPROVEMENT	171
 <u>APPENDICES</u>	
I. PATIENT INCLUSION CRITERIA	173
II. QUESTIONNAIRE	175
III. MEDICAL REVIEW CRITERIA	189
IIIa. Introduction	190
IIIb. Application of medical review criteria	192
IIIc. Set of medical review criteria	197
IV. GRADING FORM	211
IVa. Introduction	212
IVb. Instructions	214
V. CASE SUMMARY FORM	217
Va. Introduction	218
Vb. Instructions	220
VI. CASE EXAMPLES FOR PILOT (not included)	

Note: the page numbers of the appendix have been adapted for this thesis.

1. BACKGROUND

During the 1990s, and certainly after the Leidschendam conference in 1995, the National Association for General Practitioners and the Dutch College of General Practitioners invested substantially in the development and operationalisation of policies to enhance the quality of patient care in general practice. Setting up and implementing quality assurance, improvement and management was, and still is, seen as one of the most interesting and challenging developments in Dutch general practice. Activities to improve quality of care involve the development and implementation of guidelines, dissemination of educational materials, continuous medical education courses, peer review in small groups, practice visits with feedback, and so on.

Presently there is a wide variety of methods available for general practitioners (GPs) to perform quality assessment in daily practice. One of these methods is called clinical audit. It has a long tradition and is important in patient care: it brings together professionals to consider clinical evidence, promote education and research, develop and implement practice guidelines, enhance information management skills, and contribute to better management of resources. All these have the aim of improving the quality of patient care. Clinical audit is a systematic critical analysis of the care delivery process, including the procedures used for diagnosis and treatment, the use of resources and resulting outcome. If the method is based on clinical practice guidelines, and the guidelines are based on scientific evidence, a valid assessment of the health care quality is expected.

Audit into avoidable factors influencing adverse health events allows to study the quality of preventive care preceding the occurrence of an unfavourable health outcome, and to identify shortcomings in the process of care delivery by, for example, a primary care physician. Usually, audit consists of a retrospective assessment of the quality of care on the basis of chart review which focuses predominantly on the process of care delivery. The aim is to identify weaknesses in a particular area of the health care delivery process with a view to remedy them. This commonly applied investigative method is used in various studies on cause-specific mortality and has contributed considerably to the quality of care in maternal, perinatal, and peri-operative care. Although this type of study has attracted considerable attention in recent years, it has rarely been performed in cardiovascular disease prevention. Stroke is a condition that is considered to be largely amenable to medical intervention. It can be prevented because of the availability of validated, safe and effective prevention measures. For example, adequate treatment of hypertension, cessation of cigarette smoking, and alteration of other risk factors amenable to medication, diet, or other interventions (e.g. diabetes, TIA, obesity, excessive alcohol intake) substantially reduce the risk of stroke.

The method described in this manual offers general practitioners the opportunity to assess the quality of preventive care offered to patients who at some time develop a stroke. The manual provides a step-by-step guidance and overview of all audit-related aspects.

2. AIM AND STRUCTURE

Primary and secondary objectives

Primary objective:

- To systematically improve the quality of care related to stroke prevention in general practice

Secondary objectives:

- To improve technical expertise and education
- To make the behaviour of GPs and their colleagues more transparent
- To contribute to personal and professional development
- To enhance participation of GPs in quality of care assessment and improvement
- To contribute to more efficiency in daily practice

Structure

The audit is divided into 5 main sections:

Preparation	Good preparation is essential; this applies to all participants! In the preparation phase, a number of important issues need to be considered. To start with, the audit needs an introduction highlighting the overall aim and general outline. Second, an inventory of GPs who are willing to participate needs to be performed. Third, a group of participants needs to be formed and task allocated.
Pilot	Prior to the audit a pilot is conducted with the aim to, a) familiarise participants with the audit components, and b) identify and if possible clarify ambiguities and solve problems. During the pilot audit the complete audit procedure is performed using two patient samples. At this stage, participants become familiar with and should understand the various audit procedures.
Audit	At time of the audit, the quality of care delivered to patients who have developed a stroke will be assessed. The assessment is based on cases selected by the participants.
Plenary session	During the plenary session, the overall audit results will be presented and participants will discuss the individual cases.
Report writing / Plan for improvement	Report writing and formulating a plan for improvement of care.

Figure 1 gives an overview of the audit method. For each phase, specific activities and the estimated time is indicated. Figure 2 presents an overview of the assessment procedure, indicating the person(s) involved in each phase. The estimated time (in hours) needed for each phase and each participant is given in Table 1.

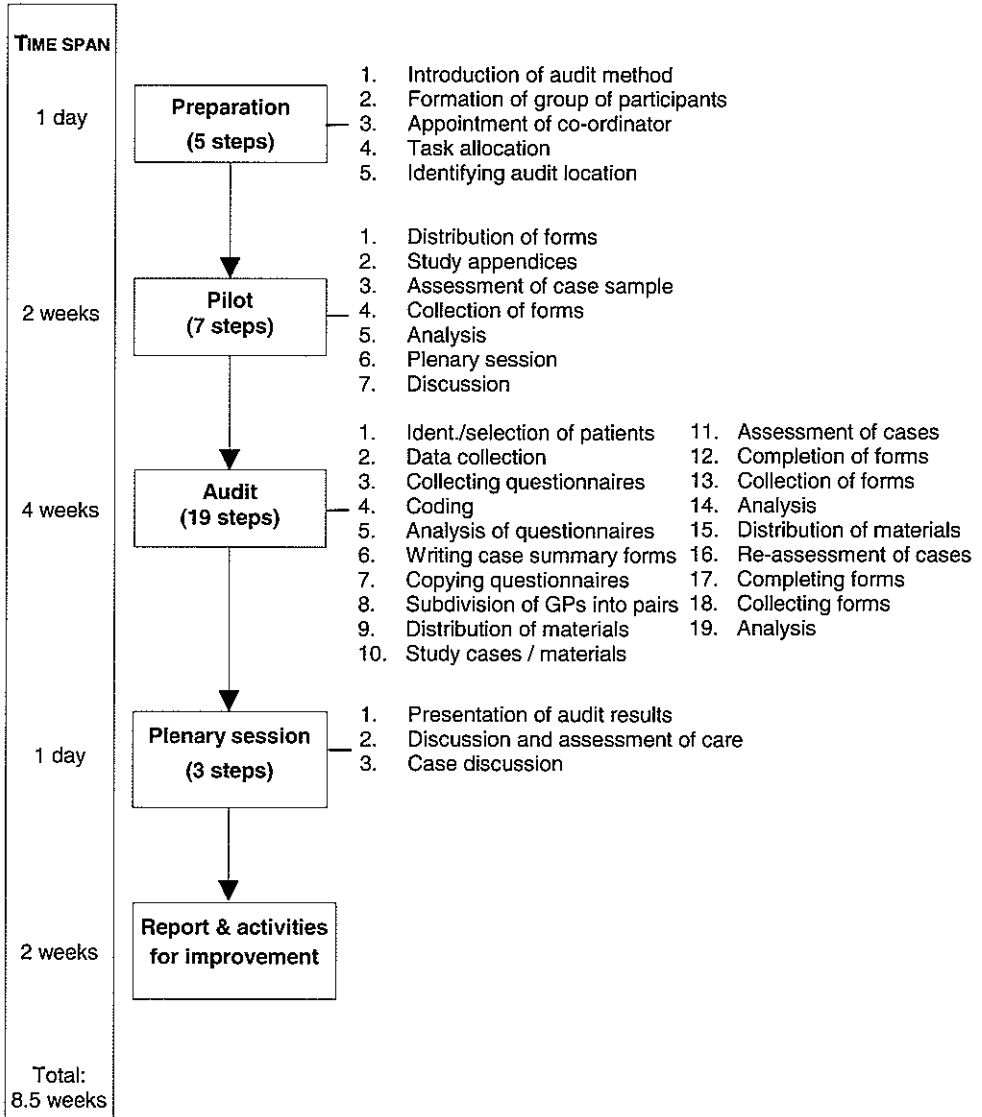


Figure 1. Overview of the audit phases, activities and time allocation.

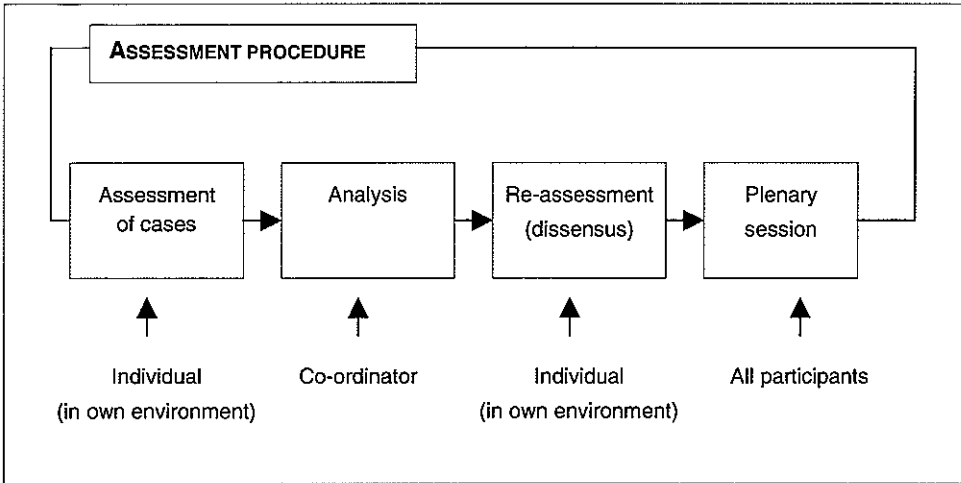


Figure 2. Overview of the assessment procedure.

Table 1. Estimated time (in hours) per stage per participant.

	Preparation	Pilot	Data collection	Audit	Report writing	Plenary session	Total
Participating GPs	2 h	2.5 h	0.5 h	5 h	---	4 h	14 h
Co-ordinator	2 h	3 h	3 h **	5 h	4h	4 h	18 h* 21 h**
Chairman	2 h	1 h	---	---	---	4 h	7 h

Data collection: GP patient records* / hospital administration **

Time allocated for writing report and plan for improvement not included (2 weeks)

A practice team generally consists of 8 GPs. The assumption is that all GPs participate in the audit. Ideally, each GP selects 2 stroke patients for assessment, so that 16 stroke patients will be included. Because the assessment will take place in pairs (i.e. consisting of 2 GPs) each GP will assess a maximum of 4 cases.

During the pilot two representative case samples will be assessed (10 - 15 minutes each) and subsequently discussed. During the plenary session all cases are discussed. The plenary session is expected to take half a day (4 to 5 hours). However, depending on the complexity of the cases, discussions can take longer than expected.

3. USER INSTRUCTIONS

In a step-by-step approach, GPs are instructed when, how and what activities to carry out. The complete audit procedure is presented in a chronological sequence. During the audit process, participants are frequently referred to the appendices I to IV for further instructions or measurement instruments. Therefore, before starting the audit each participant should read the entire manual in order to understand the overall structure and activities.

A number of activities are done individually, either in the office or at home. Tasks that can be completed in your own time are indicated with : 'ASSIGNMENT'.

4. QUALITY OF CARE ASSESSMENT

4.1 PREPARATIONS

In this section, we describe in five steps how general practitioners should prepare themselves for the audit. The audit preparation usually takes place during a regular practice team meeting.

- Introduction of audit to practice team members
- Formation of group of participants
- Appointment of co-ordinator and task allocation
- Appointment of chairman and task allocation
- Audit location

STEP 1 Introduction of audit to practice team members

During a regular practice team meeting the audit is introduced and the following issues need to be addressed:

- Objectives of the audit
- Broad outline of the audit method and activities
- Practical implications

Special attention is given to the practical consequences of the audit. If a GP decides to participate in the audit, it is important to stress that participation means investment of valuable and limited time. If GPs are not aware of the amount of time needed, this increases the risk of drop-outs, delay and loss of audit effectiveness.

STEP 2 Formation of group of participants

Initially, the practice team should decide which members will take part in the audit. All members should be enthusiastic about participating.

Internal versus external candidates

Generally, it is most convenient to select participants from one (own) practice team or group of co-operating GPs. If GPs from other practices do participate, then first consider and discuss any obstacles, concerns or fears with your own team members. You should keep in mind that a quality of care related audit can be seen as threatening e.g. because of fear of exposure, blame, or humiliation.

Inventory

In forming a group of GPs, the most important criterion is that all members are enthusiastic about participating. Secondly, participation should be based on a voluntary decision and free from any form of pressure. It is recommended to keep the same core membership during the complete audit process. A close and coherent group promotes a safe and comfortable environment which encourages participation and critical thinking. Group discussions will then be less complicated and more effective.

Number of participants

Generally, clinical audit sessions in large groups function less well than in small groups. Ideally, the group should comprise 8 to 10 members.

STEP 3 Appointment of co-ordinator and task allocation

Skilful leadership is essential to give confidence and facilitate the group process, and the qualities expected from the co-ordinator are extensive. Often the best choice is to select somebody from your own team (internal), and in many cases this may be the practice manager. Selection of the co-ordinator needs to be based on consensus.

Tasks of co-ordinator

- Support and encouragement
- Perform basic administrative procedures
- Co-ordinate logistic processes during assessment rounds
- Carry out basic statistical analysis
- Facilitate group process (general)

STEP 4 Appointment of chairman and task allocation

Skilful leadership during the plenary session is essential to give confidence and facilitate the group processes. This is easily said, but being a chairman requires extensive personal and professional qualities. In many cases, the choice is made to select somebody from the practice team (internal), and in many cases participants agree to appoint the practice manager (irrespective his/her qualities). There are also good reasons to appoint someone from outside the practice team (see below). Remember, in any case, the selection of the chairman should be consensus based.

Tasks of chairman

- Explain the aims and process of the discussion
- During discussion: keep to time, encourage participants, clarify and summarise
- Maintain basic ground rules of group discussions
- Facilitate suggestions for improvement
- Encourage participants to accept responsibility for initiating change
- Recognise emotion within the group discussion, acknowledge it, allow appropriate expression within the group
- Remain external to the group to avoid unwarranted opinions or collusion with the group during the discussion

Advantages and disadvantages of an external chairman

Advantages	Disadvantages
- Encourages open and active participation	- Could be threatening
- Minimises internal personality clashes	- Could affect existing team dynamics
- Provides safer ambience if there are any feelings of distrust	- Could involve costs
- Possibility to discuss work-related problems/stress	
- Provides someone on whom to offload stress	

STEP 5 Audit location

If possible, use a comfortable room without frequent disturbances from e.g. practice assistants and/or phone calls.

4.2 PILOT

During the pilot the quality of care is based on the two cases presented in Appendix VI: therefore at this stage no patients have to be selected.

STEP 1	Distribution of forms to participating GPs (responsibility: co-ordinator)	
---------------	-------------------------------------------------------------------------------------	--

- Blank case summary forms (2x)
- Blank grading forms (2x)

STEP 2	Study Appendix III (responsibility: all participants)	ASSIGNMENT
---------------	-----------------------------------------------------------------	-------------------

- Medical review criteria
- Application of review criteria
- Grading form
- Filling in grading form
- Case summary form
- Filling in case summary form

STEP 3	Assessment of case samples (responsibility: participating GPs)	ASSIGNMENT
---------------	--------------------------------------------------------------------------	-------------------

Assessment of two case samples using the instructions you have studied in step 2. The two case samples are presented in Appendix VI. The assessment is done individually (in the office or at home), and during the assessment you have to complete the grading and case summary form.

STEP 4	Collection of grading forms and case summary forms (responsibility: co-ordinator)	
---------------	---------------------------------------------------------------------------------------------	--

After you have finished the assessment of both cases (completion of grading and case summary form), the forms should be sent/given to the co-ordinator. Agree on a deadline for submission.

STEP 5	Analysis (responsibility: co-ordinator)	ASSIGNMENT
---------------	---------------------------------------------------	-------------------

Analysis of grading forms and case summary forms. Make a brief overview of the following:

- Results of application of review criteria
- Allocation of grades
- Inconsistencies in completing grading forms and case summary forms

STEP 6	Plenary session (responsibility: all participants)
---------------	---------------------------------------------------------------

- During the plenary:
- discussion of two sample cases
 - identify and clarify uncertainties/ambiguities
 - identify and remove potential obstacles

Protocol for plenary session

- Co-ordinator presents pilot audit results
- Discussion of experiences
- Plenary discussion of sample cases:
 - Chairman introduces the cases
 - Exchange of shortcomings in care
 - Consensus decision on grading
 - Documentation of comments by chairman (or appointed person)

STEP 7	Discussion and agreement on final procedure (responsibility: all participants)
---------------	-------------------------------------------------------------------------------------------

After the pilot, all steps in the entire audit procedure need to be clearly understood by all participants. At this stage, a final procedure for the following steps have to be established. Clarify ambiguities and solve possible obstacles or disagreements!

Important issues for discussion:

- Choice of method for patient identification
- Patient inclusion criteria

4.3 AUDIT

The following steps should be followed:

STEP 1	Identification and selection of patients (responsibility: co-ordinator and participating GPs)
---------------	----------------------------------------------------------------------------------------------------------

Identification of patient can be done in two ways. These methods are described under **OPTION I** and **II**.

→ **OPTION I) Identification and selection of stroke patients from the GPs' patient records (Step 1A only).**

This is by far the easiest option. Identification and selection of suitable stroke patients can be done by the practice assistant or the GP. Generally, this process will not involve too much time, especially if your data management system is up-to-date. To obtain a representative sample, patients need to be selected at random. Although there are different approaches for randomisation, the following method is to be advised. First, identify three to four stroke patients in your patient administration system (time needed for identification depends on how your patient management system is organised). It is advised to delegated this task to the practice assistant. From the selected patients cards, the GP selects (blinded) two cases. If you have not had two stroke patients during the last year, it will not be possible to make a random selection.

STEP 1^A	Select at least 'two patients' who have had a stroke during the last year (responsibility: participating GPs)
---------------------------	--------------------------------------------------------------------------------------------------------------------------

- 1) Select patients from patient records (hand-written or electronic record)
or,
- 2) Select patients based on your memory (only if the selection method under 1 is not possible)

→ **OPTION II) Identification and selection of stroke patients from the hospital medical administration (Step 1B1 to 1B4)**

Stroke patients who have been referred to hospital for further investigation and treatment can be identified and selected here. It is important to know which hospital your patients are usually referred to. Check with your colleagues. Selection of stroke patients from the hospital requires involvement of specialists and other hospital administrative personnel. Such co-operation is not always easy, and will most likely depend on the quality of your working relationship with the specialists in that hospital. If you decide to select patients from the hospital, limit this to only one or two. If GPs have to select patients from different hospitals, the possibility arises that one hospital may agree to participate and the other not. Case recruitment will then be incomplete. Good working relationships with medical specialists in the hospital is important in your decision to use this method of patient recruitment. The advantage of selecting patients from the referral hospital is that this minimises the risk of selection bias.

STEP 1⁸¹ Contact specialist and / or administrative staff at neurology department
(responsibility: co-ordinator)

STEP 1⁸² Identification of stroke patients
(responsibility: co-ordinator / neurologist / administrative staff)

In collaboration with either the neurologist or administrative staff, identify at least two stroke patients that have been referred by GPs participating in the audit. If two stroke patients are identified, check whether these stroke patients conform with the inclusion criteria (Appendix 1). Verification is done directly after identification. If the stroke patient does not conform with the criteria, a new stroke patient should be selected immediately.

STEP 1⁸³ Copy the patients' discharge letter
(responsibility: co-ordinator / administrative staff)

After selecting two stroke patients, copies are made of the patients' discharge letters.

STEP 1⁸⁴ Distribute patient information to the GPs
(responsibility: co-ordinator)

Discharge letters are given to the GPs. Based on the patients' names the GPs are now able to identify and take out the patients' record card.

STEP 2 Data collection
(responsibility: participating GPs)

Following the instructions in Appendix IV, GPs have to complete the questionnaire. Use the patient record (hand-written patient card or electronic record). It is important to provide detailed answers to the questions.

STEP 3 Collecting questionnaires
(responsibility: participating GPs / co-ordinator)

All questionnaires are returned to the co-ordinator.

STEP 4 Coding
(responsibility: co-ordinator)

The co-ordinator assigns codes or numbers to each questionnaire.

STEP 5 Examination of questionnaires by the co-ordinator
(responsibility: co-ordinator)

ASSIGNMENT

The co-ordinator examines all questionnaires for inconsistencies and/or completeness. If questionnaires are not completed correctly, the GPs are asked to correct inconsistencies or complete unanswered questions.

STEP 6 Writing case summary forms (responsibility: co-ordinator) ASSIGNMENT

After collecting all questionnaires, for each case the co-ordinator completes a case summary form. A case summary form provides a broad outline of the patients and the care that the patient received. This overview is necessary during the individual assessment as well as during the plenary session. It provides a quick overview (see Appendix V).

STEP 7 Copy of questionnaires and case summary forms (responsibility: co-ordinator)

Since all cases will be assessed by two GPs, copies need to be made.

STEP 8 Subdivide GPs into pairs (responsibility: co-ordinator)

Because each case is assessed by two GPs, the co-ordinator divides the GPs into working pairs.

STEP 9 Distribution of materials (responsibility: co-ordinator)

All cases are distributed to the GPs. Each pair of GPs receives approximately 4 cases. Important: GPs should not assess their own patients! GPs receive 4 questionnaires and the corresponding case summary forms.

STEP 10 Study cases and materials for assessment (responsibility: participating GPs) ASSIGNMENT

Before starting your quality of care assessment, review the patient information and set of review criteria.

STEP 11 Assessment of cases (responsibility: participating GPs) ASSIGNMENT

Important: cases are assessed individually within your own environment (office or at home). There is no contact between the GPs and no discussions about the case assessment.

STEP 12 Completing the grading form (responsibility: participating GPs) ASSIGNMENT

For each case, a grading form has to be completed in as much detail as possible. If grading forms are completed correctly, they provide a clear picture of which specific aspects of care were sub-optimal, including severity of sub-optimal factors in care, domain of responsibility, grade and availability of information.

STEP 13 **Collecting the grading forms**
(responsibility: participating GPs)

After you have finished the assessment and completed the grading forms, return the grading forms to the co-ordinator (keep the questionnaire!).

STEP 14 **Analysis of grading forms**
(responsibility: co-ordinator)

ASSIGNMENT

Completed grading forms are examined by the co-ordinator. The co-ordinator checks whether the pair of GPs has reached consensus on the cases they assessed (together). The decision as to whether or not consensus was reached is based on the final grade only (0, 1, 2, and 3).

*If there is agreement on the final grade (consensus), the final score is established!
For cases where no agreement was reached, a second assessment is done.*

STEP 15 **Distribution of materials**
(responsibility: co-ordinator)

Copies are made of completed grading forms of cases where no agreement was reached on the final grade. For each case, two copies of the completed grading form together with two new grading forms are provided to the GPs who assessed the cases (i.e. now you should have received a copy of your own grading form and that of the other GPs you performed the assessment with).

STEP 16 **Re-assessment**
(responsibility: participating GPs)

ASSIGNMENT

(There is no agreement on the final grade). Now you are asked to re-assess the case taking into consideration the information provided on the grading form by the other GP. The question you have to answer is: 'in the light of the arguments used by the other GP, could you reconsider your own judgement?' Again, there is no contact between the GPs and no discussions about the case assessment.

STEP 17 **Completing grading forms**
(responsibility: participating GPs)

ASSIGNMENT

After reconsideration, both GPs complete a new grading form, irrespective of whether or not they have changed their judgement.

STEP 18	Collection of grading forms (responsibility: participating GPs and co-ordinator)
----------------	---------------------------------------------------------------------------------------------

Completed grading forms have to be returned to the co-ordinator.

STEP 19	Analysis (responsibility: co-ordinator)
----------------	----------------------------------------------------

ASSIGNMENT

Completed grading forms are examined by the co-ordinator. The co-ordinator checks whether the GPs reached consensus on cases they have assessed (as a pair). The decision as to whether or not consensus was reached is based on the final grade only (0, 1, 2, and 3)

1. If there is agreement on the final grade, the final score has been established.
2. If, after re-assessment, a difference in grade still exists but the difference is 1 (not more than one), the lowest grade will count. No further discussion is needed.
3. If, after re-assessment, a difference in grade still exists and the difference is more than 1, the case(s) will be further discussed during the plenary session.

4.4 PLENARY SESSION

Important: GPs are requested to bring all audit materials, including all completed grading forms!

STEP 1	Presentation of audit results (responsibility: co-ordinator)
---------------	-------------------------------------------------------------------------

During the plenary session, the co-ordinator presents an overview of the audit results. The following results should be included:

- Overview of the complete audit process (problems and successes)
- Percentages of consensus / dissensus after first and second assessment round
- (differences in grades)
- Final grades 0, 1, 2, and 3
- Overview of aspects of sub-optimal care
- Main bottlenecks in care delivery
- Brief discussion and feedback

STEP 2	Discussion and assessment of care (cases with no agreement on final grade) (responsibility: all participants)
---------------	--------------------------------------------------------------------------------------------------------------------------

The cases for which the GPs did not reach an agreement on the final grade will be discussed first. Each case is introduced by the chairman who briefly describes the area of conflict. Arguments for sub-optimal care will then be exchanged by other GPs, and efforts made to reach consensus. The discussion (per case) should not take longer than 15 minutes. Through a voting-by-hand procedure a final decision is made (grade 0, 1, 2, or 3). Comments need to be documented by the chairman or by someone appointed for this task. These comments can be used in a later stage to see whether improvements have been made in patient care.

STEP 3	Discussion of cases (cases with agreement on the final grade) (responsibility: all participants)
---------------	-------------------------------------------------------------------------------------------------------------

Discussion of cases where there was agreement on the final grade. As before, each case is introduced by the chairman who provides a brief case introduction and assessment report. Thereafter, participants discuss the case, and see whether they agree with the assessment of care and final grade. Finally, experiences are shared and conclusions made on the audit in its entirety.

5. REPORT AND PLAN FOR IMPROVEMENT OF CARE

After completing the audit procedure, the co-ordinator writes a short audit report that focuses on:

- Overall experience of performing guideline-derived case-based audit in general practice
- Audit results
- Main areas of sub-optimal care delivery conclusions
- Planned actions for improvements

The audit results with respect to the quality of patient care, successes and failures, should be described in detail. These findings and conclusions function as a starting point for future quality improvement actions, described in the last chapter of the report. A clear picture of the existing problems in the delivery of health care services in your practice and an understanding of their origin, enables GPs to take remedial action and direct efforts to improve care.

KEY REFERENCES

- Agency for Health Care Policy and Research. Using clinical practice guidelines to evaluate quality of care. (AHCPR Publication no. 95-0045) ed. Rockville, MD, 1995.
- Walshe K. Adverse events in health care: issues in measurement. *Qual Health Care* 2000;9:47-52
- Westcott R, Sweeney G, Stead J. Significant event audit in practice: a preliminary study. *Fam Pract* 2000;17:173-9.
- Rutten GEHM, Thomas S. NHG-Standaarden voor de huisarts (Dutch College of General Practitioners' guidelines). Utrecht: NHG; 1993.
- Geijer RMM, Burgers JS, Van der Laan JR, Wiersma TJ, Rosmalen CFH, Thomas S. NHG-Standaarden voor de huisarts (Dutch College of General Practitioners' guidelines). Utrecht: NHG; 1999.



APPENDIX I

PATIENT INCLUSION CRITERIA

PATIENT INCLUSION CRITERIA

- Diagnosis of intracerebral haemorrhage or infarction according to the WHO definition*
- Patient aged 39 to 80 years
- Occurrence of stroke less than 1 year ago
- Stroke caused by cardio- and/or cerebrovascular disease and not by trauma, infection or malignancy
- Registration of patient with the local GP for not less than two years
- Patient was not living in a nursing home during the two-year period prior to the stroke.

* A neurological deficit of sudden onset with signs compatible with a vascular lesion, with symptoms that are present for more than 24 hours, caused by cardiovascular disease and not by trauma, infection or malignancy.

APPENDIX II

QUESTIONNAIRE

QUESTIONNAIRE

Instructions:

Before completing this questionnaire, please make sure that the patient you have selected complies with the inclusion criteria mentioned in Appendix I of the manual.

Important, all questions have to be answered unless indicated otherwise. It is indicated in the questionnaire if you do not have to answer a particular question (continue to question.. / section..). Questions are often related to specific processes of care, e.g. blood pressure measurements and consequent medication, within a certain period of time. It is important that you record all blood pressure measurements within that specific time frame accurately. If you do not know the exact date on which you have taken a particular blood pressure measurement, you need to make a close estimation. The same applies to all other questions requesting such detailed information. For a number of questions, more than one answer can be given (see below).

Section I	None	Section V	(question 4, 6)
Section II	None	Section VI	(question 3, 9)
Section III	(question 5, 8, 11)	Section VII	(question 8)
Section IV	(question 5, 10)	Section VIII	(question 4)

I. Patient characteristics and stroke

1. **Sex**
2. **Age**
3. **When did the first symptoms manifest?**
4. **At time of the stroke, which physician made the diagnosis?**
5. **What were the symptoms? (Please use simple language, no medical terminology such as aphasia)**

- Male
- Female

___ years

__ / __ / ____
day month year

- Own GP
- Locum
- Other GP
- None
- Unknown

II. Course of stroke

1. **In connection with the stroke, has the patient been referred to a neurologist?**
2. **With respect to patient's referral, did any problems occur (e.g. miscommunication, accessibility of hospital, waiting list, etc)?**
3. **In connection with the stroke, has the patient been admitted to hospital?**

- Yes
- No
- Unknown

Yes, what were the problems:

- No
- Unknown

- Yes
- No
- Unknown

- 4. After the occurrence of stroke, has a CT- or MRI-scan been obtained?
- 5. Did the patient have a first-ever stroke?
- 6. If yes, when did the first-ever stroke occur?
- 7. According to your knowledge, does the patient have any neurological sequelae?
- 8. Has the patient died?

Yes, what was / were the results:

- No
- Unknown

Yes (continue to question 7)

- No
- Unknown

Date: __ / __ / __

Unknown

Yes, i.e.

- No
- Unknown

Yes, date: __ / __ / __

- No
- Unknown

IMPORTANT...!

The following questions refer to the two-year period
prior to the occurrence of the stroke

¹Time period: __ / __ / __ to __ / __ / __

¹The assessment of care is done for a period of two years preceding the occurrence of the stroke. Depending on the answer provided to question 3, part 1, (when did the first symptoms manifest?), fill out a date of two years earlier. For example: on July 3rd, 2001 the patient had a stroke. The period of assessment will be from July 3rd 1999 to July 3rd 2001.

III. Risk factors for stroke

1. Did the patient have a positive family history (<60 years of age) for cardiovascular disease?
2. Did the patient have excess body weight?
3. Have you calculated the Quetelet Index (kg/m²)?
4. Have you provided any weight control intervention?
5. What intervention(s) did the patient receive? (multiple answers possible)
6. Did the patient have an excessive alcohol intake (> 2 glasses per day)?
7. If yes, did the patient receive any intervention(s) to reduce his/her alcohol intake?

- Yes, confirmed on __ / __ / ____
- No
- Unknown

- Yes,
 - little overweight
 - lot overweight

If measured: ____kg / ____height

- No (continue to question 6)
- Unknown (continue to question 6)

- Yes
- No
- Unknown

- Yes
- No
- Unknown

- Choosing or setting target weight
- Nutritional diary
- Dietary advice
- Diet sheet
- Referral to dietician
- Referral to specialist organisation
- Other:

- Yes, since __ / __ / ____
- No (continue to question 9)
- Unknown (continue to question 9)

- Yes
- No
- Unknown

8. What interventions did the patient receive?
(multiple answers possible)

- Recording intake and feedback
- Alcohol prescriptions
- Information sheet on alcohol abuse
- Referral to alcohol addiction centre
- Other:

9. Preceding the occurrence of stroke, did the patient smoke?

- Yes
 - light
 - moderate
 - heavy

___ cigarettes / cigars / pipe per day

- No (continue to section IV)
- Unknown (continue to section IV)

10. Did the patient receive any smoking cessation intervention(s)?

- Yes
- No
- Unknown

11. What interventions did the patient receive?

- Own recording of number of cigarettes / cigars / pipes
- Smoking restrictions
- Information sheet
- Referral
- Other:

IV. Hypertension

1. According to your knowledge, did the patient have hypertension prior to the two-year period preceding the occurrence of stroke? (Note: the period referred to in this question is the period prior to the two years preceding the occurrence of stroke).

2. If yes, what (non)pharmacological treatment did the patient receive?

3. Did the patient come to visit you during the two years preceding the occurrence of stroke?

4. During this period, did you take blood pressure measurements?

5. Please enter all blood pressure measurements taken during this period (two years preceding the occurrence of stroke) and prescribed antihypertensive medication

6. Did you establish the diagnosis hypertension for the first time in this period?

7. Did you detect a heart murmur?

- Yes, since __ / __ / ____
- No (continue to question 3)
- Unknown (continue to question 3)

- Yes
- No (continue to section V)
- Unknown (continue to section V)

- Yes
- No (continue to question 6)
- Unknown (continue to question 6)

(enter readings on last page of the questionnaire)

- Yes
- No (continue to question 11)
- Unknown (continue to question 11)

Yes (description & date)

(date) __ / __ / ____

- No
- Unknown

8. Did you detect an irregular pulse?

Yes, (description & date)

(date) __ / __ / __

No

Unknown

9. Did the patient receive dietary advice (e.g. Na/K intake)?

Yes, (description & date)

(date) __ / __ / __

No

Unknown

10. Based on the results of the blood pressure measurements, which laboratory tests were done?

Test	Date	Results/medication
Glucose	__ / __ / __	
Cholesterol	__ / __ / __	
Creatinine	__ / __ / __	
Protein in fasting urine	__ / __ / __	
ECG (suspected heart failure)	__ / __ / __	

11. In case the patient had hypertension, who had treatment responsibility?

GP

Specialist

Shared care

V. Diabetes mellitus

1. According to your knowledge, did the patient have diabetes mellitus prior to the two-year period preceding the occurrence of stroke? (See question 1, section IV)

Yes, since __ / __ / __

No (continue to question 3)

Unknown (continue to question 3)

2. If yes, what (non)pharmacological treatment did the patient receive?

- 3. During this period, did you measure the patient's blood glucose level?
- 4. Please enter all blood glucose measurements during this period (i.e. two years preceding the occurrence of stroke) and prescribed medication
- 5. Did you establish the diagnosis diabetes mellitus II for the first time in this period?
- 6. Which laboratory tests were done in the two-year period preceding the occurrence of stroke?

- Yes
- No (continue to question 5)
- Unknown (continue to question 5)

(enter readings on the last page of the questionnaire)

- Yes
- No (continue to section VI)
- Unknown (continue to section VI)

Test	Date	Results/medication
Glucose	__ / __ / __	_____
Cholesterol	__ / __ / __	_____
Creatinine	__ / __ / __	_____
Protein in fasting urine	__ / __ / __	_____
ECG (suspected heart failure)	__ / __ / __	_____

- 7. In the year preceding the occurrence of stroke, did you inspect the patient's feet?
- 8. Has the patient been referred to an eye specialist during the two-year period preceding the occurrence of stroke?
- 9. During this period, has the patient been referred to an internist?
- 10. During this period, has the patient been referred to a dietician?

- Yes
- No
- Unknown
- Yes
- No
- Unknown
- Yes
- No
- Unknown
- Yes
- No
- Unknown

VI. Transient Ischaemic accident (TIA)

- | | |
|---------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Did the patient have a TIA(s) prior to the two-year period preceding the occurrence of stroke? | <input type="checkbox"/> Yes
<input type="checkbox"/> No (continue to question 3)
<input type="checkbox"/> Unknown (continue to question 3) |
| 2. Did the patient receive pharmacological treatment for stroke prevention? | <input type="checkbox"/> Yes
<input type="checkbox"/> No
<input type="checkbox"/> Unknown |
| 3. Did the patient have a TIA in the two-year period preceding the occurrence of stroke? | <input type="checkbox"/> Yes, on __/__/__, __/__/__
<input type="checkbox"/> No (continue to section VII)
<input type="checkbox"/> Unknown (continue to section VII) |
| 4. Based on the manifestation of TIA, was an echocardiogram performed? | <input type="checkbox"/> Yes
<input type="checkbox"/> No
<input type="checkbox"/> Unknown |
| 5. Consequently, has the patient been referred to a specialist? | <input type="checkbox"/> Yes
<input type="checkbox"/> No (continue to question 8)
<input type="checkbox"/> Unknown (continue to question 8) |
| 6. If yes, has a DUPLEX-scan been made? | <input type="checkbox"/> Yes
<input type="checkbox"/> No
<input type="checkbox"/> Unknown |
| 7. If yes, has a Carotid endarterectomy (CEA) been done? | <input type="checkbox"/> Yes
<input type="checkbox"/> No
<input type="checkbox"/> Unknown |
| 8. Has pharmacological treatment been started to prevent recurrence of stroke? | <input type="checkbox"/> Yes
<input type="checkbox"/> No
<input type="checkbox"/> Unknown |
| 9. If yes, what treatment? (multiple answers possible) | <input type="checkbox"/> Aspirin
<input type="checkbox"/> Clopidogrel
<input type="checkbox"/> Dipyridamol
<input type="checkbox"/> Coumarin |

VII. Other conditions prior to stroke

1. Does the patient have a heart disease or other corvitiium?

Yes,

(date) __ / __ / ____

No

Unknown

2. Does the patient have arrhythmia?

Yes,

(date) __ / __ / ____

No

Unknown

3. Does the patient have an ischaemic heart condition?

Yes,

(date) __ / __ / ____

No

Unknown

4. Does the patient have angina pectoris?

Yes, established diagnosis

__ / __ / ____

No

Unknown

5. Does the patient have heart failure?

Yes, established diagnosis

date: __ / __ / ____

No

Unknown

6. Does the patient have peripheral vascular disease?

Yes, established diagnosis

date: __ / __ / ____

No

Unknown

7. With respect to the above-mentioned risk factors, have any supplementary diagnostic procedures been performed?

Yes

No (continue to question 9)

8. What supplementary diagnostic procedures were performed during the two years prior to the occurrence of stroke?

Test	Date	Result
HB	__ / __ / __	
TSH	__ / __ / __	
ECG	__ / __ / __	
X-thorax	__ / __ / __	
Ultrasound heart	__ / __ / __	
Ankle-arm index	__ / __ / __	

9. Was any other relevant co-morbidity present?

VIII. Medication

(Antithrombotica before the stroke)

- | | |
|------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1. Did the patient take acetylsalicylic acid (Aspirin, Ascal)?</p> | <p><input type="checkbox"/> Yes, from __ / __ / __ to __ / __ / __</p> <p><input type="checkbox"/> No</p> <p><input type="checkbox"/> Unknown</p> |
| <p>2. Did the patient take other platelet inhibitors (NSAIDs/Persantin)?</p> | <p><input type="checkbox"/> Yes, from __ / __ / __ to __ / __ / __</p> <p><input type="checkbox"/> No</p> <p><input type="checkbox"/> Unknown</p> |
| <p>3. Did the patient take oral anticoagulants (Marcoumar/Sintrom)?</p> | <p><input type="checkbox"/> Yes, from __ / __ / __ to __ / __ / __</p> <p><input type="checkbox"/> No</p> <p><input type="checkbox"/> Unknown</p> |

(Other pharmacological medication)

4. Note all other pharmacological medication taken during the two-year period prior to the occurrence of stroke (e.g. oestrogen, corticosteroids, oral contraceptives).

Medication	Date
	Since __ / __ / __
	Since __ / __ / __
	Since __ / __ / __
	Since __ / __ / __
	Since __ / __ / __
	Since __ / __ / __

IX. GP – patient contact

1. Generally, how was your contact / relation with the patient?
 *(1) very bad, (2) bad, (3) normal, (4) good, (5) very good

Scale:

1	2	3	4	5
---	---	---	---	---

Explanation:

2. Which circumstances or patient characteristics restricted your provision of optimal care?

Explanation:

3. Consequently, which elements of care could not be provided optimally?

Explanation:

X. Personal details

1. Origin

- Dutch or West-European
- Surinamese or Antillian
- Turkish or Moroccan
- Other:

2. Marital status

- Married
- Widowed
- Divorced
- Not married, living together
- Never married, not living together
- Unknown

QUALITY OF CARE IN STROKE PREVENTION

3. Latest / present occupation

--

	BP		Date	Medication
	SBP	DBP		
1	___ / ___	___ / ___	___ / ___ / ___	
2	___ / ___	___ / ___	___ / ___ / ___	
3	___ / ___	___ / ___	___ / ___ / ___	
4	___ / ___	___ / ___	___ / ___ / ___	
5	___ / ___	___ / ___	___ / ___ / ___	
6	___ / ___	___ / ___	___ / ___ / ___	
7	___ / ___	___ / ___	___ / ___ / ___	
8	___ / ___	___ / ___	___ / ___ / ___	
9	___ / ___	___ / ___	___ / ___ / ___	
10	___ / ___	___ / ___	___ / ___ / ___	
11	___ / ___	___ / ___	___ / ___ / ___	
12	___ / ___	___ / ___	___ / ___ / ___	
13	___ / ___	___ / ___	___ / ___ / ___	
14	___ / ___	___ / ___	___ / ___ / ___	
15	___ / ___	___ / ___	___ / ___ / ___	

	Blood glucose	Fasting	Date	Medication
1	___	Yes / No	___ / ___ / ___	
2	___	Yes / No	___ / ___ / ___	
3	___	Yes / No	___ / ___ / ___	
4	___	Yes / No	___ / ___ / ___	
5	___	Yes / No	___ / ___ / ___	
6	___	Yes / No	___ / ___ / ___	
7	___	Yes / No	___ / ___ / ___	
8	___	Yes / No	___ / ___ / ___	
9	___	Yes / No	___ / ___ / ___	
10	___	Yes / No	___ / ___ / ___	
11	___	Yes / No	___ / ___ / ___	
12	___	Yes / No	___ / ___ / ___	
13	___	Yes / No	___ / ___ / ___	
14	___	Yes / No	___ / ___ / ___	
15	___	Yes / No	___ / ___ / ___	

APPENDIX III

MEDICAL REVIEW CRITERIA

III.A. INTRODUCTION

Medical review criteria are defined as "systematically developed statements that can be used to assess in detail specific health care decisions, services and outcomes". Each review criteria describes a discrete management decision or action or health outcome. Each review criterion is derived from a clinical practice guideline recommendation and used to determine whether the care being reviewed conforms to a particular recommendation in the guideline. In this manual, the review criteria are derived from clinical practice guidelines developed by the Dutch College of General Practitioners. These guidelines are based on scientific evidence, broad consensus, and clinical evidence. Guidelines have a prospective focus: they are designed to assist health professionals in making decisions about health care. Medical review criteria, however, assess care decisions that have already been made. Generally, they are applied retrospectively when the care that has been provided is assessed.

In an earlier study on the quality of preventive care related to stroke prevention in general practice, a set of medical review criteria was developed by a multidisciplinary panel of experts. The complete set of medical review criteria are based on six clinical practice guidelines.

The following guidelines are included:

- Hypertension
- Diabetes mellitus
- TIA
- Heart failure
- Angina pectoris
- Peripheral Vascular Disease

Each criterion comprises: a) an element of care, b) an acceptable alternative, c) data sources and d) instructions/explanatory notes (see box on next page). Elements refer to specific clinical decisions or actions that are recommended in the guideline.

Because medical review criteria are written to determine whether or not the guideline was followed, allowance must be made for situations in which the recommendations of the guideline do not apply or need not be followed. For example, treated hypertensive patients need quarterly follow-up in which blood their blood pressure is measured. If a GP refrains from doing so, this does not necessarily mean that he/she is not complying with recommended care. The patient might receive medical treatment from a cardiologist who is also responsible for the patient's treatment. In such cases, non-compliance with this specific element of the hypertension guideline could be acceptable. These acceptable alternatives are included in the medical review criteria.

Review criteria elements

Element of care	Refer to specific clinical decisions or actions (detection, diagnosis, treatment, follow-up) that are recommended in the guideline.
Acceptable alternative	A common and legitimate reason for not conforming to guideline recommendations.
Data source	Sources of data (outcome, process, or structural) where relevant data can be obtained (e.g. GP's patient records)
Instructions / Explanatory notes	Describe in detail clinical decisions or actions for health care providers recommended in the guideline

Example

In the following example, we present the first hypertension criterion. This criterion relates to recommendations for detection of patients with elevated blood pressure levels (hypertension guideline). According to this criterion a GP should once a year check the blood pressure of each patient who visits the GP on his/her own initiative (voluntary visit), or those patients who have not had a blood pressure measurement for one year or longer and are known to have diabetes mellitus II, stroke, ischaemic heart disease, or, once every three years in case of a male patient aged between 55 and 65 years, a patient with a positive family history of cardiovascular diseases, a patient with hypercholesterolaemia (cholesterol level ≥ 6.5), and/or a smoker.

Element of care	Acceptable alternatives	Data sources	Instructions / explanatory notes
<u>Detection:</u>			
1. Detection of hypertension ¹	<ul style="list-style-type: none"> - No visit - Patient refusal² - Unsuitable visit - Receiving care from specialist³ 	<ul style="list-style-type: none"> - Records - Specialist letter 	<ul style="list-style-type: none"> - BP measurement 1 per year for patient: > 60 yr, DM type II, stroke, ischaemic heart disease, hypertension, treated hyperchol., positive family history for CVD

¹mean DBP ≥ 95 mmHg, ²patient isn't co-operative, ³receiving treatment by cardiologist or internist

IIIb. APPLICATION OF MEDICAL REVIEW CRITERIA

For each patient, assessors investigate whether risk factors for stroke were present and what type of treatment was given to the patient. This information is systematically, and in detail, collected with the questionnaire. Specific clinical decisions or actions with regard to the detection, diagnosis, treatment, and follow-up of risk factors for stroke are compared with the specific clinical decisions or actions described in corresponding review criteria. For example, all aspects of care provided to a diabetes mellitus patient who has been diagnosed recently (within the two-year period before the occurrence of stroke) is compared with diabetes care that is recommended and described in the review criteria. If the patient's diagnosis was established e.g. five years earlier, actions and decisions in care related to the diagnosis of diabetes mellitus and first, second, and third pharmacological treatment will, most probably, not be included in the assessment (before the two-year period). The set of review criteria is found in Appendix IIIc. The following two examples illustrate how to use the review criteria.

Example 1

A male patient, 65 years old, divorced, suffered a stroke and was referred and admitted to hospital. Presently, one year later, no residual symptoms are present. The patient is hypertensive and for this reason visits the GP quarterly for follow-up. Despite pharmacological treatment, blood pressure measurements continue to be above recommended level (mean of 97mmHg). The GP indicates to be responsible for patient's medical and hypertension treatment (no shared care). No other risk factors for stroke are present. The following answers were given by the GPs:

III. Risk factors for stroke

- 1. Did the patient have a positive family history (< 60 years of age) for cardiovascular disease?

- 2. Did the patient have excess body weight?

- 6. Did the patient have an excessive alcohol intake (> 2 glasses per day)?

- Yes, confirmed on ___ / ___ / ____
- No
- Unknown

- Yes,
 - little overweight
 - lot overweight
- If measured: ___kg / ___height

- No (continue to question 6)
- Unknown (continue to question 6)

- Yes, since ___ / ___ / ____
- No (continue to question 9)
- Unknown (continue to question 9)

9. Preceding the occurrence of stroke, did the patient smoke?

Yes

light

moderate

heavy

_____ cigarettes / cigars / pipe per day

No (continue to section IV)

Unknown (continue to section IV)

Review criterion number 15 (based on hypertension guideline) recommends GPs to evaluate patient's cardiovascular risk profile annually (smoking status, overweight, alcohol intake, family history of cardiovascular disease, cholesterol only in cases known to have increased levels). The information provided by the GP suggests that actual care delivery did not conform with recommended care (see below).

Element of care	Acceptable alternative(s)	Data sources(s)	Instructions / explanatory notes
<u>Follow-up:</u>			
15. Annual follow-up	- None	- Patient record - Specialist letter	- BP measurement - Evaluation of patients' CVD risk profile. If possible, stop medication at DBP < 90mmHg

Example 2

Woman, 40 years old, suffered a stroke about one year ago. Subsequently, she was admitted to hospital. Presently, one year later, neurological sequela is present (aphasia). Four months preceding the occurrence of stroke, the patient suffered a TIA. She was referred to a specialist who performed additional investigations. To keep the patient from smoking, an information sheet on how to quit smoking was given. Plain medical history and no other risk factors for stroke are present.

The following answers were given by the GP:

VI. Transient ischaemic accident (TIA)

1. Did the patient have a TIA(s) prior to the two-year period preceding the occurrence of stroke?

Yes

No (continue to question 3)

Unknown (continue to question 3)

QUALITY OF CARE IN STROKE PREVENTION

- | | |
|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2. Did the patient receive pharmacological treatment for stroke prevention? | <input type="checkbox"/> Yes
<input type="checkbox"/> No
<input type="checkbox"/> Unknown |
| 3. Did the patient have a TIA in the two-year period preceding the occurrence of stroke? | <input checked="" type="checkbox"/> Yes, on 03 / 09 / 2001 , __ / __ / ____
<input type="checkbox"/> No (continue to section VII)
<input type="checkbox"/> Unknown (continue to section VII) |
| 4. Based on the manifestation of TIA, was an echocardiogram performed? | <input type="checkbox"/> Yes
<input checked="" type="checkbox"/> No
<input type="checkbox"/> Unknown |
| 5. Consequently, has the patient been referred to a specialist? | <input checked="" type="checkbox"/> Yes
<input type="checkbox"/> No (continue to question 8)
<input type="checkbox"/> Unknown (continue to question 8) |
| 6. If yes, has a DUPLEX-scan been made? | <input checked="" type="checkbox"/> Yes
<input type="checkbox"/> No
<input type="checkbox"/> Unknown |
| 7. If yes, has a Carotid endarterectomy (CEA) been done? | <input type="checkbox"/> Yes
<input checked="" type="checkbox"/> No
<input type="checkbox"/> Unknown |
| 8. Has pharmacological treatment been started to prevent recurrence of stroke? | <input type="checkbox"/> Yes
<input checked="" type="checkbox"/> No
<input type="checkbox"/> Unknown |
| 9. If yes, what treatment? (multiple answers possible) | <input type="checkbox"/> Aspirin
<input type="checkbox"/> Clopidogrel
<input type="checkbox"/> Dipyridamol
<input type="checkbox"/> Coumarin |

Review criterion numbers 6-8 (based on TIA guideline) recommends GPs to start pharmacological treatment to prevent recurrence of stroke. The information provided by the GP suggests that actual care delivery did not conform with recommended care (see below).

No	Element of care	Acceptable alternative(s)	Data sources(s)	Instructions/ explanatory notes
	Prevention stroke			
6.	Pharmacological treatment (1 st choice)	<ul style="list-style-type: none"> - Aspirin / NSAID allergy - Gastro-intestinal blood loss - Patient refusal - Atrial fibrillation 	<ul style="list-style-type: none"> - Patient record - Specialist letter 	<ul style="list-style-type: none"> - Carbasalate calcium 120mg directly after TIA
7.	Pharmacological treatment (contra-indication aspirin)	<ul style="list-style-type: none"> - Atrial fibrillation 	<ul style="list-style-type: none"> - Patient record - Specialist letter 	<ul style="list-style-type: none"> - Carbasalate calcium 38mg/day
8.	Pharmacological treatment (if atrial fibrillation present)	<ul style="list-style-type: none"> - Alcoholism - Inclination to fall - haemorrhagic diathesis 	<ul style="list-style-type: none"> - Patient record - Specialist letter 	<ul style="list-style-type: none"> - Coumarin derivative



III C MEDICAL REVIEW CRITERIA

HYPERTENSION
DIABETES MELLITUS
TRANSIENT ISCHAEMIC ATTACK
PERIPHERAL VASCULAR DISEASE
HEART FAILURE
ANGINA PECTORIS



REVIEW CRITERIA - HYPERTENSION

Elements of care		Acceptable alternatives	Data sources	Instructions / explanatory notes
Detection:				
1.	Detection of hypertension ¹	<ul style="list-style-type: none"> - No visit - Patient refusal² - Unsuitable visit - Receiving care from specialist³ 	<ul style="list-style-type: none"> - Patient record - Specialist letter 	<ul style="list-style-type: none"> - BP measurement¹ per year for patient: > 60 yr, DM type II, stroke, ischaemic heart disease, hypertension; treated hyperchol¹; positive family history for CVD
Diagnosis:				
2.	Diagnosis of hypertension DBP 95 – 104 mmHg	<ul style="list-style-type: none"> - Poor patient compliance - Receiving care from specialist³ 	<ul style="list-style-type: none"> - Patient record - Specialist letter 	<ul style="list-style-type: none"> - 5 BP measurements within 3 to 6 months after detection of increased blood pressure
3.	Diagnosis of hypertension DBP ≥ 105 mmHg	<ul style="list-style-type: none"> - Poor patient compliance - Receiving care from specialist⁴ 	<ul style="list-style-type: none"> - Patient record - Specialist letter 	<ul style="list-style-type: none"> - 3 BP measurements within 1 to 3 months after detection of increased blood pressure
4.	Diagnosis (medical history)	<ul style="list-style-type: none"> - None 	<ul style="list-style-type: none"> - Patient record - Specialist letter 	<ul style="list-style-type: none"> - Check: alcohol intake, smoking, medication; renal conditions, heart/vessels, DM type II; positive family history for CVD; to be performed within 6 months after detection of increased blood pressure⁴
5.	Diagnosis (physical examination)	<ul style="list-style-type: none"> - None 	<ul style="list-style-type: none"> - Patient record - Specialist letter 	<ul style="list-style-type: none"> - Investigations: -Heart rhythm and rate, murmur carotids, lungs, abdominal aneurysm, -murmur aa. Renales, Quietex Index, to be performed within 6 months after detection of increased blood pressure⁴

Elements of care		Acceptable alternatives	Data sources	Instructions / explanatory notes
6.	Diagnosis (laboratory tests)	- None	- Patient record - Specialist letter	- Test: -glucose, -cholesterol, -creatinine in blood, -protein in urine, to be performed within 6 months after detection of increased blood pressure ⁴
	Treatment:			
7.	Patient education	- None	- GP memory - Patient record - Specialist letter	- Cause of hypertension, effects, risk factors, (non)pharmacological treatment within 6 months after detection of increased blood pressure ⁴
8.	Treatment (non-pharmacological)	- None	- GP memory - Patient record - Specialist letter	- Quit smoking, dietary advice (Na-K-intake, alcohol) > 2/day), QI < 25, physical activity, within 6 month after detection of increased blood pressure ⁴
9.	Treatment (indication for pharmacologic treatment)	- DBP 100 mmHg - Suspected secondary hypertension	- Patient record - Dossier	- Antihypertensive treatment ⁵ . Indication: DBP 105mmHG or DBP 100-104 and ≥ 2 risk factors (male, smoker, cholesterol >6.5, DM type II, ischaemic heart disease, QI>30, positive family history for CVD), start within 2 months ⁴
10.	Treatment 1 st / 2 nd choice medication (Diuretics / β -blocker)	- Coronary disease, MI, HF> 90, gout (β -blocker) - DM2, LVH, hypercho (ACE-inhibitor) - COPD, AV-block (Diuretic/ACE-inhibitor) - M, Raynaud	- Patient record - Specialist letter	- Hydrochlorothiazide 2.5-25 ⁶ mg/day or bendroflumethiazide 2.5-5 mg/day - Hydrochlorothiazide 25 / triamterene 50: 1dosage/day if digoxine or risk of heart dysrhythmia - Atenolol 25-100 mg/day - Metoprolol 50-200 mg/day
11.	Treatment 3 rd choice medication (ACE-inhibitor or Ca-antagonist)	- Renal perfusion disorder - Heart failure	- Patient record - Specialist letter	- Captopril 25-50 mg (twice a day) / enalapril 5-40 mg - Nifedipine retard 10-40 mg (twice a day)

Elements of care		Acceptable alternatives	Data sources	Instructions / explanatory notes
	Follow-up:			
12.	Follow-up (during trial stage) a) DBP < 105 mmHg b) DBP ≥ 105 mmHg	- Non compliance - Receiving care from specialist ³	- Patient record - Specialist letter	a) BP measurement 1 per month b) BP measurement 1 per month
13.	Follow-up (at time of therapy adjustments)	- Non compliance - Interactions - Receiving care from specialist ³	- Patient record - Specialist letter	- Aim: DBP < 90 mmHg within 6 months, if needed higher dosage or change/add other pharmacologic treatment
14.	Follow-up (after trial stage)	- Receiving care from specialist ³	- Patient record - Specialist letter	- BP measurement 1 per 3 months (assistant); if possible install additional measures to modify risk factors
15.	Annual follow-up	- None	- Patient record - Specialist letter	- BP measurement 1 per year - Evaluation of patients' cardiovascular risk profile if possible, stop medication at DBP < 90mmHg
	Referral:			
16.	Referral to specialist	- Poor prognosis	- Patient record - Specialist letter	- At age of < 30 years, suspected sec. hypertension, or non responsive to treatment hypertension and organ damage; referral within 2 months

¹Hypertension: (mean) BP of 95mmHg or higher, ²Patient is not co-operative and therefore difficult to treat/detect, ³Patient receives treatment from cardiologist or internist, ⁴Arbitrarily set period (in contrast with criterion 2 and 3: described in guideline). Makes assessment of compliance to this criterion easier, ⁵Type of medication not specified and left out of consideration, ⁶All dosages in mg.

Abbreviations:

DBP=diastolic blood pressure, DM2=diabetes Mellitus type II, HR=heart frequency, hyperchol=increased cholesterol level, IHD=ischaemic heart disease, LVH=left ventricular hypertrophy, MI=myocardial infarction, Pos. FHx=positive family history of cardiovascular disease QI=Quietlet Index, RF=risk factors.

REVIEW CRITERIA - DIABETES MELLITUS

No	Elements of care	Acceptable alternatives	Data sources	Instructions / explanatory notes
1.	Diabetes Mellitus type II Definition ¹	- Receiving care from specialist ²	- Patient record - Specialist letter	- Diagnosis DM type II established if: 2 abnormal fasting glucose (≥ 6.7 mmol/l) or 2 abnormal GTT (≥ 11.1 mmol/l) or 1 abnormal glucose and complaints e.g. thirst, polyuria, itching genitals
	Treatment:			
2.	Target value	- Age > 75 year ⁴ - Patient refusal - Receiving care from specialist ²	- Patient record - Specialist letter - GP memory	Aim of DM type II treatment: - Glucose <6.7 mmol/l - Quetelet Index <25 mol/l
3.	Non pharmacologic Treatment	- Receiving care from specialist ²	- Patient record - Specialist letter - GP memory	- Referral dietician - Advice on physical activity - Advice to quit smoking
4.	Indication pharmacologic Treatment	- Receiving care from specialist ²	- Patient record - Specialist letter	- Initiate pharmacological treatment if after non pharmacological treatment during the last 6 months glucose >8 mg/dl
5.	Treatment 1 st choice medication (Oral antidiabetic drug)	- Receiving care from specialist ²	- Patient record - Specialist letter	- Prescription: Sulfonyluremderivate, Tolbutamide, max 20 mg/day
6.	Treatment 2 nd choice medication (Oral antidiabetic drug)	- Receiving care from specialist ²	- Patient record - Specialist letter	- Prescription: 2 nd generation sulfonyluremderivative Glibenclamide 2.5 mg/day to 15 mg/day or Gliclazide 80 mg/day to 80mg/day (tid) or Glipizide 5mg/day to 20mg/day
7.	Treatment 3 rd choice medication (Oral antidiabetic therapy)	- Receiving care from specialist ² (pt. with hepatic and renal dysfunction)	- Patient record - Specialist letter	- Prescription: Biguanide, Metformin 500mg/dag, z.n. + 3dd 850mg

No	Elements of care	Acceptable alternatives	Data sources	Instructions / explanatory notes
8.	Treatment last choice medication (Insulin)	- Receiving care from specialist ²	- Patient record - Specialist letter	- Prescription: insulin s.c.
	Follow-up:			
9.	Follow-up (quarterly)	- Receiving care from specialist ²	- Patient record - Specialist letter	- Actions: weight control, fasting glucose
10.	Annual follow-up	- Receiving care from specialist ²	- Patient record - Specialist letter - GP memory	- Indication: DM type II, abnormal GTT (7.8 –11); fasting glucose 5.6-6.7 mmol/l
11.	Annual follow-up (physical examination)	- Receiving care from specialist ²	- Patient record - Specialist letter - GP memory	- Actions: BP measurement, inspection of lower extremities, pulse a. dors. ped L/R, achilles' tendon reflexes
12.	Annual follow-up (laboratory tests)	- Receiving care from specialist ²	- Patient record - Specialist letter	- Actions: fasting glucose, Creatinine, Proteinuria, Cholesterol, HbA1c
	Referral:			
13.	Follow-up eye specialist	- Receiving care from specialist ²	- Patient record - Specialist letter	- Frequency: at least bi-annually follow-up of fundi (fundoscopy)
14.	Consultation specialist	- Patient refusal - Poor prognosis - Receiving care from specialist ²	- Patient record - Specialist letter	- Indication: inadequate metabolic / glyceemic control, severe complications

¹ DM type II diagnosis-related actions are not included in the assessment, ² Receiving care from specialist, ³ All glucose levels in mmol/l, ⁴ It is advised not to adhere to these recommendations if a patient is above the age of 75 years, above this age treatment is initiated mainly when the patient has physical complaints e.g. thirst, polyuria, itching genitals.

REVIEW CRITERIA - TIA

No	Elements of care	Acceptable alternatives	Data sources	Instructions / explanatory notes
	Diagnosis (after TIA):			
1.	'Regular' laboratory investigations for detection of etiology and additional factors.	- None	- Patient record - Specialist letter - GP memory	- Glucose (DM) - Cholesterol if patient < 65 years
2.	Evaluation (medical history, physical examination)	- None	- Patient record - Specialist letter - GP memory	- Detection of etiology and additional factors that need to be treated: Irregular pulse?, Heart murmur?, Carotid murmur?, Increased blood pressure?
3.	Additional ECG (investigations based on physical examination)	- None	- Patient record - Specialist letter	- Suspected atrial fibrillation. - ECG (See criterion 9 in the event of atrial fibrillation)
4.	Referral for additional (investigations based on physical examination)	- Receiving care from specialist	- Patient record - Specialist letter	- Detection of etiology and additional factors that need to be treated: Echo (suspected valvular disease) Duplex (suspected carotid stenosis)
	Prevention stroke.			
5.	Non pharmacological treatment	- None	- Patient record - Specialist letter - GP memory	- Advice: advice to quit smoking, non pharmacological treatment of hypertension and DM

No	Elements of care	Acceptable alternatives	Data sources	Instructions / explanatory notes
6.	Pharmacological treatment (1 st choice)	<ul style="list-style-type: none"> - Aspirin / NSAID allergy - Gastro intestinal blood loss - Patient refusal - Atrial fibrillation 	<ul style="list-style-type: none"> - Patient record - Specialist letter 	<ul style="list-style-type: none"> - Carbasalate calcium 120 mg directly after TIA
7.	Pharmacological treatment (contra-indication aspirin)	<ul style="list-style-type: none"> - Atrial fibrillation 	<ul style="list-style-type: none"> - Patient record - Specialist letter 	<ul style="list-style-type: none"> - Carbasalate calcium 38 mg/day
8.	Pharmacological treatment (if atrial fibrillation present)	<ul style="list-style-type: none"> - Alcoholism - Inclination to fall - haemorrhagic diathesis 	<ul style="list-style-type: none"> - Patient record - Specialist letter 	<ul style="list-style-type: none"> - Coumarin derivative
	<u>Follow-up / referral:</u>			
9.	Follow-up	<ul style="list-style-type: none"> - None 	<ul style="list-style-type: none"> - Patient record - Specialist letter 	<ul style="list-style-type: none"> - Investigations in case: At time of TIA, detection of increased blood pressure Presence of cardiovascular risk factors
10.	Referral	<ul style="list-style-type: none"> - Short life expectancy - Patients' wishes 	<ul style="list-style-type: none"> - Patient record - Specialist letter 	<ul style="list-style-type: none"> - Heart murmur (indication and request for carotid surgery)

REVIEW CRITERIA - PERIPHERAL VASCULAR DISEASE

No	Elements of care	Acceptable alternatives	Data sources	Instructions / explanatory notes
1.	Manifestation of atherosclerosis in arteries below bifurcation of aorta. Definitions ¹	-	-	- Stages: Atherosclerosis without complaints Intermittent claudicatio Pain at rest, mainly during the night Necrosis / gangrene
	Diagnosis:			
2.	Additional investigations ¹	- No abnormalities identified at 2 physical examinations	- Patient record - Specialist letter	- Non invasive vascular examination: BP or arm + ankle = Ankle-Arm-Index by means of pocket-Doppler investigations or vascular laboratory investigation
3.	Additional investigations	- None	- Patient record - Specialist letter	- Examination vascular status (heart, carotids, aorta abd.)
	Treatment and follow-up:			
4.	Peripheral vascular disease stage II Patient education/advice	- None	- Patient record - Specialist letter - GP memory	- Advice: walking exercises, quit smoking, foot care
5.	Follow-up	- None	- Patient record - Specialist letter	- Annually: course of illness, physical examination (Ratschow-test), evaluation of cardiac risk factors (hypertension/DM), evaluation of vascular status

¹Diagnosis-related actions are not included in the assessment.

REVIEW CRITERIA - HEART FAILURE

No	Elements of care	Acceptable alternatives	Data sources	Instructions / explanatory notes
	<u>Diagnosis:</u> ¹			
1.	Medical history	- Receiving care from specialist	- Patient record - Specialist letter - GP memory	<p>Severity:</p> <ul style="list-style-type: none"> - Abn. Dyspnoea - Paroxysm - Edema <p>Etiology:</p> <ul style="list-style-type: none"> - History of cardiovascular disease - Smoking, salt, intoxications - Neg. inotrope medication - Comorbidity
2.	Physical examination ¹	- None	- Patient record - Specialist letter - GP memory	- BP measurement, pulse, weight, heart, lungs, neck, liver, ankles
3.	Additional investigations ¹	- None	- Patient record - Specialist letter	- If needed Hb, X- thorax, ECG - If needed TSH - At start of medication: Na/K/Creat
	Treatment and follow-up:			
4.	Patient education	- Receiving care from specialist	- Patient record - Specialist letter - GP memory	- Advice: weight reduction, lowering salt and alcohol intake Clinic attendance in case of increasing complaints
5.	Pharmacological treatment	- None	- Patient record - Specialist letter	- Diuretics and ACE-inhibitors, if necessary add digoxin and nitrates *AF + HF > 100: digoxin *AP: nitrates

No	Elements of care	Acceptable alternatives	Data sources	Instructions / explanatory notes
6.	Follow-up	- None	- Patient record - Specialist letter	- Every 6 months: creat / K / Na
	Referral:			
7.	Referral	- Patient refusal - Poor prognosis - Receiving care from specialist	- Patient record - Specialist letter	- Indication for referral, questionable diagnosis, medication without any effect, young patient, valvular disease, cardiac dysrhythmia, recent myocardial infarction

*Diagnosis-related actions are not included in the assessment.

REVIEW CRITERIA - ANGINA PECTORIS

No	Elements of care	Acceptable alternatives	Data sources	Instructions / explanatory notes
	Diagnosis ¹ :			
1.	Physical investigations	- None	- Patient record - Specialist letter - GP memory	- BP measurement, heart/lungs, signs of hypercholesterolemia, peripheral blood vessels
2.	Additional investigations	- None	- Patient record - Specialist letter	- If indicated: -Hb, -TSH, -ECG Risk factors: -smoking, -cholesterol, -hypertension, -DM type II, -positive family history for cardiovascular disease
	Treatment ² :			
3.	Non pharmacological treatment	- Non-compliance	- Patient record - Specialist letter - GP memory	- Lifestyle (advice to quit smoking, physical activity, weight loss), DM type II metabolic control (if indicated), diet in case of hypertension/hypercholesterolemia
4.	Pharmacological treatment (1 st choice)	- COPD, Dec. cordis, DM type II, PVD ³ , Hypotension, HF<60/min	- Patient record - Specialist letter	- β -blocker: Atenolol 25-100 mg/day, Metoprolol 100-200 mg/day
5.	Pharmacological treatment (2 nd choice)	- Anemia - Hypotension	- Patient record - Specialist letter	- ISDN ⁴ slow dosage 60 mg/day
6.	Pharmacological treatment (3 rd choice)	- Sick sinus syndrome, - 1 st /2 nd degree AV conducting disturbance	- Patient record - Specialist letter	- Ca-antagonist: Diltiazem 2-3dd 60mg

¹Diagnosis-related actions are not included in the assessment, ² Because of the lowering effect on blood pressure maintenance treatment is included, ³Peripheral vascular disease, ⁴Isosorbide dinitrate.



APPENDIX IV

GRADING FORM

IVA. INTRODUCTION

All identified shortcomings in care, i.e. actions or decisions that did not comply with recommended care, need to be specified on the grading form. This form is divided into two parts:

1) Determination of shortcomings in care

In this part, identified shortcomings in care are recorded.

Determination of shortcomings in care

First column	In the first column, record the number of all review criteria which the GP did not comply with.
Second column	In this column, give a short description of the actions or decisions the GP did not comply with.
Third column	In this column, record which domain was responsible for shortcomings in care. For example, the shortcomings in care might be due to patient characteristics (e.g. alcoholism, language barriers) and not because of negligence of the GP.
Fourth column	In this column, record your judgement on whether the shortcoming in care was minor or major.

Determination of shortcomings in care (form format)

Describe: (1) Number of criterion, (2) in short notes, which shortcomings you have identified, (3) which domain (✓) the shortcoming belongs to, (4) severity of the shortcoming (minor / major)		Domain (3)		Severity of shortcoming (4)	
		Patient	GP	Minor	Major
(1)	(2)				

2) Final judgement of quality care and possible relationship with the occurrence of stroke

In the second part, a final judgement is given about the quality of care that has been provided. Based upon identified aspects of sub-optimal care and seriousness of shortcomings (minor vs. major), GPs need to provide a grade for the quality of care. The box below (part of grading the form) defines the grade 0 to 3. When you have decided on the grade, enter your grade in the following part. Finally, you need to indicate if the information that was provided to you in the questionnaire was accurate enough to make a sound judgement about the quality of care.

Final judgement (form format)

Grading	Definition
0	No sub-optimal care identified
1	Sub-optimal care was identified, but unlikely related to the patient's stroke
2	Sub-optimal care was identified, which possibly failed to prevent the patient's stroke
3	Sub-optimal care was identified, which likely failed to prevent the patient's stroke

Final grade
(score 0, 1, 2, or 3 according to above-mentioned definition)

Did you have sufficient information to assess the quality of care provided to this patient?	
(✓)	
<input type="checkbox"/>	Yes
<input type="checkbox"/>	No

IVb. INSTRUCTIONS

STEP 1 Document all identified shortcomings in care in the first section of the form. An example is given below.

Example

After examining the questionnaire it was found that: a GP delivered sub-optimal hypertensive and diabetic care to a patient. The patient visited the GP several times. The GP performed two blood pressure measurements in the two years preceding the occurrence of stroke (165/95 and 150/90). No evaluation of patient's risk profile for cardiovascular disease. Two blood glucose measurements done (7.5 mmol/l and 8.1 mmol/l). The patient did not receive treatment from a specialist. No other shortcomings in care identified.

How to document shortcomings in care on grading form:

Describe: (1) Number of criterion, (2) in short notes, which shortcomings you have identified, (3) which domain the shortcoming belongs to, (4) severity of the shortcoming (minor/major)		Domain (3)		Severity of shortcoming (4)	
		Patient	GP	Minor	Major
(1)	(2)				
Ht 14	Insufficient blood pressure measurements		✓		✓
Ht 16	No evaluation of patient's risk profile for CVD		✓		✓
Dm 9	Insufficient follow-up of DM		✓	✓	

STEP 2 Provide a final judgement on the quality of care and its possible relation with the occurrence of the stroke

You are requested to provide a final judgement on the quality of care and its possible relationship with the occurrence of the stroke. Use the definitions presented on the previous page. Grade 1, if you identified shortcomings in care, but in your opinion they did not relate to the stroke of the patient. Allocate grade 2 or 3 if you have identified shortcomings in care, and in your opinion, they have possibly or likely failed to prevent the stroke of the patient. Finally, you need to indicate if the information provided was sufficient for you to assess and judge the quality of care provided to the patient.

Example

Based on the number, type and severity of shortcomings in care identified in the above-mentioned example you believe that the general practitioner delivered sub-optimal care. The question is whether the sub-optimal care failed to prevent the stroke of the patient. According to your opinion, you believe that because of sub-optimal care delivery the stroke was not prevented (see below: II. Final judgement of quality of care in relation to the stroke).

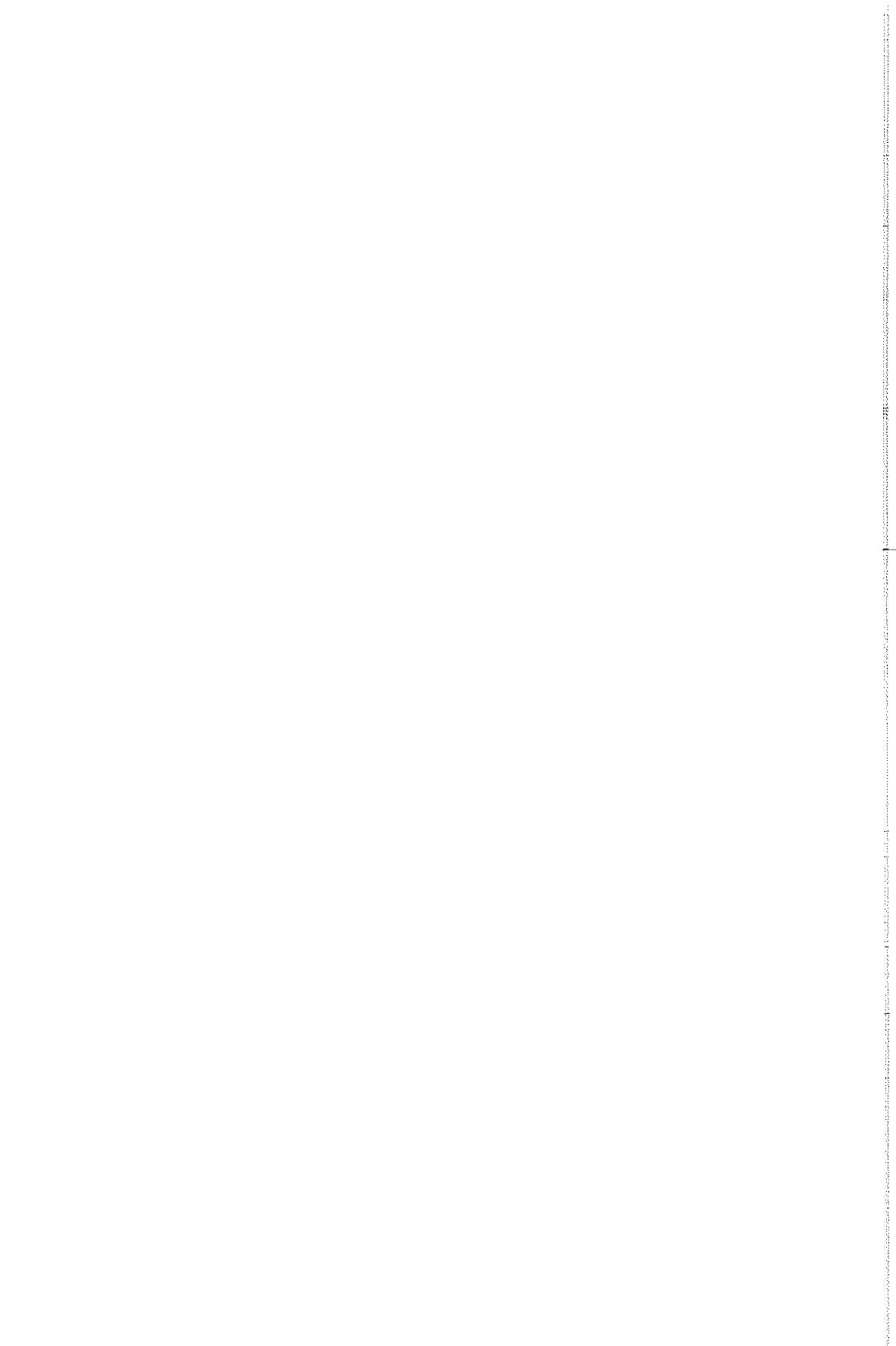
Final judgement of quality of care in relation to the stroke:

Grading	Definition
0	No sub-optimal care identified
1	Sub-optimal care was identified, but unlikely related to the patient's stroke
2	Sub-optimal care was identified, which possibly failed to prevent the patient's stroke
3	Sub-optimal care was identified, which likely failed to prevent the patient's stroke

2

Final grade (score 0, 1, 2, or 3 according to above-mentioned definition)

Did you have sufficient information to assess the quality of care provided to this patient?	
(✓)	
✓	Yes
	No



APPENDIX V

CASE SUMMARY FORM

VA. INTRODUCTION

The case summary form gives a concise overview of patient characteristics, presence of key risk factors for stroke, and preventive care that was provided to the patient by the GP. It is presented in a systematic and chronological order. This information is useful during the plenary session when participants discuss the quality of care that has been delivered. The information is taken from the questionnaire.

Case summary form (Form format)

Personal details			
Sex	Male <input type="checkbox"/> Female <input type="checkbox"/>		
Date of birth	.. / .. /		
Age at time of stroke	.. years		
Ethnicity	_____		
Occupation	_____		
Description of stroke			
Date of stroke	.. / .. /		
Hospital admission	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Date: .. / .. /
CT/MRI scan	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Result: _____
First ever stroke	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Date: .. / .. /
Patient died	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Result: _____
Lifestyle related risk factors relevant to stroke			
		Description	
Overweight	<input type="checkbox"/>	_____	
Alcohol intake	<input type="checkbox"/>	_____	
Smoking	<input type="checkbox"/>	_____	
Presence of risk factors for stroke:			
Period I: (before the two years preceding the occurrence of stroke)			
		Description	
Risk factors	Hypertension	<input type="checkbox"/>	_____
	DM	<input type="checkbox"/>	_____
	TIA	<input type="checkbox"/>	_____
	Others	<input type="checkbox"/>	_____

Period II: (two years before the occurrence of stroke)	
	Description
Risk factors	Hypertension <input type="checkbox"/>
	DM <input type="checkbox"/>
	TIA <input type="checkbox"/>
	Others <input type="checkbox"/>
Additional information	

Blood pressure measurements

No.	Date	BP (mmHg)	Medication

Blood glucose measurements

No.	Date	Glucose (mmol/l)	Medication

VB. INSTRUCTIONS

Personal details and description of stroke do not need any further explanation. Under lifestyle-related risk factors for stroke, indicate which risk factors were present before the occurrence of the stroke. Furthermore, describe how overweight the patient was, how much alcohol the patient drunk, or number of cigarettes/cigars/pipes the patient smoked. If the presence of a risk factor was unknown, please indicate. In the next section, under period I, indicate which risk factors were present in the period before the two-year period preceding the occurrence of stroke. Under description indicate the date of diagnosis and treatment given (if not known estimate). Under period II, indicate the presence of risk factors in the two-year period preceding the occurrence of stroke. This time you indicate: a) treatment responsibility, and b) the aspects of care the GP did not comply with according to the medical review criteria. Remember: the two-year period before the occurrence of stroke is the period of analysis. We assess the quality of care provided over this period. In the section blood pressure measurement and blood glucose measurements you indicate the date of the measurement, blood pressure (mmHg), and medication. Fill in all measurements made during this period.

Example 1

A patient had an excessive body weight for a long period of time. According to your understanding this has been for many years. The patient's height is 1.65 m and weight is 80 kg. You did not provide the patient with dietary advice. You do not know if the patient drinks more than 2 glasses of alcohol a day. The patient is a smoker, and smokes approximately 20 cigarettes per day. More than once you have informed the patient about the health risks involved and advised the patient to quit smoking.

Lifestyle-related risk factors relevant to stroke	
	Description
Overweight	<input checked="" type="checkbox"/> Height: 1.65, 80 kg. No dietary advice given by the GP
Alcohol intake	<input type="checkbox"/> Unknown
Smoking	<input checked="" type="checkbox"/> 20 cigarettes/day. Quit smoking advice + information sheet given

Example 2

A patient with hypertension established in 1970. Since 1994, the patient has taken Selokeen. In period II, two years preceding the occurrence of stroke, the patient visited the GP three times. Each time, the GP took a blood pressure measurement and recorded the value on the patient record.

(continue next page)

Presence of risk factors for stroke			
Period I: (before the two years preceding the occurrence of stroke)			
			<u>Description</u>
Risk factors	Hypertension	<input checked="" type="checkbox"/>	Diagnosis established in 1970. Med.: Selokeen (since 1994)
	DM	<input type="checkbox"/>	_____
	TIA	<input type="checkbox"/>	_____
	Others	<input type="checkbox"/>	_____
Period II: (two years before the occurrence of stroke)			
			<u>Description</u>
Risk factors	Hypertension	<input checked="" type="checkbox"/>	Blood pressure measurements. Did not comply with criteria: Ht 14
	DM	<input type="checkbox"/>	_____
	TIA	<input type="checkbox"/>	_____
	Others	<input type="checkbox"/>	_____
Additional information			

Blood pressure measurements

No	Date	BP (mmHg)	Medication
1	15 / 03 / 99	165 / 85	Selokeen 100 mg
2	12 / 11 / 00	195 / 100	Idem
3	04 / 12 / 00	150 / 95	Idem
4			
5			
6			

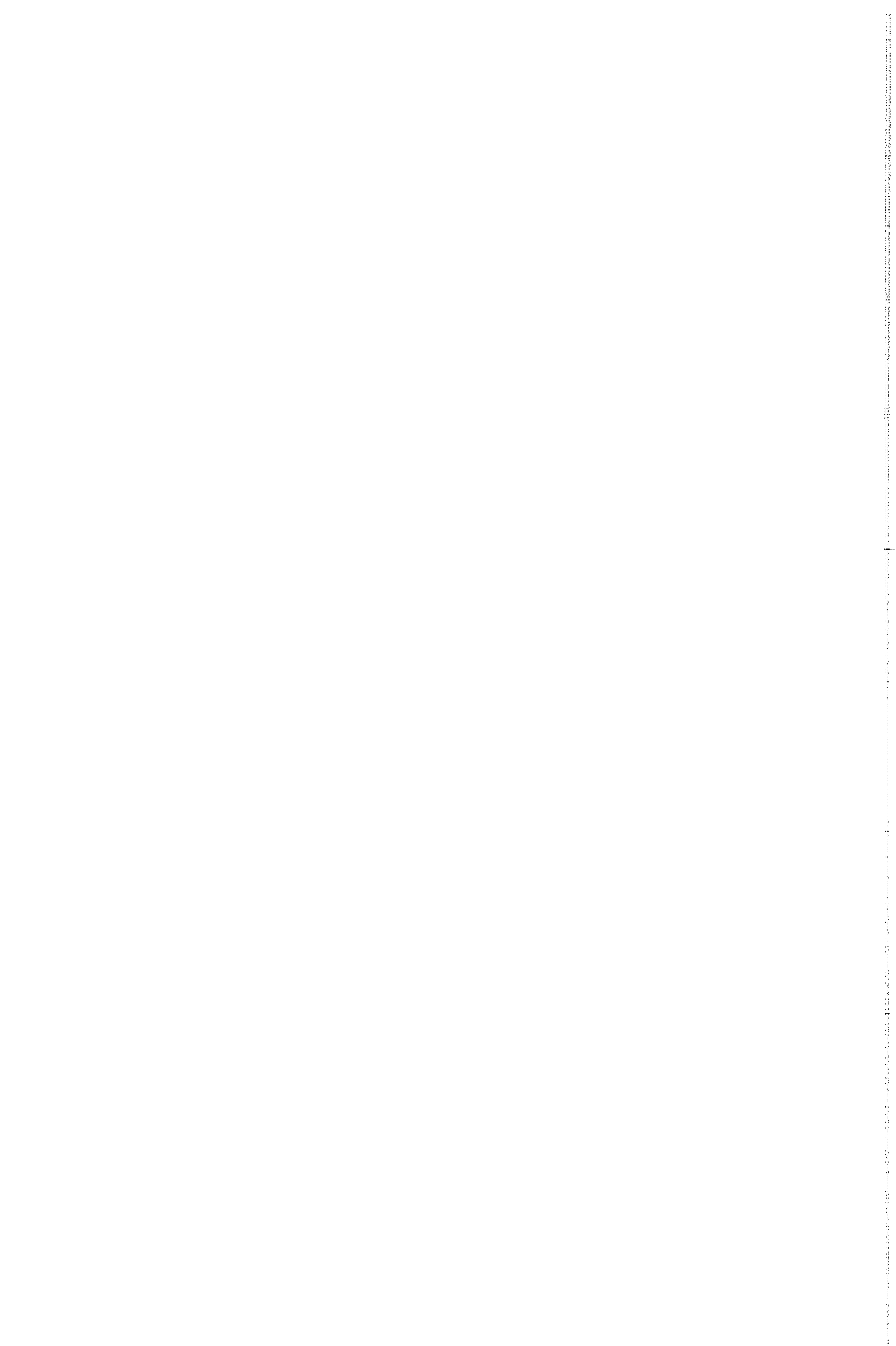
Example 3

A patient with hypertension established 10 years ago. Four years ago (before that period no information available) the GP prescribed Cardene 45mg and Chloortalidon 25mg. In period II, the patient frequently visited the GP, and blood pressure measurements were taken. Because of a TIA in 1995, the patient frequently visits the cardiologist for follow-up. For stroke prevention the patient was prescribed Ascal. Two years preceding the occurrence of stroke, the patient encountered a second TIA. For further investigation referred to the specialist.

Presence of risk factors for stroke		
Period I: (before the two years preceding the occurrence of stroke)		
		Description
Risk factors	Hypertension	<input type="checkbox"/> _____
	DM	<input type="checkbox"/> _____
	TIA	<input type="checkbox"/> _____
	Others	<input type="checkbox"/> _____
Presence of risk factors for stroke		
Period I: (before the two years preceding the occurrence of stroke)		
		Description
Risk factors	Hypertension	<input checked="" type="checkbox"/> Period unknown. Med.: Cardene 45mg + Chloortalidon 25mg
	DM	<input type="checkbox"/> _____
	TIA	<input checked="" type="checkbox"/> In 1995. Start preventive treatment stroke. Med.: Ascal
	Others	<input type="checkbox"/> _____
Period II: (two years before the occurrence of stroke)		
		Description
Risk factors	Hypertension	<input checked="" type="checkbox"/> Blood pressure measurements, see next page. Responsibility hypertensive treatment: general practitioner and specialist
	DM	<input type="checkbox"/> _____
	TIA	<input checked="" type="checkbox"/> _____
	Others	<input type="checkbox"/> _____
Additional information		

Blood pressure measurements

No	Date	BP (mmHg)	Medication
1	07 / 07 / 97	175 / 100	Cardene 45mg
2	01 / 03 / 98	170 / 115	Idem
3	14 / 05 / 98	160 / 100	Idem
4	27 / 05 / 98	160 / 90	Idem
5	11 / 06 / 98	170 / 90	Idem
6	01 / 08 / 98	175 / 100	Idem
7	21 / 11 / 98	184 / 90	Idem



DANKWOORD

Hoewel mijn naam op de omslag van dit proefschrift staat, hebben meerdere personen op verschillende wijzen bijgedragen tot de totstandkoming van dit product. Aan al diegenen die, direct of indirect, een bijdrage hebben geleverd: bedankt!

Graag wil ik een aantal personen speciale dank betuigen. Als eerste natuurlijk mijn beide promotoren, de hooggeleerden prof.dr. Johan Mackenbach en prof.dr. Niek Klazinga. Johan, als eerste wil ik je bijzonder bedanken voor de begeleiding en de mogelijkheid die jij mij geboden hebt om te promoveren. De afgelopen vier en een half jaar is een uitermate leerzame en inspirerende periode geweest, een periode die zeker van invloed zal zijn op de jaren die voor mij liggen. Bedankt voor het in mij gestelde vertrouwen, je onvermoeibare geduld en ondersteuning. Niek, ook jou wil ik uiteraard hartelijk bedanken voor al hetgeen jij voor mij hebt betekend gedurende mijn promotietraject. Onze eerste kennismaking tijdens een onschuldig informatief bezoekje aan het instituut Beleid en Management in de Gezondheidszorg van de Erasmus Universiteit bleek later grote gevolgen te hebben. Ik heb veel steun gehad aan de manier waarop jij mij doorlopend enthousiasmeerde, niet alleen voor dit proefschrift, maar ook voor kwaliteit van zorg gerelateerd onderzoek in het algemeen. Door mijn aanstelling bij de Faculteit der Geneeskunde van de Universiteit van Amsterdam heb jij mij de mogelijkheid geboden mijn werkzaamheden in deze richting te continueren. Mijn dank hiervoor! Alle personen die direct betrokken zijn geweest bij dit onderzoek ben ik uiteraard niet vergeten en wil ik ook hartelijk danken voor hun inspanningen. Allereerst wil ik Arjen van Esch en Rianne Frenken bedanken voor hun bijdrage aan het project. Arjen, ik vind het leuk dat je op 10 september aanstaande, in de functie van paranimf, van de partij zal zijn! Rianne, zeker in het begin van mijn aanstelling heb ik bijzonder veel aan jouw ondersteuning gehad. Onze samenwerking en persoonlijk contact heb ik altijd zeer op prijs gesteld.

De leden van de begeleidingscommissie prof.dr. C.A. van Donselaar, prof.dr. H. Huijjer Abu-Saad, prof.dr. Th.J.M. Verheij, prof.dr. J. Troost, dhr. P. Kleingeld, dhr. C.M. Limburg, dr. A.H. van den Meiracker, ir. M.A.E. van der Waal, dr. J. van der Meulen, en dhr. A.J.M.F. Janssen ben ik zeer erkentelijk voor hun medewerking aan dit project. Ook de leden van het panel van deskundigen prof.dr. J.W. van Ree, dr. D.W.J. Dippel, dhr. J. Heeringa, dr. R.P. Kleyweg, dr. A. Knuistingh Neven, en dr. G.J.E. Rinkel wil ik bedanken voor hun enorme tijdsinvestering en wetenschappelijke inbreng. Met name de beoordeling van zorg geleverd aan een

DANKWOORD

aanzienlijk aantal patiënten uit ons onderzoek heeft veel van jullie kostbare tijd in beslag genomen.

Ik wil prof.dr. P.J. Koudstaal en prof.dr. A. Prins bedanken voor de tijd die zij altijd maar weer wilden vrijmaken voor de ondersteuning van dit onderzoek. Onze besprekingen waren veelal constructief en gemoedelijk, jullie input is van groot belang geweest voor het verloop en slagen van dit onderzoek.

Uiteraard wil ik hierbij de huisartsen die hebben deelgenomen aan dit onderzoek bedanken voor hun medewerking. Zonder hen was dit onderzoek in zijn geheel niet mogelijk geweest.

Verder wil ik mijn collega's van de afdeling Maatschappelijke Gezondheidszorg bedanken voor hun collegialiteit en prettige werksfeer. Hoewel er teveel collega's bij MGZ zijn om ze afzonderlijk in dit dankwoord te bedanken, wil ik mijn ex-kamergenoten Veerle, Carolien, Aafje, en Gitte speciaal bedanken voor alle ditjes en datjes en alle lol. Ook de beide Franken, Anna, Gerard, Jolande, met wie ik regelmatig koffiepauzes doorbracht, wil ik bedanken voor het veraangemen van mijn werk op de afdeling. Ik wens alle leden van het MGZ Rancilio-discussieplatform alle succes!

Gerard, jouw statistische ondersteuning is uiteraard van groot belang geweest bij het analyseren van de onderzoeksgegevens.

Lorian Laraine Visser. Thanks you very much for editing the work. It's hash bien of graet valuw.

Lieve Wendy, in het begin, nog niet zo lang geleden, leek het je leuk om met mij het leven te delen. Iemand die rustig op zijn fietsje, of lopend, naar de universiteit gaat, werkt aan wetenschappelijke vraagstukken die hem ook nog eens blijken te interesseren, en gewoonlijk op tijd thuis is om vervolgens 's avonds en in de weekenden leuke en spannende dingen te doen. Inmiddels, ruim twee jaar verder, zit ik al maanden avond aan avond, weekenden inclusief, gekluisterd aan mijn computer. Nu dit proefschrift af is beloof ik je dat dit gaat veranderen! Stukkie, bedankt voor je eindeloze geduld en alle steun die jij mij in deze periode hebt gegeven.

ABOUT THE AUTHOR

Johan de Koning was born on December 27, 1963 in Rotterdam. He graduated in 1984 at the Emmauscollege in Rotterdam (secondary education) and started studying physiotherapy at the Hogeschool Rotterdam. In 1988 he obtained his Bachelor's degree. After two years of practice in the Netherlands, he went to South Africa to work as a physiotherapist in an orthopaedic hospital in Umtata (Transkei). Assigned by MEMISA, he worked from 1992 to 1995 as a rehabilitation officer for Malawi Against Polio, a local non-governmental organisation. He assisted in the operationalisation of a nation-wide rehabilitation program (outreach clinics) providing services to Malawian communities and Mozambican refugees. From 1995 to 1997, he was located in Paramaribo where he worked as a regional rehabilitation advisor for the Netherlands Leprosy Relief Association (Leprastichting) in the Republic of Suriname, Trinidad & Tobago and the Commonwealth Caribbean. After his return to the Netherlands in 1997, he entered a one-year master's program in Public Health at the Royal Tropical Institute in Amsterdam, the Netherlands. It was during this course that he further developed his interest in health care quality, a topic on which he wrote his master's thesis (Application of quality assurance measures in health projects in developing countries: approaches of Dutch aid agencies). From 1998 until 2003 he was affiliated with the Department of Public Health of the Erasmus MC, University Medical Centre Rotterdam. The main research project he worked on is described in this thesis. During his final year, he worked part-time as a senior advisor for the Dutch Institute for Health Care Improvement (CBO) in Utrecht, the Netherlands, involved in evidence-based guideline development and professional auditing. Presently he works as a researcher at the Department of Social Medicine at the Academic Medical Centre, University of Amsterdam.



STELLINGEN

behorende bij het proefschrift

Quality of care in stroke prevention An audit among general practitioners

1.

De bestaande tekortkomingen in de door huisartsen geleverde preventieve zorg rond cardiovasculaire risicofactoren rechtvaardigen de veronderstelling dat het optreden van het CVA verder kan worden teruggebracht. (Dit proefschrift)

2.

In praktijken waar huisartsen op grotere schaal patiënt- en zorggegevens registreren in het huisartsendossier en preventieve taken delegeren aan de praktijkassistent, leveren huisartsen minder vaak sub-optimale preventieve zorg. (Dit proefschrift)

3.

Bewoners van achterstandswijken hebben naast een verhoogd risico op ziekte en sterfte ten gevolge van hart- en vaatziekten tevens een grotere kans op kwalitatief mindere preventieve zorg dan bewoners van niet-achterstandswijken. (Dit proefschrift)

4.

Door beperkte registratie van patiënt- en zorggegevens door huisartsen is de toepassing van een case-control design voor het evalueren van de kwaliteit van de zorg ten aanzien van cardiovasculaire risicofactoren in de huisartspraktijk op dit moment niet mogelijk. (Dit proefschrift)

5.

Een op richtlijnen gebaseerde audit van zorgprocessen ter preventie van het CVA blijkt door huisartsen in een huisartsengroep goed uitvoerbaar, mits aan een aantal organisatorische randvoorwaarden is voldaan. (Dit proefschrift)

6.

2003 heeft aangetoond dat 'een mooie zomer' toegevoegd kan worden aan de lijst van factoren die de consumptiegeneigdheid van gezondheidszorg van de Nederlander beïnvloeden: massaal verkozen patiënten een strandbezoek boven een chirurgisch ingrijpen.

7.

Wetenschap is een bewustwordingsproces waarbij onbewuste logica omgezet wordt in bewuste logica.

8.

Professionele deskundigheid is meer dan een optelsom van kennis, vaardigheden en attitude: wanneer het geheel in ogenschouw wordt genomen worden de onderdelen ervan anders gezien dan in geïsoleerde vorm.

9.

De veel gehoorde boodschap van pensioen-, spaar- en beleggingsfondsen 'investeer nu en profiteer later' is ook van toepassing op de preventie van hart- en vaatziekten.

10.

Iemand kan veel gelezen en geschreven hebben over bomen, maar als hij ze nog nooit daadwerkelijk gezien, geroken, geplant, of gevoeld heeft, is hij niet in staat na te gaan of zijn beschrijvingen adequaat en de begrippen vruchtbaar zijn.

11.

Het accepteren van de veranderlijkheid en vergankelijkheid der dingen is een levenskunst.

Rotterdam, 10 september 2003

Johan de Koning