

# **Prescribing in Primary Care**

**Pharmacotherapy in primary care and the cooperation between  
general practitioners and community pharmacists**

© P.E.M. Muijrs.

All rights reserved. No part of this book may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system without written permission from the publisher, except for the inclusion of brief quotations in a review.

ISBN: 905681219X

Book preparation and printing: Unigraphic Maastricht

Cover: Peter Wortel ([www.peterwortel.nl](http://www.peterwortel.nl))

# **Prescribing in Primary Care**

**Pharmacotherapy in primary care and the cooperation between  
general practitioners and community pharmacists**

## **Proefschrift**

ter verkrijging van de graad van doctor  
aan de Universiteit Maastricht  
op gezag van de Rector Magnificus,  
Prof. Mr. G.P.M.F. Mols,  
volgens het besluit van het College van Decanen,  
in het openbaar te verdedigen  
op vrijdag 1 juli 2005 om 16.00 uur

door

**Paul Emile Marie Muijers**

Promotores:

Prof. dr. J.A. Knottnerus  
Prof. dr. R. Grol

Co-promotor:

Dr. R. Janknegt (Maasland Ziekenhuis Sittard)

Beoordelingscommissie:

Prof. dr. J.Th.M.van Eijk (voorzitter)  
Prof. dr. G.J. Dinant  
Prof. dr. F.M. Haaijer-Ruskamp (Rijksuniversiteit Groningen)  
Prof. dr. P.A. de Smet (Radboud Universiteit Nijmegen)  
Dr. R.A. Winkens

The studies in this thesis were financed by CZ Actief in Gezondheid (health insurance company) and the Royal Dutch Association for the Advancement of Pharmacy (KNMP); financial support for the printing of this thesis was kindly provided by Novartis Pharma Nederland.

Paranimfen:

Drs Sabine Muijers MMC

Dr. Joep Muijers



<b>Contents</b>	<b>Page</b>
1. Introduction, aim and relevance of the study, structure of the thesis	3
2. Background, research questions and measuring instruments	11
3. Changing relationships: attitudes and opinions of general practitioners and pharmacists regarding the role of the community pharmacist	33
4. Pharmacists in Primary Care. Determinants of the care-providing function of the community pharmacist in primary care	51
5. Prescribing indicators. Development and validation of guideline-based prescribing indicators as an instrument to measure the variation in the prescribing behaviour of general practitioners	67
6. Differences in prescribing between general practitioners. Impact of the cooperation with pharmacists and visits from pharmaceutical industry representatives	83
7. General practitioner and pharmacist. Differences in prescribing and their relationship to pharmaceutical care	97
8. General discussion, conclusions	111
9. Summary	135
10. Samenvatting	145
Appendices	154
A. Questionnaires sent to general practitioners and pharmacists	155
B. Prescribing indicators	171



# Chapter 1

## Introduction, aim and relevance of the study, structure of the thesis

### Introduction

Prescribing, dispensing and cooperating.

The majority of drugs are prescribed by general practitioners. More than 50% of consultations with general practitioners results in the patient receiving a prescription; depending on the country, this percentage varies from 60 to 90 %<sup>1,2</sup>. However, it is becoming increasingly difficult for general practitioners to choose the appropriate drug. Not only is this a consequence of the large and ever-increasing number of drugs available but also of the fact that many acute and chronic conditions can now be treated with drugs in an aging population<sup>3,4</sup>. In many countries, evidence-based guidelines are now available to help general practitioners in choosing the appropriate drug<sup>5-10</sup>. Yet despite this, there are still considerable differences among general practitioners with respect to prescribing. These differences are caused by the underlying need of patients for pharmaceutical care as well as by variations in routines and in the quality of prescribing drugs<sup>11-18</sup>. Incorrect prescription of drugs is a problem that, particularly among the elderly, can lead to hospital admissions and to higher costs which in principle can be avoided<sup>19-21</sup>. The costs associated with drug use are high and account for a substantial part of the health care budget. On average in Western European countries these costs encompass 15 percent of the total health care budget<sup>22</sup>.

The variation in prescribing behaviour among general practitioners can be observed at the pharmacy, where drugs prescribed to patients by general practitioners are supplied. In a number of countries, pharmacists are increasingly discussing the variation in prescribing drugs with the general practitioners with whom they work<sup>23-26</sup>. Over the past 20 years, pharmacists have clearly shifted the focus of their work from drugs to patients; at present pharmacists are advising patients and informing doctors rather than preparing drugs<sup>26</sup>. The advice provided to physicians by the pharmacist is based on the pharmacist's knowledge of the drug and on his concerns about drug-related problems observed in the pharmacy on a day-to-day basis<sup>27,28</sup>. In various countries, the changing

role of the pharmacist has already led to a more structured cooperation in the form of regular Pharmacotherapeutic Audit Meetings (PTAMs) between general practitioners and pharmacists. At these meetings, agreements are made with the objective of improving the pharmacotherapeutic care provided. Prescription figures are often used in these meetings to illustrate the behaviour of general practitioners in prescribing drugs and the associated variations that exist in drug administration<sup>25-27,29,30</sup>. These variations can also be seen with the help of prescribing indicators derived from existing evidence-based guidelines. These indicators consequently provide an indication of the quality of the drug prescribing<sup>31-34</sup>.

Drug prescription as an important part of the general practitioner's tasks has already been mentioned. General practitioners differ in the quality of their prescribing patterns and many pharmacists try to exert a positive influence on this. Therefore, more insight needs to be gained into the factors associated with the differences in the quality of prescribing drugs and in particular the pharmacist's influence on these variations. Our study aims to clarify the factors contributing to the variation in drug prescribing between general practitioners and the influence of pharmacists on prescribing routines of general practitioners.

### **Aim and relevance of the study**

#### Quality and costs

The quality and the variation of prescribing drugs by general practitioners are influenced by a number of factors<sup>14</sup>. One of these factors might be the pharmacist's behaviour. Due to his knowledge of drugs, the pharmacist is frequently able to assess whether a drug has been prescribed optimally for a particular case. Moreover, as a consequence of the increasing focus on care and the existing cooperation with general practitioners, the pharmacist is also likely to contribute in the optimal use of drugs in primary care.

The influence of the pharmacist with respect to signalling drug-related problems, such as prescription mistakes and drug interactions, is clearly existent and also generally accepted<sup>27,28,35</sup>.

Despite the pharmacist's specific expertise and the existing cooperation among pharmacists and general practitioners, in most countries, the pharmacist does not yet have a clearly defined role in the appropriate choice of drug <sup>35-37</sup>. Therefore, gaining more insight into the quality of and into the pharmacist's role in pharmacotherapy is required. Our study aims to clarify how the pharmacist's care-providing function influences the quality of prescribing by general practitioners.

Clarifying these effects would be relevant for both the quality of and for the costs associated with the pharmacotherapeutic care provided:

- If the pharmacist's care-providing function satisfies a need among general practitioners, is associated with the prescribing behaviour by general practitioners, and is characterised by improved adherence to generally accepted guidelines, then a more clearly defined care-providing function of the pharmacist in primary care would be recommended.
- If the pharmacist's care-providing function does not satisfy a need among general practitioners and is also not associated with a prescribing behaviour that is characterised by an improved adherence to generally accepted guidelines, then questions will need to be raised about the consequences of this for the costs incurred for pharmaceutical help. This would mostly deal with the costs incurred for the pharmacist's remuneration; in the Netherlands this accounts for about one-quarter of the drug costs <sup>22</sup>.

From different perspectives, additional support was sought for the hypothesis that the pharmacist's care-providing function satisfies a need among general practitioners and is associated with a prescribing behaviour characterised by improved adherence to generally accepted guidelines.

We have therefore formulated a number of research questions with respect to the underlying relationships between general practitioners and pharmacists, to the manner in which pharmacists fulfil the care-providing function, to the possibility to measure the quality of prescribing by general practitioners, and to the possible determinants of the quality of prescribing by general practitioners which are associated with the pharmacist's care-providing function. These research questions are presented in greater detail in chapter 2.

## Structure of the thesis

**Chapter 2** gives the background of the research. The prescribing behaviour of general practitioners, the influence of guidelines and the influence of the pharmacist are discussed using the context of the scientific literature. Consideration is also given to the development of the pharmacist's care-providing function. The research questions are presented in this chapter together with a short description of the measuring instruments which were used to conduct the research.

**Chapter 3** details a cross-sectional study which investigates whether the opinions of general practitioners about the pharmacist's expertise, task, responsibilities and role, differ from those of pharmacists. In addition this study looks into the factors associated with the attitude of general practitioners towards the pharmacist's care-providing function.

A second cross-sectional study is presented in **chapter 4**. This study investigates the extent to which pharmacy-specific and person-specific factors among pharmacists are associated with the three most important aspects of the care-providing function: the *care for the individual patient*, the *cooperation with prescribers* and the *registration of the care provided*.

**Chapter 5** describes the development and the validation of prescribing indicators based on national general practice guidelines. Prescribing indicators make it possible to estimate the quality and the variation that exists in the general practitioners' prescribing behaviour. These indicators were used to investigate the differences among general practitioners with respect to prescribing drugs, as presented in **chapter 6**. In this study we paid particular attention to determinants of following guidelines related to the attitude of general practitioners with respect to the pharmacist's role and to the manner in which general practitioners cooperated with pharmacists. The prescribing indicators developed were also used to carry out the study reported in **chapter 7**, which again examines the differences among general practitioners with respect to prescribing drugs. However, in this study we particularly focused on determinants related to the care-providing function of the pharmacist with whom the general practitioner cooperated.

The results of this study are discussed in more detail in **chapter 8**. This chapter also considers the implications of the encompassing research for daily practice and provides

recommendations for further research. A summary of the thesis is given in **chapter 9**. The **appendix** provides an overview of the questionnaires compiled for the study as well as of the prescribing indicators developed.

## References

1. Van der Heide H, Tinke JL. Facts and figures, cost development of pharmaceutical aid. The Hague, The Netherlands: Foundation for Pharmaceutical Statistics; 1999 [www.sfk.nl/english/index.html](http://www.sfk.nl/english/index.html). Accessed 1 February 2005.
2. RCGP information sheets. Prescribing in general practice. London UK: Royal College of General Practitioners; Oct. 2000.
3. Linjakumpu T, Hartikainen S, Klaukka T, Veijola J, Kivela SL, Isoaho R. Use of medications and polypharmacy are increasing among the elderly. *J Clin Epidemiol* 2002;55(8):809-17.
4. Veehof L, Stewart R, Haaijer-Ruskamp F, Jong BM. The development of polypharmacy. A longitudinal study. *Fam Pract* 2000;17(3):261-7.
5. The Dutch guidelines for general practitioners <http://nhg.artsennet.nl> (English). Accessed 1 February 2005.
6. The Scottish Intercollegiate Guidelines Network: [www.sign.ac.uk/about/introduction.html](http://www.sign.ac.uk/about/introduction.html). Accessed 1 February 2005.
7. New Zealand Guidelines Group: [www.nzgg.org.nz](http://www.nzgg.org.nz). Accessed 1 February 2005.
8. Guideline Development Project Consortium, Australia. [www.health.gov.au/nhmrc/publications/cphome.htm](http://www.health.gov.au/nhmrc/publications/cphome.htm). Accessed 1 February 2005.
9. NCG (National Guideline Clearinghouse), USA: [www.guideline.gov/](http://www.guideline.gov/). Accessed 1 February 2005.
10. Geijer RMM, Burgers JS, van der Laan JR, Wiersma Tj, Rosmalen CFH, Thomas S. *Standaarden voor de huisarts [Practice guidelines for general practitioners]*. 2nd ed. Utrecht, The Netherlands: Bunge;1999.
11. Watkins C, Harvey I, Carthy P, Moore L, Robinson E, Brawn R. Attitudes and behaviour of general practitioners and their prescribing costs: a national cross sectional survey. *Qual Saf Health Care* 2003;12(1):29-34.
12. Mantyselka P, Ahonen R, Kumpusalo E, Takala J. Variability in prescribing for musculoskeletal pain in Finnish primary health care. *Pharm World Sci* 2001;23(6):232-6.
13. Jones MI, Greenfield SM, Jowett S, Bradley CP, Seal R. Proton pump inhibitors: a study of GPs' prescribing. *Fam Pract* 2001;18(3):333-8.
14. Haaijer-Ruskamp FM, Denig P. Invloeden bij het kiezen van geneesmiddelen [Influences on general practitioners' decisions to prescribe drugs]. *Geneesmiddelenbulletin* 2001;35: 37-43.
15. Bjerrum L, Bergman U. Wide variation in the number of different drugs prescribed by general practitioners. A prescription database study. *Scand J Prim Health Care* 2000;18(2):94-8.
16. Bjerrum L, Sogaard J, Hallas J, Kragstrup J. Polypharmacy in general practice: differences between practitioners. *Br J Gen Pract* 1999;49(440):195-8.

17. Guillemot D, Carbon C, Vauzelle-Kervroedan F, Balkau B, Maison P, Bouvenot G, Eschwege E. Inappropriateness and variability of antibiotic prescription among French office-based physicians. *J Clin Epidemiol* 1998;51(1):61-8.
18. McBride JE, Pater JL, Dorland JL, Lam YM. Extent and variation of omeprazole prescribing in an elderly population of Ontario. *Ann Pharmacother* 1997;31(4):411-6.
19. Beijer HJ, de Blaey CJ. Hospitalisations caused by adverse drug reactions (ADR): a meta-analysis of observational studies. *Pharm World Sci* 2002;24(2):46-54.
20. Zhan C, Sangl J, Bierman AS, Miller MR, Friedman B, Wickizer SW, et al. Potentially inappropriate medication use in the community-dwelling elderly: findings from the 1996 Medical Expenditure Panel Survey. *JAMA* 2001;286(22):2823-9.
21. Tamblyn RM, McLeod PJ, Abrahamowicz M, Monette J, Gayton DC, Berkson L, et al. Questionable prescribing for elderly patients in Quebec. *CMAJ* 1994;150(11):1801-9.
22. Tinke JL, Griens AMGF. Data en feiten [Facts and figures]. The Hague. The Netherlands: Foundation for Pharmaceutical Statistics; 2003.
23. Van Dijk L, Barnhoorn H, De Bakker D. Het Farmacotherapie Overleg in 1999, stand van zaken en effecten op voorschrijven [Pharmaco-therapeutic audit meeting in 1999, current situation and effects on prescribing]. Utrecht. The Netherlands. Nivel;2001.
24. Van den Hoogen HJ, HooijmansGLJ, Meulepas M. Samen voorschrijven. [Prescribing together]. *Medisch Contact* 1999;54(41):1399-1401.
25. Bradley CP, Taylor RJ, Blenkinsopp A. Primary care, opportunities and threats. Developing prescribing in primary care. *BMJ* 1997;314(7082):744-7.
26. Beney J, Bero LA, Bond C. Expanding the roles of outpatient pharmacists: effects on health services utilisation, costs, and patient outcomes (Cochrane Review). In: *The Cochrane Library*, 4, 2001. Oxford.
27. Van Mil JW, Dudok van Heel MC, Boersma M, Tromp TF. Interventions and documentation for drug-related problems in Dutch community pharmacies. *Am J Health Syst Pharm* 2001;58(15):1428-31.
28. Buurma H, de Smet PA, van den Hoff OP, Egberts AC. Nature, frequency and determinants of prescription modifications in Dutch community pharmacies. *Br J Clin Pharmacol* 2001;52:85-91.
29. Hakansson A, Andersson H, Cars H, Melander A. Prescribing, prescription costs and adherence to formulary committee recommendations: long-term differences between physicians in public and private care. *Eur J Clin Pharmacol* 2001;57(1):65-70.
30. Kocken GA. Medication discussion groups in the Netherlands: five years of experience. *Med Educ* 1999;33(5):390-3.
31. Haaijer-Ruskamp FM, Hoven JL, Mol PG (2004). A conceptual framework for constructing prescribing quality indicators: a proposal. WHO Regional Office for Europe, Copenhagen.
32. Cantrill JA, Sibbald B, Buetow S. Indicators of the appropriateness of long-term prescribing in general practice in the United Kingdom: consensus development, face and content validity, feasibility, and reliability. *Qual Health Care* 1998;7(3):130-5.
33. Lawrence M, Olesen F. Indicators of quality in healthcare. *Eur J Gen Pract* 1997;3: 103-8.

34. Bateman DN, Eccles M, Campbell M, Soutter J, Roberts SJ, Smith JM. Setting standards of prescribing performance in primary care: use of a consensus group of general practitioners and application of standards to practices in the north of England. *Br J Gen Pract* 1996;46(402):20-5.
35. Carroll NV. Do community pharmacists influence prescribing? *J Am Pharm Assoc (Wash DC)* 2003;43(5):612-21.
36. Florentinus S. Invloed apotheker in kaart gebracht [Community pharmacists' influence on prescribing]. *Pharm Weekbl* 2002;137(35):1237.
37. Watson M, Gunnell D, Peters T, Brookes S, Sharp D. Guidelines and educational outreach visits from community pharmacists to improve prescribing in general practice: a randomised controlled trial. *J Health Serv Res Policy* 2001;6(4):207-13.



## Chapter 2

### Background, research questions and measuring instruments

#### Background

The research described in this thesis focuses on the quality of prescribing by general practitioners and the pharmacist's role in this. We have related the quality of prescribing to existing evidence-based guidelines. The prescribing routines of general practitioners, the influence of clinical guidelines and the influence of the pharmacist on these prescribing routines form the background to this research. Each of these aspects are discussed in more detail below.

#### The prescribing behaviour of general practitioners

Drug prescription patterns differ considerably among individual general practitioners<sup>1-7</sup>. Previous research has been aimed at determining factors which may account for these differences. These factors can be divided into five categories: General person-specific and practice-specific characteristics, pharmaceutical aspects, the effect of guidelines, the effect of information and education (postgraduate training, pharmacist, pharmaceutical industry) and the influence of the patient<sup>8,9</sup>.

With respect to the person-specific and practice-specific characteristics, there are indications in various countries that high-volume prescribing is positively associated with male doctors, running a large practice or a solo practice, working in dispensing practices, not being a GP trainer and running a practice in a deprived area<sup>1, 9-14</sup>.

Pharmaceutical aspects such as efficacy and safety also have a significant effect on the choice for a drug. However, it is striking that other influences are often found to be stronger; for example, obsolete or ineffective drugs are still prescribed, and there are also cases where the newest drugs assume a status which they do not deserve, due to the insufficiently described side-effect profile<sup>12, 15-17</sup>. In addition the marketing strategy of the pharmaceutical industry has been shown to have a clear effect on the choice for a given drug<sup>18-20</sup>.

The influence of the patient is particularly related to the decision to prescribe. Expectations and emotions play a role in this, for example, if doctors feel pressured by a patient to prescribe a certain drug, such as antibiotics, sedatives and drugs for symptomatic treatments<sup>21,22</sup>.

In our study, we have mainly focused on the influence of pharmacotherapeutic guidelines and on the influence of the advisory and informing role which pharmacists have started to assume by providing pharmaceutical care. These are two relatively new effects which arose in the 1990s, which require more insight in determining their impact on the quality of prescribing. These two effects are discussed in more detail below.

### **The effect of clinical guidelines**

In many countries evidence-based clinical guidelines are available to help general practitioners make decisions on the best medication from the wide spectrum of available drugs<sup>23-28</sup>.

The situation in the Netherlands where the research was carried out will be briefly explained to illustrate the development and the effect of clinical guidelines.

Since 1983 the Health Care Insurance Board (Dutch acronym: CVZ) has published the *Farmacotherapeutisch Kompas* on a yearly basis<sup>29,30</sup>. This *Farmacotherapeutisch Kompas* lists all drugs available in the Netherlands, and provides recommendations about the treatment of disorders with drugs, based on pharmacotherapeutic as well as economic considerations. The *Farmacotherapeutisch Kompas* primarily provides a pharmacological assessment; drugs which should no longer be prescribed receive a negative recommendation, and are printed in red. Only in case where the quality of the various drugs do not differ, are economic considerations taken into account. The recommendations given in the *Farmacotherapeutisch Kompas* are regarded as an important source of information by many prescribers<sup>31,32</sup>.

In 1989, the Dutch College of General Practitioners (Dutch acronym: NHG) started to publish clinical guidelines according to a systematic, evidence-based procedure. New guidelines are published in the monthly journal *Huisarts en Wetenschap*, and a laminated card with an overview is included. Each guideline is supported by evidence drawn from published scientific results, is freely available on the Internet and is

supplemented by educational materials wherever possible. The evidence-based character of the NHG practice guidelines is still improving: since 2001, gaps in the scientific evidence have been systematically listed and recorded in the form of research questions <sup>23,33</sup>. The NHG practice guidelines, which contains pharmacotherapy recommendations, are considered to be generally accepted <sup>34-36</sup>. The guidelines from the *Farmacotherapeutisch Kompas* generally match the pharmaceutical recommendations given in the NHG guidelines (see chapter 5).

Despite the existence of these freely accessible guidelines, their influence is often limited, and a clear gap between best-practice based on guidelines and day-to-day practice exists <sup>37</sup>. There are many possible causes for this, such as lack of time, anxiety for criticism from colleagues, disagreement with the guideline content, lack of financial incentives and lack of knowledge and skills for change. Non-person-specific factors such as legislation, marketing activities by the pharmaceutical industry and the distribution of prescription drugs also play a role <sup>38,39</sup>.

The developments which have occurred in the Netherlands illustrate that the implementation of guidelines requires more than just their dissemination. As this was realised over the course of time, policies focused on implementation were introduced. Since 1991, an accompanying policy has been introduced in which general practitioners are remunerated for their participation in pharmacotherapeutic audit meetings (PTAM) and in which the PTAM process is supported by professionals from the Dutch Institute for Effective Use of Medication <sup>40</sup>. In addition, the government is planning to give the pharmacist the legal status of 'care provider', thereby aiming to give pharmacists the right to provide pharmaceutical care to patients, both independently and in consultation with the prescriber <sup>41</sup>. This development assumes that pharmacists are drug experts, who are familiar with the guidelines concerning the treatment of patients, and who will use their specific knowledge to exert a positive influence, both on the prescription as well as on the use of drugs. Dependent on the degree of cooperation between general practitioners and pharmacists or the level at which the PTAM functions, several studies have found indications for a measurable effect on the quality of prescribing <sup>9, 42-44</sup>. The developments in the Netherlands described above confirm that guidelines are more effective when embedded in existing structures. As previously stated, merely

disseminating prescription guidelines has little effect; different controlled studies have even demonstrated that written feedback to general practitioners with respect to compliance with prescription guidelines, hardly influences the prescribing behaviour<sup>45-47</sup>. Programmes focused on implementing guidelines must be thoroughly prepared and clearly described and embedded within existing structures aimed at improving care<sup>48</sup>. Several theories and models with respect to this are now available. However, the value of these models has not yet been established, and further research in prospective studies is needed<sup>39</sup>.

Prescribing indicators derived from these guidelines are needed to investigate the extent to which prescription guidelines have been implemented or are complied with.

### **The influence of the pharmacist**

The pharmacist's role in healthcare has changed over the past 20 years. Whereas until well into the 20th century pharmacists mainly focused on preparing drugs, nowadays hardly any preparation takes place in the pharmacy<sup>49-52</sup>. Instead, there is now a clearer focus on the patient. Advising patients, consulting with prescribers and drug monitoring have now become part of the pharmacist's care-providing function.

The start of the 1990s marked an important turning point in the pharmacist's role in healthcare. In this period, the pharmacist's care-providing function was established and the term 'pharmaceutical care' was defined as 'the structured, intensive care of the pharmacist for an optimal pharmacotherapy in which the patient and his condition are the primary concern'. The aim is to obtain optimal health-related quality of life<sup>53,54</sup>.

### ***The effects of a care-providing function***

The changing role and position of the pharmacist in healthcare over the past 20 years can be characterised by a more patient-oriented approach by the pharmacist, which has led to the practising of a care-providing function. The effects of the pharmacist's care-providing function have been investigated in earlier studies. A Cochrane Review of these developments, published in 2000, concluded that it is worthwhile for pharmacists to continue advising patients about the use of drugs and providing doctors with information about pharmacotherapy. It also transpired that: 'there is some evidence that

counselling by pharmacists directed towards people with diabetes or hypertension improves their outcomes<sup>55</sup>.

Using the same MeSH headings, 'pharmacy' and 'pharmacist', as used in the Cochrane Review we searched via Medline from 2000-2005 and selected publications dealing with: 'randomised controlled trial', 'controlled clinical trial', 'comparative studies', 'follow-up studies', 'prospective studies', or 'evaluation studies'.

Since the research described in this thesis focuses on the quality of prescribing by general practitioners and the pharmacist's role in this, we included only the studies related to cooperation between pharmacists and general practitioners as described in the table below.

### Recent studies about the new role of the pharmacist related to the co-operating with general practitioners

Ref	Year	Objective	Setting	Design	Results
55	2000	To examine the effect of expanding the roles of outpatient pharmacists.	Cochrane Effective Practice and Org.of Care Group.	Systematic Cochrane review.	It is worthwhile for pharmacists to continue advising patients about the use of drugs and providing doctors with information about pharmacotherapy. More rigorous research is needed to document the effects of outpatient pharmacist interventions.
59	2000	Evaluation of an educational program designed to help physicians control the overall cost of drugs and total health care.	St. Paul, MN, USA. 12 general medicine clinics in a managed health care plan.	Comparative study.	Pharmacists acting as advisers to primary care physicians in general medicine clinics contributed to an overall reduction of cost for drugs and total health care.
60	2000	To compare a community pharmacist-managed repeat prescribing system with established methods of managing repeat prescribing.	Dep. of General Practice and Primary Care University of Aberdeen. 19 GP practices.	Randomised controlled trial.	A system of managing repeat prescribing has been demonstrated to be logistically feasible, to identify clinical problems, and to make savings in the drugs bill.
61	2000	To study the use of a clinical pharmacist as a therapeutics adviser to modify antibiotic prescribing by general practitioners.	Department of Pharmacology University of Western Australia 112 GPs.	Randomised controlled trial.	The academic detailing process was successful in modifying prescribing patterns and it also decreased prescription numbers and costs. Application of the scheme on a nationwide basis could not only improve prescriber choice of the most appropriate antibiotic but also result in a significant saving of health care dollars.

Ref	Year	Objective	Setting	Design	Results
68	2000	To evaluate the cost-effectiveness of a community pharmacy based programme for therapeutic outcomes monitoring of asthma patients' drug therapy.	Research and Development Division, Pharmakon, Danish College of Pharmacy Practice, Hilleroed. 139 GPs.	controlled clinical trial. Multicenter Study.	It is concluded that the community pharmacist can contribute to identify and solve drug-related problems in a cost-effective way with positive impact on asthma patients health, clinical and psycho-social outcomes, even though the program is time consuming and intensive.
66	2000	To determine the impact of ambulatory care clinical pharmacist interventions on clinical and economic outcomes of patients with dyslipidemia.	University of Colorado, School of Pharmacy, Denver, USA. 208 patients with dyslipidemia and 229 Controls. Nine medical centers.	Randomised controlled trial.	Ambulatory care clinical pharmacists can significantly improve dyslipidemia in a practice setting designed to manage drug-related problems.
67	2000	To study the the ability of a pharmacist outreach program to address underutilisation of ACE inhibitors.	School of Pharmacy, University of Colorado. All physicians and community pharmacies (150) on Newfoundland's Avalon Peninsula.	Randomised controlled trial.	A pharmacist outreach program involving the use of prescription records and academic detailing did not affect prescribing or dosages of ACE inhibitors but demonstrated value as a quality assurance tool.
72	2000	To determine whether a medicine review and education programme influences the compliance and knowledge of older people in general practice.	General practice. Division of Academic Pharmacy Practice, Univ. of Leeds. 1477 patients of 65 years or older in general practice in a suburb.	Controlled clinical trial.	A general practice based medication review and education programme improved medicine compliance and knowledge of older people in the short term.
77	2001	To describe the processes of care used by CPs in terms of drug-related problems (DRPs) and status of DRPs at follow-up.	Faculty of Pharmaceutical Sciences, Univ. of British Columbia. 159 patients, 65 years or older, taking 3 or more medications.	Follow-up study.	On follow-up, 40% of the 559 DRPs identified were resolved, controlled, or improved. Patients accepted 76% of pharmacists recommendations, and physicians accepted 72% of pharmacists' suggested resolutions of DRPs.

Ref	Year	Objective	Setting	Design	Results
58	2001	To determine whether a pharmacist can effectively review repeat prescriptions through consultations with elderly patients in general practice.	Division of Academic Pharmacy Practice, School of Healthcare Studies, University of Leeds, UK. 4 practices.	Randomised controlled trial.	A clinical pharmacist can conduct effective consultations with elderly patients in general practice to review their drugs. Such review results in significant changes in patients' drugs and saves more than the cost of the intervention without affecting the workload of general practitioners.
71	2001	Evaluation of randomised trials of counselling, education, and other clinical services provided by pharmacists.	Center for Pharmaceutical Health Services Research, Temple University, Philadelphia, PA, USA.	Evaluation study.	These trials demonstrated that counselling of patients and their physicians by pharmacists can improve patient outcomes. The evidence that counselling of patients alone improved patient outcomes was good, though weaker because of suboptimal trial design.
74	2001	To study the effect of medication review led by a pharmacist on resolution of pharmaceutical care issues, medicine costs, use of health and social services and health-related quality of life.	General medical practices in Scotland UK 332 patients of 65 years or older.	Randomised controlled trial.	No changes in medicine costs or health-related quality of life in either group. Small increases in contacts with health-care professionals and slightly fewer hospital admissions among the intervention group than the control group. Pharmacist-led medication review has the capacity to identify and resolve pharmaceutical care issues and may have some impact on the use of other health services.
78	2001	To measure the outcomes of a harmonised, structured pharmaceutical care programme provided to elderly patients.	Multicentre study in seven European countries.	Randomised controlled trial.	The pharmacists involved in providing pharmaceutical care had a positive opinion on the new approach, as did the majority of general practitioners surveyed.
57	2002	To examine the prevalence of prescriptions that offer the opportunity for generic drug use, to examine the prevalence of generic drug use by examining the rate of generic drug prescribing and the rate of generic substitution by pharmacists.	School of Pharmacy, University of Wisconsin-Madison. 6380 prescriptions.	Comparative study.	Pharmacists play a large and important role in generic drug use and efforts to increase generic drug use directed at pharmacists should be maintained. Additional efforts to increase generic drug use likely should be targeted at prescribers.

Ref	Year	Objective	Setting	Design	Results
69	2002	To determine the effectiveness of structured adherence counselling by pharmacists on the eradication of <i>Helicobacter pylori</i> .	Kaiser Center for Health Research, Portland, USA. Group-practice, 1393 adult dyspeptic patients.	Randomised controlled trial.	In this study, additional counselling by pharmacists did not affect self-reported adherence to the treatment regimen, eradication rates, or dyspepsia symptoms but did increase patient satisfaction.
65	2002	To determine the effect of a program of community pharmacist intervention on the process of cholesterol risk management in patients at high risk for cardiovascular events.	54 community pharmacies Heritage Medical Research Centre, Edmonton, Alberta, Canada.	Randomised controlled trial.	A community-based intervention program improved the process of cholesterol management in high-risk patients. This program demonstrates the value of community pharmacists working in collaboration with patients and physicians.
64	2003	determining the effect of a pharmacist-led intervention on medication compliance in patients with heart failure.	152 patients presenting to a cardiology outpatient clinic or admitted to hospitals in the Netherlands.	Randomised controlled trial.	A pharmacy-led intervention can improve medication compliance in patients with moderate to severe heart failure, even in those with relatively high compliance.
70	2003	To evaluate the acceptability, utility and impact of evidence-based therapeutic guides on patients.	Faculty of Pharmaceutical Sciences, Univ. of British Columbia 1176 patients.	Prospective study.	Physicians and pharmacists reported that the guides helped their patients understand the issues involved in their treatment.
75	2003	To examine whether the intervention by a specially trained pharmacist could reduce the number of daily medication units taken by elderly patients, as well as costs and health care use.	48 randomly selected family physicians, Ontario.	Randomised controlled trial.	Physicians were receptive to the recommendations to resolve drug-related problems, suggesting that collaboration between physicians and pharmacists is feasible.
63	2003	To evaluate the role of the pharmacist in establishing lipid intervention programs.	Department of Pharmacy Practice, University of the Pacific, Stockton, California, USA.	Evaluation study.	Results of several studies evaluating intervention programs indicate that pharmacists can play a key role in improving cholesterol management. These interventions were associated with decreases in clinical events.

Ref	Year	Objective	Setting	Design	Results
76	2003	To gather opinions of patients, GPs, and CPs development of a system of electronic transfer of prescription-related information between GPs and community pharmacies.	Department of General Practice and Primary Care, University of Aberdeen 200 GPs, 200 CPs, 800 patients.	Comparative study.	Electronic transfer of prescription-related information is likely to be acceptable to all users, but concerns about patient confidentiality and an extended role for pharmacists in prescription management need to be addressed.
62	2004	To evaluate a pharmacist-conducted programme to promote dietary and lifestyle modification and compliance with lipid-lowering drug therapy.	School of Pharmacy, University of Tasmania, Hobart, Tasmania, Australia. 94 patients.	Randomised controlled trial.	The reduction in total cholesterol in the intervention group should translate to an expected 21% reduction in cardiovascular mortality risk and a 16% reduction in total mortality risk, more than twice the risk reduction achieved in the control group. In addition, the programme was very well received by the patients and their general practitioners, by satisfaction questionnaire.
73	2004	To review evidence from RCTs to determine whether drug related problems can be modified by providing clinical pharmacy services for the elderly	Division of Geriatric Medicine, University of Pittsburgh. 14 RCTs in community-based settings.	Comparative study.	The studies provided considerable evidence that clinical pharmacy interventions reduced the occurrence of drug related problems in the elderly but showed limited evidence that such interventions reduced morbidity, mortality, or health care costs.
56	2004	To measure the cost and utilisation outcomes of pharmacist intervention in a primary care medical group.	Primary care medical group operating under a financial risk contract with a health plan. 65 primary care physicians	Evaluation study.	A targeted educational program for physician-prescribers conducted by a clinical pharmacist working for a primary care medical group can reduce the expenditures for outpatient drug therapy by lowering the average cost per pharmacy claim.

From a number of recent studies about the new role of the pharmacist that have been published since the Cochrane Review it has emerged that a clear cost reduction can be achieved with respect to repeat prescriptions, generic substitution and the average cost per pharmacy claim <sup>56-60</sup> and that in addition to these cost reductions, interventions by pharmacists can lead to a better choice of antibiotics <sup>61</sup>, or an improved compliance of patients with high cholesterol levels or heart failure <sup>62-67</sup>. Interventions by the pharmacist can have a positive effect on the satisfaction of asthma patients and dyspeptic patients <sup>68,69</sup> and can also lead to a high compliance as well as a reduction in the problems

experienced with drugs <sup>70-72</sup>. In addition there are indications that clinical pharmacy interventions reduces the occurrence of drug related problems in the elderly and can result in fewer hospital admissions <sup>73,74</sup>.

A number of recent studies have also revealed that general practitioners are open to recommendations from pharmacists and that they have a positive opinion about the pharmacist's care-providing function <sup>75-78</sup>.

In various studies, the effects of the pharmacist's care-providing function were visible under the controlled circumstances of the study design. However, these controlled circumstances are not present in day-to-day practice. General practitioners and pharmacists differ in the degree to which they want to cooperate, and among pharmacists, there are differences with regards to practising a care-providing function. Moreover, the cooperation is in principle on a voluntary basis <sup>42, 79-86</sup>. The consequences of this for the day-to-day practice of the pharmacist's care-providing function, which is partly focused on providing optimal pharmacotherapy for the patient, are not clear.

### ***The implementation of pharmaceutical care***

Within the pharmaceutical world, the care-providing function i.e. the concept of pharmaceutical care as described above, is generally accepted and widely understood, but in most countries, the implementation of pharmaceutical care in healthcare is proceeding slowly and a final form of this has yet to be established <sup>87-96</sup>. The developments which have occurred in the Netherlands reflect this situation and form an important background to this thesis. We will therefore briefly describe these developments.

In an average-sized Dutch pharmacy, some 200 prescriptions are prepared and supplied every day <sup>51</sup>. This large number implies that it is impossible for the pharmacist to personally assist all patients. The pharmacist has therefore partly delegated the care-providing function to the pharmacy assistants. Automated drug monitoring systems play a supporting role in this regard. Many pharmacies do not only register the supplied drugs, but they also register other care-related information that is relevant for monitoring the care provided <sup>97-99</sup>. However, part of the care-providing function cannot be delegated, as this requires the professional expertise of the pharmacist. A balanced and

transparent distribution of tasks within the pharmacy team is therefore necessary<sup>100</sup>. As the pharmacist does not take the initiative to treat a patient, harmonisation and cooperation with prescribers is of high importance to the practising of the care-providing function of a pharmacist. The position occupied by the pharmacist within primary care was, as previously indicated, formalised in 1991 with the official introduction of the PTAM and will shortly become more significant with the inclusion of the pharmacist in the Medical Treatments Agreement act (Dutch acronym: WGBO)<sup>41,42,101</sup>. For independent pharmacists, a care-providing function is associated hand in hand with a retail function sparking a public debate in recent years<sup>102-106</sup>. Separating the care-providing and retail functions is often seen as an important condition for a credible care-providing function of the pharmacist<sup>107</sup>. Maximising profits by selling drugs to sick people is considered to be an ethical dilemma. This problem is difficult to solve within the existing context of Dutch pharmacy practice, since the pharmacist has to devote a lot of attention to financial matters, due to cost-saving measures from the government<sup>108</sup>.

In our study of the quality of prescribing by general practitioners and the influence of the pharmacist thereon, we have mainly focused on the pharmacist's care-providing function. We have assessed this function on the basis of the previously described definition of pharmaceutical care. We distinguish three important duties in the pharmacist's care-providing function: *individual patient care* in the direct patient contact, the *cooperation with prescribers* in aiming to achieve optimal pharmacotherapy and *the registration of the care provided*.

The care-providing role, in contrast to the traditional role of the pharmacist as a preparer of drugs, is not yet generally accepted, and there is still little insight into the influence of pharmacy-specific and person-specific factors on the care-providing process<sup>82-84, 86</sup>.

For centuries, pharmacists mostly focused on the drug. The increased focus on the patient is a recent phenomenon of the past few decades<sup>52</sup>. This rapid shift in focus implies that the pharmacist's position in community health has not yet been clearly established. In 1999, the Royal Dutch Medical Association (Dutch acronym: KNMG) still did not consider the pharmacist to be a fellow care provider, not even in the area of pharmacotherapy<sup>109</sup>. In that same year, the World Medical Association also failed to

recognize the pharmaceutical care provided by the pharmacist<sup>110</sup>. Despite the present oppositions, pharmacists in the Netherlands have taken the initiative to focus on pharmaceutical care<sup>111-114</sup>.

Assuming an added value of the pharmacist's care-providing role, the Dutch Pharmacist's Association (Dutch acronym: KNMP) started a publicity campaign aimed at improving the pharmacist's image<sup>113, 115-119</sup>. The pharmacist was referred to as the 'ideal drug expert'. Many pharmacists participated in projects that took the form of 'themed weeks'. However, there was no follow-up in the form of a national evaluation of the result, and therefore, no measurable added value of the care-providing function practice was obtained.

Before 1991, in many places, regular consultations between general practitioners and pharmacists already took place, and there were sufficient reasons to assume that such consultations can be valuable<sup>120-124</sup>. Following the official introduction of the PTAM in 1991, within the framework of the accompanying policy, pharmacists and prescribers started to cooperate more. However, the pharmacist's task was and still is not clear enough. It is not clear what prescribers can expect from the pharmacist and what the position of the pharmacist is within primary care. Therefore, a better comprehension of the opinion of general practitioners concerning the expertise, task, responsibility and role of a pharmacist in pharmacotherapy and of the degree to which the opinions among GPs and pharmacists differ, needs to be attained. As described in the previous section a better insight also needs to be gained into the consequences of the pharmacist's care-providing function for the quality of prescribing in the day-to-day practice.

Our study focuses on the quality of prescribing by general practitioners and on the pharmacist's role in that. In light of the previously discussed background, we have formulated the following research questions:

### **Research questions**

1. What is the opinion of general practitioners concerning the expertise, task, responsibility and role of the pharmacist in pharmacotherapy; on what extent do their views differ from those of pharmacists? (chapter 3).

2. Which factors are associated with the attitude of general practitioners towards the pharmacist's role? (chapter 3).
3. What effect do pharmacy-specific and person-specific factors have on the care-providing processes in the pharmacy (i.e. on individual patient care, the cooperation with prescribers and the registration of the care provided)? (chapter 4).
4. Can prescribing indicators be formulated on the basis of existing general practice guidelines, which are suitable for describing the prescribing behaviour of general practitioners and the variation that exists in this behaviour? (chapter 5).
5. Is the quality of prescribing drugs by general practitioners related to their attitude towards the pharmacist's role and how they cooperate with the pharmacist on a day-to-day basis and in the PTAM? (chapter 6).
6. Is the quality of prescribing drugs by general practitioners related to the care-providing function practised by the pharmacist with whom they cooperate in day to day practice? (chapter 7).

## **Measuring instruments**

### ***Questionnaire***

In 2001, a questionnaire was sent to all general practitioners and pharmacists who were active in the operating areas of two health insurers in the south of the Netherlands. Four million people reside in this part of the country, which covers a quarter of the Netherlands' total area. The healthcare infrastructure and medical consumption pattern in the southern part of the Netherlands are representative for the rest of the country <sup>125</sup>.

A total of 1574 general practitioners and 399 pharmacists received a questionnaire.

The questions and statements were initially formulated on the basis of the authors' personal experience in the area of pharmacotherapeutic care and on the basis of data taken from scientific literature. The 'Pharmacy check for basic pharmaceutical care' as published by the KNMP in 2000, was also used <sup>126</sup>. The final versions of the questionnaires were compiled following discussions with experts, and the incorporation of comments from 10 general practitioners and 10 pharmacists <sup>127</sup>.

The questionnaires were sent out in mid-May 2001 along with a short explanation. As a second pharmacist is present in about half of the pharmacies, two questionnaires were

sent to each pharmacy. Three weeks later, a reminder was sent to non-respondents. Ten weeks after the reminder had been sent, 15 percent of the non-respondents were randomly selected for a telephone questionnaire.

The privacy of the respondents was ensured by processing the questionnaires anonymously using bar codes <sup>128</sup>. The study was submitted to the medical ethics committee of Maastricht University and was compliant with the privacy rulings of the Dutch Data Protection Authority. The privacy aspects were stated in an accompanying letter. The completion and return of the questionnaire was rewarded with a gift token. The content of the questionnaires to general practitioners and pharmacists can be found in the appendix.

### ***Prescribing indicators***

In order to answer the fourth, fifth and sixth research questions, we firstly formulated 51 draft prescribing indicators based on medication recommendations in the NHG practice guidelines and the corresponding recommendations of the *Farmacotherapeutisch Kompas*. These prescribing indicators were presented to a panel of experts, who assessed their validity. Subsequently the utility and discriminating power of the remaining indicators were assessed using a prescription database, compiled from the prescription databases of 379 pharmacies, which contained prescriptions from 1434 general practitioners over a period of one year. Chapter 5 describes the development of the 20 prescribing indicators ultimately used. The text of the prescribing indicators is available at: [www.hag.unimaas.nl/onderzoek/hapo.htm](http://www.hag.unimaas.nl/onderzoek/hapo.htm) (Accessed 1 February 2005).

### **References**

1. Watkins C, Harvey I, Carthy P, Moore L, Robinson E, Brawn R. Attitudes and behaviour of general practitioners and their prescribing costs: a national cross sectional survey. *Qual Saf Health Care* 2003;12(1):29-34.
2. Mantyselka P, Ahonen R, Kumpusalo E, Takala J. Variability in prescribing for musculoskeletal pain in Finnish primary healthcare. *Pharm World Sci* 2001;23(6):232-6.
3. Jones MI, Greenfield SM, Jowett S, Bradley CP, Seal.R. Proton pump inhibitors: a study of GPs' prescribing. *Fam Pract* 2001;18(3):333-8.
4. Bjerrum L, Bergman U. Wide variation in the number of different drugs prescribed by general practitioners. A prescription database study. *Scand J Prim Health Care* 2000;18(2):94-8.

5. Bjerrum L, Sogaard J, Hallas J, Kragstrup J. Polypharmacy in general practice: differences between practitioners. *Br J Gen Pract* 1999;49(440):195-8.
6. Guillemot D, Carbon C, Vauzelle-Kervroedan F, Balkau B, Maison P, Bouvenot G, Eschwege E. Inappropriateness and variability of antibiotic prescription among French office-based physicians. *J Clin Epidemiol* 1998;51(1):61-8.
7. McBride JE, Pater JL, Dorland JL, Lam YM. Extent and variation of omeprazole prescribing in an elderly population of Ontario. *Ann Pharmacother* 1997;31(4):411-6.
8. Haaijer-Ruskamp FM, Denig P. Invloeden bij het kiezen van geneesmiddelen [Factors affecting the choice of drugs]. *Gebu* 2001;35:37-43.
9. Peeters-Udding LM. Prescription of drugs in general practice. Longitudinal changes and influence of a prescription formulary. Dissertation. University of Maastricht: The Netherlands; 2000.
10. Bjorner T, Laerum E. Factors associated with high prescribing of benzodiazepines and minor opiates. A survey among general practitioners in Norway. *Scand J Prim Health Care* 2003;21(2):115-20.
11. Stewart RE, Vroegop S, Kamps GB, van der Werf GT, Meyboom-de Jong B. Factors influencing adherence to guidelines in general practice. *Int J Technol Assess Health Care* 2003;19(3):546-54.
12. Steffensen FH, Sorensen HT, Olesen F. Diffusion of new drugs in Danish general practice. *Fam Pract* 1999;16(4):407-13.
13. Wilson RP, Hatcher J, Barton S, Walley T. The association of some practice characteristics with antibiotic prescribing. *Pharmacoepidemiol Drug Saf* 1999;8(1):15-21.
14. Wilson RP, Hatcher J, Barton S, Walley T. The influence of practice characteristics on the prescribing of benzodiazepines and appetite suppressant drugs. *Pharmacoepidemiol Drug Saf* 1998;7(4):243-51.
15. Prosser H, Walley T. New drug uptake: qualitative comparison of high and low prescribing GPs attitudes and approach. *Fam Pract* 2003;20(5):583-91.
16. Butler CC, Rollnick S, Pill R, Maggs-Rapport F, Stott N. Understanding the culture of prescribing: qualitative study of general practitioners' and patients' perceptions of antibiotics for sore throats. *BMJ* 1998;317(7159):637-42.
17. Ferner RE. Newly licensed drugs. *BMJ* 1996;313:1157-1158.
18. Watkins C, Moore L, Harvey I, Carthy P, Robinson E, Brawn R. Characteristics of general practitioners who frequently see drug industry representatives: national cross sectional study. *BMJ* 2003;326(7400):1178-9.
19. Wazana A. Physicians and the pharmaceutical industry: is a gift ever just a gift? *JAMA* 2000;283(3):373-80.
20. Angell M. The pharmaceutical industry--to whom is it accountable? *N Engl J Med* 2000;342:1902-4.
21. Cockburn J, Pit S. Prescribing behaviour in clinical practice: patients' expectations and doctors' perceptions of patients' expectations--a questionnaire study. *BMJ* 1997;315:520-3.
22. Bradley CP. Uncomfortable prescribing decisions: a critical incident study. *BMJ* 1992;304:294-6.
23. The Dutch guidelines for general practitioners <http://nhg.artsennet.nl> (English). Accessed 1 February 2005.
24. The Scottish Intercollegiate Guidelines Network:

- [www.sign.ac.uk/about/introduction.html](http://www.sign.ac.uk/about/introduction.html). Accessed 1 February 2005.
25. New Zealand Guidelines Group: [www.nzgg.org.nz](http://www.nzgg.org.nz). Accessed 1 February 2005.
  26. Guideline Development Project Consortium, Australia.  
[www.health.gov.au/nhmrc/publications/cphome.htm](http://www.health.gov.au/nhmrc/publications/cphome.htm). Accessed 1 February 2005.
  27. NCG (National Guideline Clearinghouse), USA: [www.guideline.gov/](http://www.guideline.gov/). Accessed 1 February 2005.
  28. Geijer RMM, Burgers JS, van der Laan JR, Wiersma Tj, Rosmalen CFH, Thomas S. Standaarden voor de huisarts [Practice guidelines for general practitioners]. 2nd ed. Utrecht, The Netherlands: Bunge;1999.
  29. Farmacotherapeutisch Kompas [The Pharmacotherapeutic compass]. Amstelveen. The Netherlands: Commissie Farmaceutische Hulp van het College Voor Zorgverzekeringen [Health Care Insurance Board];1982. Published annually.
  30. Farmacotherapeutisch Kompas [The Pharmacotherapeutic compass]. [Http://www.fk.cvz.nl](http://www.fk.cvz.nl). Accessed 1 February 2005).
  31. Den Hoedt M, Ruitkamp G. De raadpleegfunctie van het Farmacotherapeutisch Kompas [The consultative function of the Dutch Formulary]. Houten, The Netherlands: Ipso Facto;2003. (<http://www.ipsofacto.nl>. Accessed 1 February 2005).
  32. Taspinar A. Het Farmacotherapeutisch Kompas 2000/2001 [The Pharmacotherapeutic compass 2000/2001]. Ned Tijdschr Geneeskd 2000;144(37):1774-8.
  33. Burgers JS, Boluyt N. De kwaliteit van CBO-richtlijnen en NHG-Standaarden beoordeeld met het AGREE-instrument. [An assessment using the AGREE instrument of the quality of clinical practice guidelines produced by the Dutch Institute for Healthcare Improvement and the Dutch College of General Practitioners (NHG) evaluation]. Huisarts Wet 2004;47(9):394-9.
  34. Braspenning JCC, et al. Huisartsgeneeskundig handelen volgens richtlijnen [General practice according to guidelines]. In: Braspenning JCC, Schellevis FG, Grol RPTM, (eds). Tweede Nationale Studie naar ziekten en verrichtingen in de huisartspraktijk. Kwaliteit huisartsenzorg belicht [Second National Study into diseases and treatments in general practice. Discussion on quality of general practice]. Utrecht/Nijmegen: Nivel WOK; 2004.  
[http://www.nivel.nl/pdf/ns2\\_rapport4.pdf](http://www.nivel.nl/pdf/ns2_rapport4.pdf) . Accessed 1 February 2005.
  35. Burgers JS, Zaat JOM, Spies TH, van der Bij AK, Mookink HGA, Grol RPTM. De kwaliteit van de NHG-Standaarden. Beoordeling van 130 kernaanbevelingen uit 28 standaarden. [The quality of Dutch clinical guidelines for general practice. Appraisal of 130 key recommendations from 28 guidelines developed by the Dutch College of General Practitioners] Huisarts Wet 2002;45(7):349-53.
  36. Grol R, Dalhuijsen J, Thomas S, Veld C, Rutten G, Mookink H (1998) Attributes of clinical guidelines that influence use of guidelines in general practice: observational study. BMJ 26;317(7162):858-61.
  37. Grol R, Grimshaw J. From best evidence to best practice: effective implementation of change in patients' care. Lancet 2003;362(9391):1225-30.
  38. Veninga CC, Lundborg CS, Lagerlov P, Hummers-Pradier E, Denig P, Haaijer-Ruskamp FM. Treatment of uncomplicated urinary tract infections: exploring differences in adherence to guidelines between three European countries. Drug Education Project Group. Ann Pharmacother 2000;34(1):19-26.

39. Grol R, Wensing M. Implementation of quality assurance and medical audit: general practitioners' perceived obstacles and requirements. *Br J Gen Pract* 1995;45(399):548-52.
40. DGV, Stichting doelmatige geneesmiddelenvoorziening, tegenwoordig: Nederlands instituut voor verantwoord medicijngebruik [the Dutch Institute for Effective Use of Medication]. <http://www.medicijngebruik.nl>. Accessed 1- February 2005.
41. Moss F. De apotheker en de WGBO [The pharmacist and the Medical Treatment Contracts Act]. *Pharm Weekbl* 2001;136(45):1679-81.
42. Van Dijk L, Barnhoorn H, De Bakker D. Het Farmacotherapie Overleg in 1999, stand van zaken en effecten op voorschrijven [Pharmaco-therapeutic audit meeting in 1999, current situation and effects on prescribing]. Utrecht. The Netherlands. Nivel;2001.
43. Veninga, C. C. M., Improving prescribing in general practice. Dissertation. University of Groningen. The Netherlands; 2000.
44. De Vries, C.S., Collaboration in healthcare. The tango to drug safety. Dissertation. University of Groningen. The Netherlands;1998.
45. Madrideo-Mora R, Amado-Guirado E, Perez-Rodriguez MT. Effectiveness of the combination of feedback and educational recommendations for improving drug prescription in general practice. *Med Care* 2004;42(7):643-8.
46. Sondergaard J, Andersen M, Stovring H, Kragstrup J. Mailed prescriber feedback in addition to a clinical guideline has no impact: a randomised, controlled trial. *Scand J Prim Health Care* 2003;21(1):47-51.
47. O'Connell DL, Henry D, Tomlins R. Randomised controlled trial of effect of feedback on general practitioners' prescribing in Australia. *BMJ* 1999;318(7182):507-11.
48. Grol R. Successes and failures in the implementation of evidence-based guidelines for clinical practice. *Med Care* 2001;39(8 Suppl 2):II46-54.
49. Buurma H, de Smet PA, van den Hoff OP, Sysling H, Storimans M, Egberts AC. Frequency, nature and determinants of pharmacy compounded medicines in Dutch community pharmacies. *Pharm World Sci* 2003; 25(6): 280-7.
50. RCGP information sheets. Prescribing in general practice. London UK: Royal College of General Practitioners; Oct. 2000.
51. Van der Heide H, Tinke JL. Facts and figures, cost development of pharmaceutical aid. The Hague, The Netherlands: Foundation for Pharmaceutical Statistics; 1999. ([www.sfk.nl/english/index.html](http://www.sfk.nl/english/index.html). Accessed 1 February 2005).
52. Wittop Koning DA. De oude apotheek [The old pharmacy]. Bussum. The Netherlands:Van Dishoeck, van Holkema & Warendorf;1966.
53. Van Mil JWF. Pharmaceutical Care, the future of pharmacy. Theory, research and practice. Dissertation. 2000 University of Groningen. The Netherlands. ISBN: 90-9013367-4.
54. Hepler CD, Strand LM. Opportunities and responsibilities in pharmaceutical care. *Am J Hosp Pharm* 1990;47(3):533-43.
55. Beney J, Bero LA, Bond C. Expanding the roles of outpatient pharmacists: effects on health services utilisation, costs, and patient outcomes (Cochrane Review). In: *The Cochrane Library*, 4, 2001. Oxford.
56. Walker S, Willey CW. Impact on drug costs and utilization of a clinical pharmacist in a multisite primary care medical group. *J Manag Care Pharm* 2004;10(4):345-54.

57. Mott DA, Cline RR. Exploring generic drug use behavior: the role of prescribers and pharmacists in the opportunity for generic drug use and generic substitution. *Med Care* 2002;40(8):662-74.
58. Zermansky AG, Petty DR, Raynor DK, Freemantle N, Vail A, Lowe CJ. Randomised controlled trial of clinical medication review by a pharmacist of elderly patients receiving repeat prescriptions in general practice. *BMJ* 2001;323(7325):1340-3.
59. Zunker RJ, Carlson DL. Economics of using pharmacists as advisers to physicians in risk-sharing contracts. *Am J Health Syst Pharm* 2000;57(8):753-5.
60. Bond C, Matheson C, Williams S, Williams P, Donnan P. Repeat prescribing: a role for community pharmacists in controlling and monitoring repeat prescriptions. *Br J Gen Pract* 2000;50(453):271-5.
61. Ilett KF, Johnson S, Greenhill G, Mullen L, Brockis J, Golledge CL, Reid DB. Modification of general practitioner prescribing of antibiotics by use of a therapeutics adviser (academic detailer). *Br J Clin Pharmacol* 2000;49(2):168-73.
62. Peterson GM, Fitzmaurice KD, Naunton M, Vial JH, Stewart K, Krum H. Impact of pharmacist-conducted home visits on the outcomes of lipid-lowering drug therapy. *J Clin Pharm Ther* 2004;29(1):23-30.
63. Ito MK. Role of the pharmacist in establishing lipid intervention programs. *Pharmacotherapy* 2003;23(9 Pt 2):41S-47S.
64. Bouvy ML, Heerdink ER, Urquhart J, Grobbee DE, Hoes AW, Leufkens HG, et al. Effect of a pharmacist-led intervention on diuretic compliance in heart failure patients: a randomized controlled study. *J Card Fail* 2003;(5):404-11.
65. Tsuyuki RT, Johnson JA, Teo KK, Simpson SH, Ackman ML, Biggs RS, et al. A randomized trial of the effect of community pharmacist intervention on cholesterol risk management: the Study of Cardiovascular Risk Intervention by Pharmacists (SCRIP). *Arch Intern Med* 2002;162(10):1149-55.
66. Ellis SL, Carter BL, Malone DC, Billups SJ, Okano GJ, Valuck RJ, et al. Clinical and economic impact of ambulatory care clinical pharmacists in management of dyslipidemia in older adults: the IMPROVE study. *Impact of Managed Pharmaceutical Care on Resource Utilization and Outcomes in Veterans Affairs Medical Centers. Pharmacotherapy* 2000;20(12):1508-16.
67. Turner CJ, Parfrey P, Ryan K, Miller R, Brown A. Community pharmacist outreach program directed at physicians treating congestive heart failure. *Am J Health Syst Pharm* 2000;57(8):747-52.
68. Sondergaard B, Thorleifsson S, Herborg H, Frokjaer B, Hepler CD, Ersboll BK. Quality assurance of drug therapy for patients with asthma. Health economic analysis. *Ugeskr Laeger* 2000;162(4):480-6.
69. Stevens VJ, Shneidman RJ, Johnson RE, Boles M, Steele PE, Lee NL. Helicobacter pylori eradication in dyspeptic primary care patients: a randomized controlled trial of a pharmacy intervention. *West J Med* 2002;176(2):92-6.
70. McCormack JP, Dolovich L, Levine M, Burns S, Nair K, Cassels A, et al. Providing evidence-based information to patients in general practice and pharmacies: what is the acceptability, usefulness and impact on drug use? *Health Expect* 2003;6(4):281-9.
71. Morrison A, Wertheimer AL. Evaluation of studies investigating the effectiveness of pharmacists' clinical services. *Am J Health Syst Pharm* 2001;58(7):569-77.

72. Lowe CJ, Raynor DK, Purvis J, Farrin A, Hudson J. Effects of a medicine review and education programme for older people in general practice. *Br J Clin Pharmacol* 2000;50(2):172-5.
73. Hanlon JT, Lindblad CI, Gray SL. Can clinical pharmacy services have a positive impact on drug-related problems and health outcomes in community-based older adults? *Am J Geriatr Pharmacother* 2004;2(1):3-13.
74. Krska J, Cromarty JA, Arris F, Jamieson D, Hansford D, Duffus PR, et al. Pharmacist-led medication review in patients over 65: a randomized, controlled trial in primary care. *Age Ageing* 2001;30(3):205-11.
75. Sellors J, Kaczorowski J, Sellors C, Dolovich L, Woodward C, Willan A, et al. A randomized controlled trial of a pharmacist consultation program for family physicians and their elderly patients. *CMAJ* 2003;169(1):17-22.
76. Porteous T, Bond C, Robertson R, Hannaford P, Reiter E. Electronic transfer of prescription-related information: comparing views of patients, general practitioners, and pharmacists. *Br J Gen Pract* 2003;53(488):204-9.
77. Kassam R, Farris KB, Burbach L, Volume CI, Cox CE, Cave A. Pharmaceutical care research and education project: pharmacists' interventions. *J Am Pharm Assoc (Wash)* 2001;41(3):401-10.
78. Bernstein C, Bjorkman I, Caramona M, Crealey G, Frokjaer B, Grundberger E, et al. Improving the well-being of elderly patients via community pharmacy-based provision of pharmaceutical care: a multicentre study in seven European countries. *Drugs* 2001;18:63-77.
79. Howard M, Trim K, Woodward C, Dolovich L, Sellors C, Kaczorowski J, Sellors J. Collaboration between community pharmacists and family physicians: lessons learned from the Seniors Medication Assessment Research Trial. *J Am Pharm Assoc (Wash DC)* 2003;43(5):566-72.
80. Hughes CM, McCann S. Perceived interprofessional barriers between community pharmacists and general practitioners: a qualitative assessment. *Br J Gen Pract* 2003;53(493):600-6.
81. Edmunds J, Calnan MW. The reprofessionalisation of community pharmacy? An exploration of attitudes to extended roles for community pharmacists amongst pharmacists and General Practitioners in the United Kingdom. *Soc Sci Med* 2001;53(7):943-55.
82. Matheson C, Bond CM, Mollison J. Attitudinal factors associated with community pharmacists' involvement in services for drug misusers. *Addiction* 1999;94(9):1349-59.
83. Farris KB, Schopflocher DP. Between intention and behavior: an application of community pharmacists' assessment of pharmaceutical care. *Soc Sci Med* 1999;49(1):55-66.
84. Odedina FT, Hepler CD, Segal R, Miller D. The Pharmacists' Implementation of Pharmaceutical Care (PIPC) model. *Pharm Res* 1997;14(2):135-44.
85. Spencer JA, Edwards C. Pharmacy beyond the dispensary: general practitioners' views. *BMJ* 1992;304(6843):1670-2.
86. Mason HL. Using attitudes and subjective norms to predict pharmacist counseling behaviors. *Patient Couns Health Educ* 1983;4(4):190-6.
87. Traulsen JM, Klinker BO. Using health technology assessment to put pharmaceutical care on the political agenda. *Pharm World Sci* 2004;26(2):61-3.

88. Silcock J, Raynor DK, Petty D. The organisation and development of primary care pharmacy in the United Kingdom. *Health Policy* 2004;67(2):207-14.
89. Eisert A, Gunther J. Evidenzbasierte Pharmazie in Offizin- und Krankenhaus-apotheke - Eine Zukunftsvision? [Evidence-based pharmacology in community and hospital pharmacies - A vision of the future?]. *Z Arztl Fortbild Qualitatssich* 2003;97(4-5):263-70.
90. Van Mil JW, Tromp DF, McElnay JC, de Jong-van den Berg LT, Vos R. Development of pharmaceutical care in The Netherlands: pharmacy's contemporary focus on the patient. *J Am Pharm Assoc (Wash)* 1999;39(3):395-401.
91. Barner JC, Bennett RW. Pharmaceutical care certificate program: assessment of pharmacists' implementation into practice. *J Am Pharm Assoc (Wash)* 1999;39(3):362-7.
92. Muijrs PEM. *The future of the Public Pharmacist*. Strasbourg. France: Council of Europe Publishing;1998. ISBN 92-871-3628-9.
93. Winslade NE, Bajcar JM, Bombassaro AM, Caravaggio CD, Strong DK, Yamashita SK. Pharmacist's management of drug-related problems: a tool for teaching and providing pharmaceutical care. *Pharmacotherapy* 1997;17(4):801-9.
94. Kirk JK, Michael KA, Markowsky SJ, Restino MR, Zarowitz BJ. Critical pathways: the time is here for pharmacist involvement. *American College of Clinical Pharmacy. Pharmacotherapy* 1996;16(4):723-33.
95. Lee MP, Ray MD. Planning for pharmaceutical care. *Am J Hosp Pharm* 1993;50(6):1153-8.
96. Godwin HN. Harvey A. K. Whitney Lecture. To a new beginning from converging paths. *Am J Hosp Pharm* 1991;48(8):1697-703.
97. Van Mil JW, Dudok van Heel MC, Boersma M, Tromp TF. Interventions and documentation for drug-related problems in Dutch community. *Pharmacies. Am J Health Syst Pharm* 2001;58(15):1428-31.
98. De Gier JJ. The Electronic Pharmaceutical Dossier: an effective aid to documenting pharmaceutical care data. *Pharm World Sci* 1996;18(6):241-3.
99. Kirking DM, Thomas JW, Ascione FJ, Boyd EL. Detecting and preventing adverse drug interactions: the potential contribution of computers in pharmacies. *Soc Sci Med* 1986;22(1):1-8.
100. Van Mil JWF, Tromp ThFJ, De Jong-van den Berg LTW. Taakverdeling tussen apotheker en assistenten [The division of tasks between pharmacists and their assistants]. *Pharm Weekbl* 2000;135(17):951-53.
101. Kocken GA. Medication discussion groups in the Netherlands: five years of experience. *Med Educ* 1999 May;33(5):390-3.
102. Klankbordgroep farmaceutische zorg. Farmaceutische zorg in beleid en praktijk [Advisory board pharmaceutical care. Pharmaceutical care in policy and practice.] Dutch Ministry of Health, Welfare and Sports, 7 February 2000.
103. Scheerder RLJM. Overzicht van overheidsbeleid en rapporten [Overview of government policy and reports]. *Pharm Weekbl* 2000;135:110-111S.
104. The Boston Consulting Group. Geneesmiddel verzekerd [Drug insured]. Report issued by BCG to health insurers in the Netherlands, November 1999.
105. Muijrs PEM. Weg met de winkel [Get rid of the shop]. *Pharm Weekbl* 1996;131:168-9.

106. Koopmans I, Van de Ven M, Van der Geest L. Geneesmiddelen handel of zorg [Drugs: trade or care]? Breukelen. The Netherlands:Nijfer;1997. ISBN 90 399 14400.
107. De Vos C. Geneesmiddelenvoorziening: handel of gezondheidszorg? [Provision of drugs: trade or health care?] Staatscourant 91;14 May 1993.
108. Mobach MP. Thought and action, change to the customer in community pharmacy practice. Dissertation. University of Groningen. The Netherlands;1999. ISBN: 90-72591-70-4.
109. KNMG. "Geen indicatie op recept" of "de indicatie hoort niet op het recept" ["No indication on the prescription" or "the indication should not be on the prescription"]. Medisch Contact 1999;54:630.
110. Anonymus, Wereldorganisatie artsen wijst pharmaceutical care af [World Medical Association rejects pharmaceutical care]. Pharm Weekbl 1999;134(46):1589.
111. Met het oog op de patiënt. De toegevoegde waarde van de openbare apotheek [With an eye for the patient. The added value of the public pharmacy]. The Hague. The Netherlands: Royal Dutch Association for the Advancement of Pharmacy (KNMP) leaflet; March 1996.
112. Van Mil JWF, Tromp T F J. Pharmaceutical care. Pharm. Weekbl 1996;131 (special edition 1996: Farmacie in Nederland) 67-70.
113. Uw apotheek. Portret van een professie [Your pharmacist: Portrait of a profession]. The Hague. The Netherlands: Royal Dutch Association for the Advancement of Pharmacy (KNMP); 1994.
114. Apotheek kwaliteitszaak. Beleidsplan van de Nederlandse apotheker [Pharmacy: Quality outlet. Policy plan of the Dutch pharmacist] The Hague. The Netherlands: Royal Dutch Association for the Advancement of Pharmacy (KNMP);1991.
115. NSS / marktonderzoek b.v. Imago apothekers 1997, resultaten tweede effectmeting imago apothekers [Image pharmacists 1997, results of second effect measurement of image pharmacists]. The Hague. The Netherlands: Royal Dutch Association for the Advancement of Pharmacy (KNMP);1997.
116. Voituren GJH. Communicatieplan Openbare Apotheek met overgrote meerderheid aangenomen [Communication plan Public Pharmacy accepted by the vast majority]. Pharm Weekbl 1994;129:992.
117. Baggerman C. KNMP en imago: communicatie of organisatie? [KNMP and image: communication or organisation?] Pharm Weekbl 1994;129:946.
118. Pascoe R. Dutch pharmacists revamp their image. BMJ 1994;309:1254.
119. Voituren GJH. Start landelijke publiekscampagne [Start of national publicity campaign]. Pharm. Weekbl 1994;129:1054.
120. Van de Poel GTh. Cooperation between General Practitioners and Pharmacists. Dissertation. Erasmus University Rotterdam. The Netherlands:1988.
121. Van der Does E., Van de Poel GTh. Samenwerking huisarts-apotheker [Cooperation between general practitioner-pharmacist]. Het medisch jaar 1984. Utrecht. The Netherlands: Bohn Scheltema en Holkema;1984.
122. Reenders K. Samenwerking tussen huisartsen en apothekers [Cooperation between general practitioners and pharmacists]. Med Contact 1984;38:756-760.
123. Wittop Koning PA. De invloed van de stadsapotheker op het voorschrijfpatroon van de huisarts, een voorbeeld. [The influence of the urban pharmacist on the

- prescribing pattern of the general practitioner, an example.] Pharm. Weekbl 1982;117:785-792.
124. Van der Does E., G. Th. Van de Poel en M. Pannevis. Aspecten van de samenwerking Huisarts-apotheker [Aspects of the cooperation between the general practitioner and the pharmacist]. Med. Contact 1981;35: 537.
  125. Statistics Netherlands. Available at: <http://www.cbs.nl>. Accessed 1 February 2005.
  126. Apotheekcheck op het basispakket farmaceutische zorg [Pharmacycheck for basic pharmaceutical care]. The Hague. The Netherlands: Royal Dutch Association for the Advancement of Pharmacy (KNMP);2000.
  127. Questionnaires Hapo-project. Available at: <http://www.hag.unimaas.nl/onderzoek/hapo.htm> Accessed febr.1. 2005.
  128. Rappoport AE. A hospital patient and laboratory machine-readable identification system (MRIS) revisited. J Med Syst 1984;8(1-2):133-56.

## **Chapter 3**

### **Changing relationships: attitudes and opinions of general practitioners and pharmacists regarding the role of the community pharmacist**

Paul E.M. Muijers, J. André Knottnerus, Jildou Sijbrandij, Rob Janknegt, Richard P.T.M. Grol

Published in Pharmacy World & Science 2003; 25(5): 235-241

## **Abstract**

*Background:* Relationship between general practitioners and pharmacists.

*Aim:* To explore similarities and differences in opinions between general practitioners and pharmacists about the pharmacist's role. To identify factors which determine the attitude of the general practitioner towards the role of the pharmacist as a care provider.

*Design:* Cross-sectional questionnaire survey.

*Setting:* Netherlands 2001.

*Participants:* 926 non-dispensing general practitioners, 93 dispensing general practitioners and 328 community pharmacists.

*Methods:* Statements about the pharmacist's position in primary care were formulated. The attitude towards the pharmacist's care-providing function was determined by adding the scores to the statements. Data were collected on age, gender, professional experience, trainership, type and size of practice, electronic communication, urbanisation level, part-time work, work pressure, postgraduate training, pharmacotherapy audit meetings (PTAMs), the mutual relationship and the desired role of the pharmacist in pharmacotherapy.

*Results:* No significant differences in opinions were found between pharmacists and non-dispensing general practitioners with respect to a number of the pharmacist's signalling tasks. Eighty-six percent (CI 83-89) of non-dispensing general practitioners and eighty-two percent (CI 76-87) of pharmacists shared the opinion that pharmacists need to provide the general practitioner with feedback on prescription figures. Furthermore, 85% (CI 82-88) of the non-dispensing general practitioners and 80% (CI 75-86) of the pharmacists believed that pharmacists should suggest items for the PTAM agenda, based on prescription patterns they notice in their pharmacy. The attitude of general practitioners towards the care-providing function of the community pharmacist correlates significantly with the relationship between general practitioners and pharmacists ( $p < 0.001$ ). There is also a significant difference ( $p < 0.001$ ) in the attitude score between dispensing and non-dispensing general practitioners: dispensing general practitioners scored lower on the attitude scale.

*Conclusion:* Pharmacists and general practitioners largely agree on the pharmacotherapeutic signalling role that a pharmacist should fulfil. A good relationship benefits the attitude of general practitioners towards the pharmacist's care-providing function.

**Keywords**

Attitude, Function, Opinion, Pharmacists, Prescribing, Primary health care, Role, Survey, The Netherlands.

## **Introduction**

In the last 30 years, a number of developments have resulted in an increased focus on the care community pharmacists provide <sup>1</sup>. The preparation of medicines by pharmacies is becoming less important <sup>2</sup>. Medication-control has improved significantly due to the use of computers in the pharmacy. In many countries cooperation with prescribers and patient guidance have also become important aspects <sup>3-16</sup>. As a result of these developments, the relationship between pharmacists and general practitioners is changing.

In light of these developments, a recent Cochrane review concluded that pharmacists should continue their role in providing patient counselling on drug therapy and educating physicians about drug therapy <sup>17</sup>. Some aspects of the pharmacist's current role, such as providing advice and medication-control, are already well received by general practitioners. However, other aspects, such as prescribing medication and adjusting an ongoing pharmacotherapy, are often less well perceived <sup>18-21</sup>.

Based on the current literature, it can be assumed that the contribution of the pharmacist to the quality of pharmacotherapy increases as cooperation between pharmacists and general practitioners improves <sup>3</sup>. For a successful cooperation, both parties should agree on each other's respective tasks. Different perceptions by pharmacists and general practitioners concerning the pharmacist's role could reduce the quality of their cooperation. The communication and cooperation between the two parties might be improved if additional insights are gained into the factors which underlie the different perceptions. This study therefore address the following two questions:

- What is the opinion of general practitioners concerning the expertise, task, responsibility and role of the pharmacist in pharmacotherapy, on what extent do their views differ from those of pharmacists?
- Which factors determine the attitude of general practitioners towards the pharmacist's role?

## **Methods**

In 2001, a questionnaire was sent to all general practitioners and pharmacists who were active in the operating areas of two health insurers in the south of the Netherlands. Four million people reside in this part of the country, which covers a quarter of the

Netherlands' total area. The healthcare infrastructure and medical consumption pattern in the southern part of the Netherlands is representative for the rest of the country<sup>22</sup>. Nine percent of the general practitioners approached dispensed. These dispensing general practitioners operate in areas with a low population density where an independent pharmacy is not financially viable.

The questionnaires and a short explanatory note were sent by post in the second half of May 2001. In an accompanying letter it was stated that the questionnaire data would be anonymously processed, and would not be related to the identity of respondents. Three weeks later the non-respondents were sent a reminder.

As about half of the pharmacies are run by two pharmacists, two copies of the questionnaire were sent to each pharmacy. Questionnaires were sent to a total of 1574 general practitioners and 399 pharmacists. Ten weeks after sending the reminder, a short phone questionnaire was conducted with 15% of the non-respondents, who were selected on a random basis.

### ***Variables and instruments***

The questions and statements in the questionnaire were initially formulated according to personal experience of the authors in general practice and the current literature.

We also used a questionnaire constructed by the Dutch Pharmacist Organisation, which was designed to determine the level of pharmaceutical care provided within a pharmacy<sup>23</sup>.

To evaluate the questionnaire's face and content validity, preliminary versions were reviewed by a group of ten general practitioners and ten pharmacists. To strengthen the internal consistency and reliability, a relatively large number of questions addressing the same underlying topic was formulated.

The final version of the questionnaire was drafted using additional information obtained from conversations with specialists in the field as well as the feedback received from the 10 general practitioners and 10 pharmacists<sup>24</sup>.

The questionnaires sent to both general practitioners and pharmacists contained the same 17 statements with respect to the pharmacist's position in primary care.

Respondents were asked to state their opinion concerning the role, task, expertise and responsibility of the pharmacist in primary care (Table 1).

**Table 1.** Opinions of general practitioners (GPs) and community pharmacists (CPs) on the role of the pharmacist in primary care.

Statement	Non-dispensing GPs % (n = 926)	Community pharmacists % (n = 328)	Dispensing GPs % (n = 93)
	% agree (compl. + part.) (99% CI)	% agree (compl. + part.) (99% CI)	% agree (compl. + part.) (99% CI)
<i>Statements addressing the task and role of the pharmacist</i>			
Pharmacists should suggest agenda items for PTAM based on prescription patterns observed in their pharmacies. <sup>§</sup>	85 (82-88)	80 (75-86)	64 (50-77)
Pharmacists should provide GPs with prescription figures. <sup>§</sup>	86 (83-89)	82 (76-87)	58 (44-71)
Pharmacists should register undesired prescription patterns. <sup>§</sup>	67 (63-71)	70 (63-76)	56 (43-69)
Pharmacists should play a very important role in patient care. <sup>##</sup>	69 (65-73)	97 (94-99)	28 (16-40)
Pharmacists play a very important role in the GPs pharmacotherapy policy. <sup>##</sup>	39 (35-43)	90 (86-94)	23 (11-34)
The pharmacist's role extends beyond the distribution of medication. <sup>#</sup>	53 (48-57)	68 (61-74)	39 (26-52)
Pharmacists should have the opportunity to generic substitution. <sup>#</sup>	71 (67-75)	99 (97-100)	77 (66-88)
Pharmacists should have the opportunity to therapeutic substitution. <sup>#</sup>	30 (26-33)	76 (70-82)	48 (35-62)
Pharmacists should be allowed to provide repeat-medication independently. <sup>#</sup>	12 (9.4-15)	78 (72-84)	4.4 (0.00-9.9)
Pharmacists greatly influence the use of medication. <sup>##</sup>	42 (38-46)	65 (58-72)	27 (15-39)
Pharmacists greatly influence the prescription policy of GPs within their area. <sup>##</sup>	40 (36-44)	50 (43-57)	13 (4.0-22)
<i>Statements addressing responsibility</i>			
Pharmacist is co-responsible for treatment of a patient. <sup>##</sup>	64 (60-68)	85 (80-90)	41 (28-54)
Pharmacists are co-responsible for the consequences of an irrational therapy. <sup>#</sup>	48 (44-52)	67 (60-74)	47 (34-61)
<i>Statement addressing expertise</i>			
Pharmacists are the major medication experts in primary care. <sup>##</sup>	75 (72-79)	98 (96-100)	27 (15-39)
To be able to make PTAM-agreements, the expertise of the pharmacist is essential. <sup>##</sup>	87 (85-90)	96 (94-99)	70 (58-82)
The GP should contact the pharmacist in case of problems concerning the prescription of the appropriate pharmacotherapy for a given patient. <sup>#</sup>	80 (76-83)	97 (94-99)	73 (60-85)
The pharmacist should know all diagnoses of a given patient that could interfere with medicines. <sup>#</sup>	28 (24-32)	76 (70-82)	39 (25-52)

# significant differences ( $\chi^2$  test) in % agree between CPs and non-dispensing GPs (p < 0.01)

§ significant differences ( $\chi^2$  test) in % agree between dispensing and non-dispensing GPs (p < 0.01)

For each statement, general practitioners and pharmacists could indicate their opinion on a five-point Likert scale <sup>25</sup>. The scale contained the following five options: “completely agree”, “partially agree”, “neutral”, “partially disagree”, and “completely disagree”.

Two multiple-choice questions were also included. These addressed the mutual relationship between the general practitioner and the pharmacist, and the desired role

of the pharmacist in pharmacotherapy. Furthermore, participants were asked to indicate their age, gender, professional experience, trainer ship, whether or not they were dispensing, the type and size of their practice, whether they send prescriptions electronically, the urbanisation level, part-time work, work pressure experienced, postgraduate training and participation in pharmacotherapy audit meetings (PTAMs).

### ***Analysis***

The Likert scale was dichotomised to agree/do not agree. The Chi-square-test was used to analyse the differences in opinions among pharmacists, dispensing general practitioners and non-dispensing general practitioners concerning the role, task, responsibility and expertise of the pharmacist. P-values lower than 0.01 were considered significant.

Attitudes towards the care-providing function of the pharmacist in primary care, were determined by adding the scores of the 17 statements ('completely agree' = 5 points, 'partially agree' = 4 points, etc., 'completely disagree' = 1 point). The higher the score, the more favourable the attitude of the respondent towards the pharmacist's care-providing function in primary care. The attitude score could vary between 17 and 85. A reliability-analysis was carried out to verify sufficient internal consistency (Cronbach's alpha = 0.83).

To determine which factors affected the general practitioners' attitude score, a descriptive analysis of the variables thought to affect this was first carried out. The GEE (generalised estimations equations) method with a compound symmetry correlation structure was used to account for possible data clustering caused by cooperation between general practitioners in PTAM groups. Multilevel analyses were carried out by including one independent variable at a time, followed by an analysis including all predictors. The intra-class correlation coefficient (defined as the variance between PTAM groups and total variance) of the multiple-regression analysis with GEE turned out to be low (0.092), indicating that no significant data clustering had occurred. All analyses were carried out using SAS release 8.2 (SAS Institute Inc., Cary, North Carolina).

## Results

### Response

The results are summarised in Table 2.

In both groups, 71% responded to the questionnaire (1019 general practitioners, 270 pharmacists). This number does not include non-respondents who were no longer actively practising. Fifteen percent of the non-respondents were randomly selected and interviewed by means of a phone questionnaire. On two leading questions, concerning the role and expertise of the pharmacist, no significant differences ( $p > 0.1$ ) were found between respondents and telephoned non-respondents. The majority of respondents and telephoned non-respondents considered the relationship between the pharmacist and general practitioner to be good or excellent, with no significant differences ( $p > 0.1$ ) found between respondents and telephoned non-respondents.

**Table 2.** Basic characteristics of the survey population and comparison of respondents and telephoned non-respondents.

	General Practitioners <i>n</i> =1434		Pharmacists <i>n</i> =379	
	Respondent <i>n</i> = 1019	Non-respondent sample <i>n</i> =50	Respondent <i>n</i> = 270 <sup>ψ</sup>	Non-respondent sample <i>n</i> =25 <sup>§</sup>
Survey population				
Average age in years (standard deviation)	47 (6.5)	50 (5.6)	42 (9.3)	44 (7.9)
Male/female ratio (% male)	82%	98%	65%	88%
Solo-practice	38%	70%		
Dispensing GP	9%	20%		
Second pharmacist			17%	12%
Rural	48%	59%	40%	32%
<b>Statements</b>	%of respondents partially or completely agree (99% CI)			
The pharmacist should play a very important role in the pharmacotherapeutic policy of the general practitioner	37(33-41)	46(28-64)	90(86-94)	100(81-100)
In the process of making PTAM working agreements, the expertise of the pharmacist is essential	86(83-89)	90(79-100)	96(94-99)	100(81-100)
In general, how would you describe your relationship with the pharmacists / general practitioners in your area?	% good / very good			
	68(64-71)	77(61-93)	73(67-80)	76(54-98)
	% of respondents who replied "co-determining"			
What should be the role of the pharmacist with regards to the medication use of the patient?	20(17-23)	14(1.4-27)	69(62-75)	80(59-100)

<sup>ψ</sup> A total of 270 pharmacies and 328 pharmacists responded to the questionnaire. Age, gender, second pharmacist and replies to the statements are indicated for each individual pharmacist, the other replies are indicated per pharmacy.

<sup>§</sup> A total of 25 pharmacies was contacted, and in each one, one pharmacist was interviewed.

### ***Opinions of General Practitioners and Pharmacists***

Table 1 summarises the opinions of pharmacists, and dispensing and non-dispensing general practitioners on 17 statements concerning the pharmacist's position in primary care. No significant differences in opinion were found between pharmacists and non-dispensing general practitioners for three signalling tasks based on the daily observations of the pharmacist in his pharmacy: Eighty-six percent (CI 83-89) of non-dispensing general practitioners and eighty-two percent (CI 76-87) of the pharmacists shared the opinion that pharmacists need to provide the general practitioner with feedback on prescription figures. Further, 85% (CI 82-88) of the non-dispensing general practitioners and 80% (CI 75-86) of the pharmacists believed that pharmacists should suggest items for the PTAM agenda, based on prescription patterns they notice in their pharmacy. Seventy percent (CI 63-76) of the pharmacists and 67% (CI 63-71) of the non-dispensing general practitioners considered the registration of undesired trends in prescription patterns a task of the pharmacist ; fifty-six percent (CI 43-69) of the dispensing general practitioners also believe that pharmacists have this signalling task. Moreover, 97% (CI 94-99) of the pharmacists and 69% (CI 65-73) of the non-dispensing general practitioners believe that the pharmacist should play an important role in patient care.

An important difference in opinion between general practitioners and pharmacists concerns the role of the pharmacist in the general practitioner's prescribing policy. Whereas 90% (CI 86-94) of the pharmacists believe that they should play a major role in this policy, only 39% (CI 35-43) of non-dispensing and 23% (CI 11-34) of dispensing general practitioners agree. Furthermore, 77% (CI 73-80) of non-dispensing and 70% (CI 57-82) of dispensing general practitioners believe that the pharmacist should have an advisory role in deciding which drug should be given to patients, whereas 69% (CI 62-75) of pharmacists would like to have a co-determining role (Table 3).

The existing differences in opinion as to the responsibilities and other tasks are discussed further below.

**Table 3** The desired role of the pharmacist according to pharmacists and dispensing and non-dispensing general practitioners (percentages).

	Non-dispensing GPs (n=926)	Community pharmacists (n=328)	Dispensing GPs (n=93)
<i>What should be the role of the pharmacist with regards to the use of medication by the patient? (99% CI)</i>			
Decisive role <sup>#</sup>	0.11(0.00-0.39)	4.3(1.4-7.2)	0.00(0.00-5.6)
Co-decisive role <sup>#</sup>	20(17-23)	69(62-75)	17(7.2-28)
Advising role <sup>#</sup>	77(73-80)	26(20-33)	70(57-82)
No role <sup>#s</sup>	3.4(1.8-4.9)	0.61(0.00-1.7)	13(4.0-22)

# = significant differences ( $\chi^2$  test /Fisher's exact test) between CPs and non-dispensing GPs (p<0.01).

\$ = significant differences ( $\chi^2$  test / Fisher's exact test ) between dispensing. and non-dispensing GPs (p<0.01).

### **Determinants of the attitude towards the pharmacist's care-providing function**

Tables 4 and 5 show potential determinants of the attitude score and the results of the analyses.

**Table 4** Overview of the attitude scores and predictors of attitude scores in means (sd) and/or percentages. n=971\*

Variable	Percentage	Mean (sd)
Attitudescore		57(10)
Relationship pharmacist <sup>1</sup>	5/11/17/48/19 (n=961)	
% dispensing GP	9	
Full-parttime%		89(18)
Female	17	
Number of PTAMs <sup>2</sup>	2/36/47/9/6	
Age in years		47(6.5)
Postgraduate training <sup>3</sup>	9/56/33/2	
Work experience (years)		17 (7.8) (n=944)
Urbanisation <sup>4</sup>	26/25/48	
Group-practice	62	
Size of practice (patients)		1736 (785)
Workload <sup>5</sup>	12/24/41/15/7	
Electr. Communication <sup>6</sup>	37	
Trainer of GPs	31	

\* these GPs have also been included in the regression model (Table 5).

<sup>1</sup>Relationship with pharmacist: bad/ could be improved/ workable/good/ very good.

<sup>2</sup>PTAM: never/1-3/ 4-5/ 6-7/ >=8 per year.

<sup>3</sup>Post-graduation schooling: never/ occasionally/ regularly/ often.

<sup>4</sup>Urbanisation: urban/ sub-urban/ rural.

<sup>5</sup>Perceived workload: comfortable/acceptable/ heavy/ very heavy/ too heavy.

<sup>6</sup>Electronic communication: percent of pharmacies in which >50% of prescriptions are received electronically.

**Table 5** Regression coefficients for the GEE models used to predict attitude (n=971)

	Intercept	Simple linear regression		Multiple linear regression	
	(s.e)	$\beta$	99% CI	$\beta$	99% CI
Relationship with pharmacist <sup>§</sup>	47(1.5)	2.9	1.9;3.9	2.6	1.7;3.6
% dispensing GP *	58(0.44)	-7.1	-11;-3.3	-5.8	-9.7;-1.9
Full-part-time ‡	62(1.7)	-0.056	-0.10;-0.008	-0.049	-0.11;0.015
Female*	57(0.47)	2.0	0.075;4.0	0.77	-1.9;3.5
Number of PTAM <sup>§</sup>	55(1.3)	1.0	-0.21;2.3	0.057	-1.0;1.1
Age in years	55(2.5)	0.041	-0.090;0.17	0.15	-0.085;0.38
Postgraduate training <sup>#</sup> never	55(2.6)	0.82	-6.1;7.7	0.15	-6.0;6.3
Postgraduate training <sup>#</sup> sometimes		2.5	-4.3;9.2	2.1	-3.8;8.0
Postgraduate training <sup>#</sup> regularly		3.1	-3.7;9.9	2.7	-3.3;8.7
Postgraduate training <sup>#</sup> often		0 (ref)		0 (ref)	
Work experience in number of years	58(0.80)	-0.014	-0.12;0.092	-0.066	-0.25;0.12
Urbanisation <sup>#</sup> urban	57(0.67)	1.4	-1.2;4.0	-1.1	-3.4;1.1
Urbanisation <sup>#</sup> suburban		0.95	-2.0;3.9	-0.58	-3.4;2.2
Urbanisation <sup>#</sup> rural		0 (ref)		0 (ref)	
Group-practice*	57(0.61)	0.76	-1.1;2.6	-0.56	-2.5;1.4
Size of practice <sup>v</sup>	59(0.94)	-0.079	-0.21;0.054	-0.031	-0.17;0.11
Workload <sup>§</sup>	58(0.99)	-0.39	-1.2;0.44	-0.21	-1.0;0.59
Electronic communication	57(0.49)	-0.13	-2.0;1.7	-0.44	-2.1;1.3
Trainer of GPs*	57(0.48)	-0.0082	-1.9;1.9	0.44	-1.3;2.2
Intercept				46	33-60

§ Included as continuous variables.

\* Indicated as a 0/1.

‡ Expressed as a percentage between 1 and 100.

# These variables were also tested as a whole (Wald test), these tests were not significant.

<sup>v</sup> Expressed per 100 patients.

The simple analyses with GEE show that the four main attitude determinants are (1) the relationship with the pharmacist, (2) whether or not a responding general practitioner is dispensing, (3) part-time working and (4) the gender of the respondent. However, according to the multiple-regression analysis, part-time working and gender are not significant predictors. For gender in particular, the coefficient decreases to less than the standard error, as a result of the correction for part-time working.

The multiple-regression analysis with GEE demonstrates that the relationship between general practitioners and pharmacists who work within the same area significantly affects the attitude score ( $p < 0.001$ ).

On average, general practitioners who have a very good relationship with nearby pharmacists have an attitude score 10 points ( $4 \times 2.6$ ) higher than general practitioners who have a poor relationship with the pharmacists in their area ( $p < 0.001$ ).

There is also a significant difference ( $p < 0.001$ ) in attitude score between dispensing and non-dispensing general practitioners. On average, dispensing general practitioners scored 6 points lower on the attitude scale compared to non-dispensing general practitioners.

### ***Discussion***

We have reported a number of differences and similarities in opinions between general practitioners and pharmacists concerning the pharmacist's role in pharmacotherapeutics. Two factors which determine the attitude of the general practitioner towards the pharmacist's role as a care provider have also been identified.

The majority of general practitioners and pharmacists who participated in our survey confirmed a good relationship between the two professions, confirming earlier studies carried out in other countries<sup>20,21</sup>. We found that such a good relationship correlates with a more positive attitude of general practitioners towards the community pharmacist's care-providing function.

Furthermore, we found that general practitioners and pharmacists both agree that the pharmacist has a signalling task towards the general practitioner. More than 80% of the pharmacists and non-dispensing general practitioners agree that pharmacists should provide prescription figures during pharmacotherapeutic audit meetings and should comment on prescription patterns they observe within their pharmacy. Due to the lack of clear agreements and differences in regulations between individual European countries, this signalling task is not yet a part of a pharmacist's standard set of tasks<sup>26</sup>.

Such a signalling task fits into the advisory role that general practitioners expect of a pharmacist. Our finding that the majority of general practitioners want a pharmacist to

have an advisory role rather than a codetermining role is in agreement with other studies<sup>19-21, 27</sup>. A possible explanation for this finding is that general practitioners mostly believe that pharmacists do not have sufficient medical training to be able to correctly interpret a diagnosis or to participate in the clinical decision process<sup>20,28,29</sup>. This may also explain the observed differences in opinion concerning therapeutic substitution and the extent to which the pharmacist should be familiar with all diagnoses relevant to the drugs prescribed.

With respect to generic substitution few differences in opinion were found (Table 1). This is not surprising due to the drug-focused character and existing international policies to stimulate this<sup>30</sup>. On the other hand, opinions as to the desirability of pharmacists providing repeat-prescriptions vary widely. Although the provision of repeat-prescriptions by the pharmacist offers advantages for patients, general practitioners and pharmacists alike<sup>9,31,32</sup>, only 12% of non dispensing and 4% of dispensing general practitioners do consider this to be a pharmacist's task. This strongly contrasts with 78% of pharmacists who think it is a pharmacist's task. A possible explanation for this is that general practitioners would lose the ability to charge the applicable repeat-medication prescription rate to privately insured patients<sup>33</sup>. Since one-third of the patients in a general practice are privately insured, this might result in a substantial loss of income. Compared to their non-dispensing colleagues, dispensing general practitioners are in favour of a more limited role for pharmacists: 28% (CI 16-40) believe that pharmacists should play a very important role in patient care, versus 69% (CI 65-73) of non dispensing general practitioners and 97% (CI 94-99) of pharmacists. Dispensing general practitioners also obtain lower scores on the attitude scale. This is hardly surprising as such general practitioners have a practice in the countryside, with no pharmacies nearby. Therefore, these general practitioners provide both medical and pharmaceutical care. Given the positive opinion of 70% (BI 58-82) of dispensing general practitioners concerning the expertise of the pharmacist within the PTAM, it would be interesting to determine the pharmacist's role in rural areas. This is also true for the advisory role that pharmacists can have in deciding which pharmacotherapy should be prescribed to a given patient.

Forty-six percent (BI 60-68) of the general practitioners, and eighty-five percent (BI 80-90) of the pharmacists, consider the pharmacist to be partially responsible for the treatment of patients. However, when asked whether pharmacists are liable for the possible consequences of irrational pharmacotherapy, both general practitioners and pharmacists considered the pharmacist to be responsible to a much lesser extent. Perhaps this suggests a current lack of a clear definition of the pharmacist's responsibilities in pharmacotherapeutic patient care <sup>34</sup>. If one considers the pharmacist's knowledge of the use of drugs to be superior to the general practitioner's knowledge in this area then pharmacists should be responsible for possible consequences of providing patients with medication, which they know is obsolete or non-functional, even when this medication was prescribed by the general practitioner.

### **Conclusion and recommendation**

Based on a large population and a high response rate, the results of this cross-sectional survey indicate that general practitioners and pharmacists have good relationships with each other, and that they agree on the signalling role that a pharmacist, in his/her function as a drug expert, should fulfil in pharmacotherapeutics. The optimisation of the relationship between general practitioners and pharmacists positively affects the attitude of general practitioners towards the pharmacist's care-providing function. The role that the pharmacist can fulfil in providing feedback from the pharmacy to general practitioners and PTAM groups seems to be important and should be further emphasised. Moreover, the advisory role of the pharmacist deserves more attention. Currently, the differences in opinion between general practitioners and pharmacists seem too large to merit a fruitful discussion on topics such as the diagnosis on the prescription, the provision of repeat-medication by pharmacists, therapeutic substitution or the possibility of a codetermining role for the pharmacist in the general practitioner's pharmacotherapeutic policy.

Whereas dispensing general practitioners acknowledge the expertise of the pharmacist, they generally do not believe that pharmacists should play a very important role in patient care. It would therefore be interesting to further investigate whether and how

pharmacists can collaborate with dispensing general practitioners in a synergistic way, particularly in rural areas.

Both pharmacists and general practitioners generally acknowledge the responsibility of the pharmacist towards the patient that uses medication. A more precise definition of the pharmacist's responsibilities would benefit the cooperation between pharmacists and general practitioners and would create a clearer situation for the patient. A fruitful cooperation between general practitioners and pharmacists is an important part of further quality improvement in pharmacotherapeutic care.

Prospective research in order to explore the impact of collaboration and attitude on quality of prescription, is recommended.

### **Acknowledgements**

We thank the CPs and GPs who participated in this study.

### **Funding**

This study was funded by a research grant from the Royal Dutch Association for the Advancement of Pharmacy (KNMP) and CZ Health Insurance company.

### **Conflicts of interests**

None.

### **References**

1. Mil JWF. Pharmaceutical Care, the future of pharmacy, theory, research and practice. Thesis. Groningen: J.W.F. van Mil; 1999. ISBN 90-9013367-4.
2. Tinke JL. Facts and Figures, cost development of Pharmaceutical care. Den Haag: Stichting Farmaceutische Kengetallen.1995.
3. De Vries CS. Collaboration in healthcare, the tango to drug safety. Thesis. Groningen: C.S. de Vries; 1998. ISBN 90-367-0978-4.
4. Van de Poel G. Cooperation between General Practitioners and Pharmacists. Thesis. Rotterdam: G.Th. Van de Poel; 1988.
5. Harding G, Taylor KM. Professional relationships between general practitioners and pharmacists in health centres. *Br J Gen Pract* 1990;40(340):464-6.
6. Blom AT, Paes AH, Bakker A, Koopman CJ, van der Meer C. Pharmacist-physician co-operation at a regional level. *Pharm World Sci* 1994;16(1):13-7.
7. Diwan VK, Wahlstrom R, Tomson G, Beermann B, Sterky G, Eriksson B. Effects of "group detailing" on the prescribing of lipid-lowering drugs: a randomized controlled trial in Swedish primary care. *J Clin Epidemiol* 1995;48(5):705-11.

8. Krska J, Cromarty JA, Arris F, Jamieson D, Hansford D, Duffus PR, et al. Pharmacist-led medication review in patients over 65: a randomized, controlled trial in primary care. *Age Ageing* 2001;30(3):205-11.
9. Bond C, Matheson C, Williams S, Williams P, Donnan P. Repeat prescribing: a role for community pharmacists in controlling and monitoring repeat prescriptions. *Br J Gen Pract* 2000;50(453):271-5.
10. Zunker RJ, Carlson DL. Economics of using pharmacists as advisers to physicians in risk-sharing contracts. *Am J Health Syst Pharm* 2000;57(8):753-5.
11. Rodgers S, Avery AJ, Meechan D, Briant S, Geraghty M, Doran K, et al. Controlled trial of pharmacist intervention in general practice: the effect on prescribing costs. *Br J Gen Pract* 1999;49(446):717-20.
12. Hawksworth GM, Corlett AJ, Wright DJ, Chrystyn H. Clinical pharmacy interventions by community pharmacists during the dispensing process. *Br J Clin Pharmacol* 1999;47(6):695-700.
13. Kocken GA. Medication discussion groups in the Netherlands: five years of experience. *Med Educ* 1999;33(5):390-3.
14. Sondergaard B, Thorleifsson S, Herborg H, Frokjaer B, Hepler CD, Ersboll BK. Quality assurance of drug therapy for patients with asthma. Health economic analysis. *Ugeskr Laeger* 2000;162(4):480-6.
15. Morrison A, Wertheimer AL. Evaluation of studies investigating the effectiveness of pharmacists' clinical services. *Am J Health Syst Pharm* 2001;58(7):569-77.
16. Zermansky AG, Petty DR, Raynor DK, Freemantle N, Vail A, Lowe CJ. Randomised controlled trial of clinical medication review by a pharmacist of elderly patients receiving repeat prescriptions in general practice. *BMJ* 2001;323(7325):1340-3.
17. Beney J, Bero LA, Bond C. Expanding the roles of outpatient pharmacists: effects on health services utilisation, costs, and patient outcomes. *Cochrane Database Syst Rev* 2000(3):CD000336.
18. Anonymus. Wereldorganisatie artsen wijst pharmaceutical care af. [World Medical Association adopts statements on pharmaceutical care]. *Pharm Weekbl* 1999;134:1589.
19. Spencer JA, Edwards C. Pharmacy beyond the dispensary: general practitioners' views. *BMJ* 1992;304(6843):1670-2.
20. Ellis BC, Dovey SM, Collins DM, Tilvard MW, Clark DW. General practitioners' views on the role of the community pharmacist. *N Z Med J* 1992;105(943):403-5.
21. Nathan A, Sutters CA. A comparison of community pharmacists' and general practitioners' opinions on rational prescribing, formularies and other prescribing related issues. *J R Soc Health* 1993;113(6):302-7.
22. Statistics Netherlands. Available at: <http://www.cbs.nl/en>. Accessed 1 July, 2002.
23. Royal Dutch Association for the Advancement of Pharmacy (KNMP). Apotheekcheck op het basispakket farmaceutische zorg [Pharmacycheck for basic pharmaceutical care]. September 2000 KNMP Den Haag.
24. Questionnaires Hapo-project. Available at: [http://www.hag.unimaas.nl/onderzoek/Projecten/Frame\\_projecten.htm](http://www.hag.unimaas.nl/onderzoek/Projecten/Frame_projecten.htm). Accessed 1 July, 2002.

25. Streiner DL, Norman GR. Health measurements scales, a practical guide to their development and use. 2nd ed. Oxford, UK: Oxford University Press; 1995. ISBN 0 19 262670 1.
26. Cancrinus-Matthijssse AM, Lindenberg SM, Bakker A, Groenewegen PP. The quality of the professional practice of community pharmacists: what can still be improved in Europe? *Pharm World Sci* 1996;18(6):217-28.
27. Ranelli PL, Biss J. Physicians' perceptions of communication with and responsibilities of pharmacists. *J Am Pharm Assoc (Wash)* 2000;40(5):625-30.
28. Muijrsers PEM. Apotheker en voorschrijver, collega's in de zorg. [Pharmacist and Physician colleagues in Healthcare] *Pharm Weekbl* 1998;133: 294-7.
29. Edmunds J, Calnan MW. The reprofessionalisation of community pharmacy? An exploration of attitudes to extended roles for community pharmacists amongst pharmacists and General Practitioners in the United Kingdom. *Soc Sci Med* 2001;53(7):943-55.
30. Mrazek M. Increasing demand while decreasing costs of generic medicines. *The Lancet* 2000;356:1784-5.
31. Dijkers, FWD. Repeat prescriptions, a study in general practice in the Netherlands. Thesis. Rotterdam: F.W.D. Dijkers; 1997.
32. Dowell J, Cruikshank J, Bain J, Staines H. Repeat dispensing by community pharmacists: advantages for patients and practitioners. *Br J Gen Pract* 1998;48(437):1858-9.
33. Rates available at: [www.ctgzorg.nl/publicaties/3-2-1-beroepen.asp](http://www.ctgzorg.nl/publicaties/3-2-1-beroepen.asp). Accessed 1 July, 2002.
34. Ten Hoopen MM. Zorg op recept, de relatie apotheker- geneesmiddelengebruiker in veranderend maatschappelijk en juridisch perspectief. Thesis. Maastricht: Boom Juridische Uitgevers; 2001. ISBN 90 5454 120 2.



## **Chapter 4**

### **Pharmacists in Primary Care**

#### **Determinants of the care-providing function of Dutch community pharmacists in primary care**

Paul E.M. Muijers, J. André Knottnerus, Jildou Sijbrandij, Rob Janknegt, Richard P.T.M. Grol

Published in Pharmacy World & Science 2004;26(5):256-262.

## **Abstract**

*Background:* The development of the care-providing function of the community pharmacist (CP) and variations in professional practice.

*Aim:* To identify determinants of the care-providing function of the CP.

*Design:* Cross-sectional questionnaire survey.

*Setting:* The Netherlands 2001.

*Participants:* 328 CPs.

*Methods:* Questionnaires were used to collect data about the care provided in pharmacies. As dependent variables three partial constructs: 'individual patient care', 'registration of the care', and 'cooperation with GPs', and one total construct: 'care function' were formed. Independent variables were: gender, work experience, attitude to the care-providing function, tenure, relationship with GPs, pharmacist trainer, frequency of postgraduate training, workload, part-time working, frequency of contact with pharmaceutical representatives, presence of technicians with a specialised caring duty, size of the pharmacy, urbanisation, competition, franchise pharmacy, presence of sufficient personnel. A multiple-regression analysis was performed.

*Results:* Respondents 71%, of the respondents 29% never enquired about the patient's experience when supplying a medication for the second time. The supply of self-care remedies was never registered by 11% of respondents. Ninety percent of pharmacists participate more than 4 times per year in Pharmacotherapy Audit Meetings. The attitude of the pharmacist, relationship with the GP, presence of specialised technicians, frequency of postgraduate training and the type of tenure are significantly positively correlated with a care-providing function. Being a pharmacist trainer is significantly positively related with 'individual patient care', the frequency of postgraduate training is significantly positively correlated with 'registration of the care' and the number of years in service is significantly negatively correlated with 'cooperation with GPs'. There is a negative correlation between the cooperation with GPs and the number of years a pharmacist has been in service.

*Conclusion:* Based on this survey, the development of programmes focused on optimal attitude, and cooperation between pharmacists and GPs is recommended.

**Keywords**

Attitude, Care-providing function, Community pharmacists, Determinants, Patient care, Primary health care, The Netherlands.

## Introduction

In primary care, pharmacists play an important role in the distribution of industrially prepared prescription drugs. Compared with a few decades ago, prescription drugs are now hardly ever prepared in the pharmacy: 4.2% over 2002 in The Netherlands <sup>1</sup>. Since the emergence of pharmaceutical care at the start of the 1990s, pharmacists have devoted increasingly more attention to the care of the patient. Pharmaceutical care is defined as: the structured, intensive care of the pharmacist for an optimal pharmacotherapy in which the patient and his condition are the primary concern. The aim is to obtain optimal health-related quality of life <sup>2</sup>. Recent studies have recognised the value of the pharmacist's advisory function in both the direct contact with patients as well as the cooperation with general practitioners (GPs) <sup>3-6</sup>.

The pharmacist's contact with the patient and the GP provides information that can be relevant for the patient's treatment. The registration of this information in an electronic pharmaceutical dossier is essential for monitoring the care provided and goes beyond the registration of prescription drugs supplied <sup>7-9</sup>. We distinguish three important duties in the pharmacist's care-providing function: *individual patient care* in the direct patient contact, the *cooperation with prescribers* in aiming to achieve optimal pharmacotherapy and *the registration of the care provided*. With the development of the care-providing function, the pharmacist now has a broader range of duties which go beyond the preparation and supply of prescription drugs. The expected variations in professional practice are not only influenced by pharmacy-related and person-related factors but also by the pharmacist's opinions and attitudes. There is very little literature in this field. <sup>10-13</sup>.

We carried out a study that mapped the pharmacist's care-providing function and the influence of the aforementioned factors on this. In view of the pharmacist's changing function, the influence of these factors could be important for the quality of the care-providing function.

## Methods

In May 2001, a questionnaire was sent to all pharmacists (n = 379) who were contracted to run a pharmacy in the operating areas of two health insurers from the south of the Netherlands. Four million people reside in this part of the country, which covers a

quarter of the total area of the Netherlands (16 million inhabitants). The health care infrastructure and the medical consumption pattern in the southern part of the Netherlands are representative for the rest of the country <sup>14</sup>.

The questionnaires and a short explanatory note were mailed to the pharmacists; a separate covering letter stated that the questionnaire data would be processed anonymously and would not be related to the identity of respondents. A reminder was sent to the non-respondents after three weeks.

As about half of the pharmacies are run by two pharmacists, two questionnaires were sent to each pharmacy. Ten weeks after the reminder had been sent, a short phone questionnaire was conducted with 20% of the non-respondents, who were selected on a random basis.

### ***Variables and instruments***

Questions and statements were drawn up based on the literature, discussions in the research team and existing questionnaires <sup>15</sup>. A final questionnaire was drawn up based on the comments of experts and 10 practising pharmacists to provisional questionnaires <sup>16</sup>.

The final questionnaire was used to measure the following three groups of variables:

- (a) The reported performance of the care-providing function. This was related to three aspects of the care-providing function: *individual patient care*, *cooperation with GPs* and *registration of the care*. Table 2 gives an overview of the items related to the questions posed.
- (b) The attitude of pharmacists to the care-providing function: For this purpose use was made of a previously developed attitude scale based on 17 statements <sup>6,16</sup>. These statements enquired about attitudes concerning the task, role, responsibility and expertise of the pharmacist.
- (c) Demographic data, person-related and practice-related characteristics: degree of urbanisation, competition with other pharmacies, size of pharmacy, franchised pharmacy (belonging to a chain of pharmacies that presents itself to the public with an extended care-oriented range of services), presence of sufficient personnel, presence of technicians with specialised care duties, pharmacist's gender, number

of years in service, type of tenure (owner pharmacist, managing pharmacist, second pharmacist), full-time equivalent (part-time work), workload, relationship with GPs, function as pharmacist trainer, frequency of participation in pharmacotherapeutic postgraduate training, and frequency of contact with pharmaceutical representatives.

### ***Analysis***

To answer the research question, the scores on the care-providing function questions for individual patient care, cooperation with GPs and registration of medical data were added up in three general constructs '*individual patient care*', '*care registration*', and '*cooperation with GPs*'. The total construct '*care-providing function*' was also formed. These constructs functioned as dependent variables. To verify whether there was sufficient internal consistency in the sum scores stated, a reliability analysis was performed (the respective Cronbach's alpha values were: 0.67, 0.59, 0.83 and 0.84).

By adding up the scores from the 17 statements, the general construct 'attitude with respect to the care-providing function of the pharmacist' was formed (Cronbach's alpha = 0.83). The higher the score, the more favourable the attitude of the respondent towards the pharmacist's care-providing function in primary care. The attitude score could vary between 17 and 85.

To investigate which factors were related to the pharmacist's care-providing function, a multiple linear regression analysis was performed for each construct. The independent variables were the previously stated demographic data, person-related and practice-related characteristics and the attitude of the pharmacist with respect to the care-providing function (sum score).

The linear regression models included all of the independent variables simultaneously. To reduce the chance of false-significant results, a significance level of  $0.05/3 = 0.017$  (Bonferroni correction) was adopted for the analysis of the partial constructs. A significance level of 5% was adopted for the analysis of the total construct. Model fit was assessed by *r*-square.

All of the analyses were performed using SAS version 8.02 (SAS Institute Inc., Cary, North Carolina).

## Results

### Response

A response of 71% (270 of 379 pharmacies) was obtained. A total of 328 pharmacists, including second pharmacists, completed the questionnaire. The characteristics are presented in Table 1.

**Table 1.** Basic characteristics of the survey population and comparison of respondents and telephoned non-respondents. Scores on some important questions and statements.

Survey population Pharmacies n=379	Respondents n = 270 <sup>1</sup>	Non-respondents sample n=25 <sup>2</sup>
Average age in years (standard deviation)	42 (9.3)	44 (7.9)
Male/female ratio (% male)	65%	88%
Second pharmacist	17%	12%
Rural	40%	32%
<i>Statements</i>	<i>% of respondents who replied 'completely agree' or 'partially agree'<sup>3</sup></i>	
The pharmacist should play a very important role in the pharmacotherapeutic policy of the GP*	90	100
The pharmacist's expertise is essential in drawing up PTAM working agreements*	96	100
	<i>% of respondents who replied 'good' or 'very good'<sup>4</sup></i>	
In general, how would you describe your relationship with GPs in your area?*	73	76
	<i>% of respondents who replied 'co-decisive role'<sup>5</sup></i>	
What should be the pharmacist's role with respect to the patient's medication use?*	69	80

<sup>1</sup> A total of 270 pharmacies and 328 pharmacists responded to the questionnaire. Age, gender and replies to the statements are indicated for each individual pharmacist, the other replies are indicated in accordance with pharmacy.

<sup>2</sup> A total of 25 pharmacies was contacted, and in each one, one pharmacist was interviewed.

<sup>3</sup> five points scale: completely agree/ partially agree/ neutral/ partially disagree/ completely disagree.

<sup>4</sup> five points scale: bad/ could be improved/ workable/ good/ very good.

<sup>5</sup> four points scale: decisive role/ co-decisive role/ advisory role/ no role.

\* no significant differences ( $p > 0.1$ ) were found between respondents and telephoned non-respondents.

Of the 109 non-responding pharmacies 25 were randomly selected and 1 pharmacist from each of these was interviewed by means of a telephone questionnaire. For the leading questions, concerning the role and expertise of the pharmacist, no significant differences were found between respondents and telephoned non-respondents. The majority of respondents and telephoned non-respondents considered the relationship between the pharmacist and GP to be good or excellent, and no significant differences were found between respondents and telephoned non-respondents.

### Interpretation of the care-providing function

Table 2 contains a description of the care-providing function items of the three constructs and presents the data from the reliability analysis and the survey.

**Table 2.** Description of care-providing function items distributed over three constructs. Results of the reliability analyses and the survey (n = 328 pharmacists)

Constructs	Never %	Occasionall y %	Regularly %	Often %
<i>Individual patient care (Cronbach's alpha = 0.67; average 14, sd 2.6)</i>				
How often does your pharmacy use a structured set of questions when supplying self-care remedies?	2.8	15	48	35
How often does your pharmacy provide supplementary information with home deliveries?	4.9	35	33	27
How often does your pharmacy provide information about the use and side effects of a drug which is supplied to a given patient for the first time?	1.8	19	33	46
How often do you enquire about a patient's experience with a given drug before providing that same drug for the second time to that patient?	29	57	11	3.1
How often do you engage in a personal consultation with a patient in a separate area?	0.31	51	37	11
<i>Care registration (Cronbach's alpha = 0.59; average 8.0, sd 1.9)</i>				
Besides files of supplied medication, does your pharmacy keep other medical records in a database e.g. pregnancy, allergies, breast cancer?	4.3	27	42	27
How often do you register the supply of self-care remedies?	11	59	27	3.7
How often do you register care interventions that take place in your pharmacy?	12	28	28	32
<i>Cooperation with GPs (Cronbach's alpha = 0.83; average 26, sd 5.6)</i>				
How often do you discuss the care provided by your pharmacy with GPs?	6.2	42	42	10
How often do GPs contact you for advice about a patient's medication?	2.8	46	39	12
How often do you contact a GP about a patient's medication?	0.92	22	58	19
How often do you participate in a Pharmacotherapy Audit Meeting (PTAM)? <sup>1</sup>	5.6	4.1	26	64
How often do you provide agenda items for the PTAM as a consequence of noteworthy prescriptions?	5.3	31	35	23
How often do you supply prescription statistics from your pharmacy to your PTAM group?	6.3	26	31	31
How often do you use prescription statistics to evaluate whether agreements made within your PTAM group are honoured?	23	43	18	10
How often do you generate prescription statistics for the PTAM in cooperation with other pharmacies?	24	26	19	26
How often do you provide individual GPs with feedback on the extent to which they have complied with agreements?	44	34	11	5.1
	1-3/yr	4-5/yr	6-7/yr	>8/yr
How many times per year does your PTAM group meet?	5.1	31	44	14
<i>Total care-providing function (Cronbach's alpha = 0.84; average 48, sd 7.9)</i>				

<sup>1</sup>Pharmacists who never attend a Pharmacotherapy Audit Meeting (PTAM) score 'not applicable' on the questions listed below (5.6%). For the regression analyses the 'not applicable' category is added to the 'never' category or, for the last question, to the '1-3 times' category.

For the *individual patient care*, the response to the question 'How often do you enquire about a patient's experience with a given drug before providing that same drug for the second time to that patient' is remarkable: 29% of the pharmacists indicated that they never did this. When supplying self-care remedies, 83% of pharmacists (regularly 48%; often 35%) use a structured set of questions.

For the *cooperation with GPs*, the pharmacist's 'informative activities' in the local Pharmacotherapy Audit Meetings (PTAMs) are noteworthy. Fifty-eight percent indicated that they regularly to frequently provided agenda items for the PTAM as a result of

noteworthy prescriptions, and sixty-two percent regularly to frequently provided prescription statistics from the pharmacy to the PTAM.

The proportion of pharmacists who participate in PTAMs is high: 90% indicate that they participate more than 4 times per year.

### **Determinants of the care-providing function**

The multiple-regression analysis reveals that a number of determinants are significantly positively correlated with the extent to which the pharmacist practises a care-providing function. For the *total care function* these are: a positive attitude of the pharmacist with respect to the care-providing function, a good relationship with the GP, the presence of technicians with a specialised care-providing duty and frequent participation in pharmacotherapeutic postgraduate training (Table 3).

**Table 3.** Multiple linear regression analysis.

Dependent variable: total construct care-providing function pharmacist (n = 328).  $r^2 = 0.40$

Independent variables	Percentage	Means (sd)	$\beta$	95% CI
Attitude, continuous scale of 17-85		72 (6.7)	0.31	0.20;0.43 <sup>1</sup>
Technicians with specialised care-providing duties <sup>3</sup>	52.3		3.3	1.8;4.9 <sup>1</sup>
Pharmacist's tenure: owner pharmacist <sup>3</sup>	52.0		-0.86	-3.3;1.6
managing pharmacist <sup>3</sup>	31.4		-2.7	-5.2;-0.32 <sup>2</sup>
second pharmacist <sup>3</sup>	16.6		0(ref)	
Franchised pharmacy <sup>3</sup>	46.6		1.2	-0.31;2.8
Pharmacist trainer <sup>3</sup>	21.9		1.4	-0.53;3.3
Gender female <sup>3</sup>	35.4		-1.3	-3.1;0.52
Frequency of contact with pharmaceutical representatives per month <sup>4</sup>		3.3 (2.7)	0.14	-0.14;0.43
Number of years in service <sup>4</sup>		14.2 (8.6)	-0.043	-0.15;0.064
Frequency of postgraduate training Never/ occasionally/ regularly/ often <sup>4</sup>	0/ 21.1/ 63.0/ 15.9		2.2	0.95;3.5 <sup>1</sup>
Relationship with GP: Poor/ could be better/ workable/ good/ very good <sup>4</sup>	1.2/ 9.6/ 15.8 / 47.5 / 25.8		2.7	1.9;3.5 <sup>1</sup>
Workload: to high <sup>3</sup>	7.1		2.0	-0.85;4.9

<sup>1</sup>p < 0.001.

<sup>2</sup>p < 0.05.

<sup>3</sup>yes=1.

<sup>4</sup>Continuous variable.

The tenure held by the pharmacist is significantly correlated with the extent to which the pharmacist practises the care-providing function. For this the managing pharmacist scores significantly lowest.

In the multiple-regression analysis of the partial construct '*individual patient care*' (Table 4) attitude, the relationship with the GP, the presence of technicians with a specialised care-providing duty as well as being a 'pharmacist trainer' have a significant positive

correlation with the extent to which the pharmacist practises this aspect of the care-providing function.

**Table 4.** Multiple linear regression analysis. Dependent variables: partial constructs care-providing function (n = 328). For the complete listing of the independent variables see Table 3

	$\beta$	Bonferroni-adjusted 95% CI (=98.3 CI)
<i>Individual patient care (r<sup>2</sup> = 0.26)</i>		
Pharmacist trainer	0.94	0.088;1.8
Attitude	0.066	0.013;0.12
Relationship with GP	0.39	0.013;0.76
Technicians with specialised care-providing duties	1.1	0.46;1.8
Frequency postgraduate training attended by pharmacist	0.52	-0.054;1.1
Number of years in service	0.040	-0.0072;0.087
Franchised pharmacy	0.57	-0.11;1.3
Workload	0.60	-0.68;1.9
Gender female	-0.29	-1.1;0.51
Pharmacist's tenure: owner pharmacist	-0.21	-1.3;0.87
managing pharmacist	-0.52	-1.6;0.55
second pharmacist	0(ref)	
Frequency of contact with pharmaceutical representatives	-0.0067	-0.13;0.12
<i>Cooperation GPs (r<sup>2</sup> = 0.34)</i>		
Number of years in service	-0.10	-0.20;-0.0067
Attitude	0.21	0.10;0.32
Relationship with GP	2.2	1.5;3.0
Technicians with specialised care-providing duties	1.5	0.11;2.9
Frequency postgraduate training attended by pharmacist	1.1	-0.0079;2.3
Frequency of contact with pharmaceutical representatives	0.21	-0.045;0.46
Workload	2.0	-0.55;4.6
Gender female	-1.2	-2.9;0.37
Tenure pharmacist: owner pharmacist	-0.46	-2.6;1.7
managing pharmacist	-1.5	-3.7;0.61
second pharmacist	0(ref)	
Franchised pharmacy	0.33	-1.0;1.7
Pharmacist trainer	-0.086	-1.8;1.6
<i>Registration of the care (r<sup>2</sup> = 0.21)</i>		
Frequency postgraduate training attended by pharmacist	0.60	0.17;1.0
Attitude	0.045	0.0050;0.085
Technicians with specialised care-providing duties	0.69	0.17;1.2
Pharmacist trainer	0.52	-0.13;1.2
Franchised pharmacy	0.37	-0.14;0.89
Tenure pharmacist: owner pharmacist	-0.18	-1.0;0.63
managing pharmacist	-0.62	-1.4;0.20
second pharmacist	0(ref)	
Frequency of contact with pharmaceutical representatives	-0.057	-0.15;0.038
Workload	-0.53	-1.5;0.45
Number of years in service	0.017	-0.019;0.053
Relationship with GP	0.11	-0.18;0.39
Gender female	0.13	-0.47;0.74

In the multiple-regression analysis of the partial construct 'cooperation with GPs', attitude, the relationship with the GP and the presence of technicians with a specialised care-providing duty were found to have a significant positive correlation with the extent to which the pharmacist practises this aspect of the care-providing function.

Furthermore, there is a significant negative correlation with the pharmacist's number of years in service: the longer the pharmacist has been in service, the less the extent to which he cooperates with GPs.

In the multiple-regression analysis of the partial construct '*registration of the care provided*', it was found that in addition to the attitude and the presence of technicians with a specialised care-providing duty, the frequency of postgraduate training was positively correlated with the extent to which the pharmacist practises this aspect of the care-providing function.

In addition to the variables stated in Tables 3 and 4, the independent variables stated in the method section were also included in the analyses. The variables, 'degree of urbanisation', 'competition with other pharmacies', 'sufficient personnel', 'full-time equivalent (part-time work)', and 'size of pharmacy', did not exhibit a significant association with the extent to which the pharmacist practises a care-providing function in any of the four analyses performed.

## **Discussion**

The results from this cross-sectional study reveal that for self-care remedies in *individual patient care* a structured set of questions is often used and *registration of the care provided* often occurs. It is remarkable that when a drug is supplied to a patient for the second time, 29% of the pharmacies never enquire about the patient's experience. Particularly such questions about the patient's experience can lead to the timely detection of problems with medicine use and is therefore recommended<sup>17</sup>.

The results from this study show that a number of variables are related to the pharmacist's practise of the care-providing function. The attitude of the pharmacist with respect to his position in primary care and the relationships he has with the GPs plays an important role in this; earlier research confirmed these findings<sup>4,10,12</sup>.

PTAMs play an important role in the cooperation with GPs. Pharmacists frequently and actively play a role in these.

The presence of technicians with a specialised care-providing duty does have a positive effect on the *individual patient care* as has also been shown by other studies<sup>18</sup>. In addition to this, this study identifies that the presence of specialised technicians is

related to an improved *registration of the patient care* and to an improved *cooperation with GPs*.

We also found a correlation between the practice of a care-providing function and the tenure in which the pharmacist works. The second pharmacist who is employed under a 'managing pharmacist' or under an 'owner pharmacist' was found to be more care-oriented than a 'managing pharmacist'. This can possibly be explained by the fact that the 'managing pharmacist' or the 'owner pharmacist' is more involved in 'back office duties'. Further research will need to explore this.

A more frequent attendance of postgraduate pharmacotherapeutic training by the pharmacist was also found to be correlated to a more care-oriented function and in particular with the *registration of the care provided*. This is an interesting finding because the adequate registration of the care provided is essential for the monitoring of patients by the pharmacy team and the pharmacist's guidance in this is indispensable.

The practice of a function such as a pharmacist trainer was found to be associated with greater attention to individual patient care. This may be due to the extra attention given to pharmaceutical care by the practical training of a community pharmacist.

The *cooperation with the GP* seems to be negatively related with the pharmacist's number of years in service. As pharmaceutical care is a relatively new development in community pharmacy, a possible explanation for this could be that the older generation of pharmacists consider cooperation to be less important. Since cooperation with GPs forms an important part of the pharmacist's care-providing function, further research into how this cooperation should be formulated is important.

In view of the 'informative activities' with the help of prescription statistics (which 60% of pharmacists regularly to frequently use in PTAMs) it is recommended that research is carried out to explore the extent to which an 'assessing function' for the pharmacist fits into the cooperation with GPs. With such an 'assessing function', the pharmacist makes greater use of his possibilities to assess compliance with generally accepted guidelines and agreements with the aid of prescription statistics. Earlier research has indicated that GPs find this important<sup>6,19,20</sup>.

Causal relationships cannot be demonstrated in a cross-sectional study such as this. Also selective drop-out cannot be excluded. In view of the response-rate of 71% and the

results of the non-respondents research, selective drop-out seems to be unlikely. It is recommended that the determinants described are further investigated in a prospective study. In this a number of the self-reported data with respect to the PTAM for example, can be replaced with objective data.

## **Conclusion**

The professional practice of the pharmacist has undergone a development that has resulted in *individual patient care, cooperation with GPs and registration of the care* becoming visible elements in the care-providing function practised by the pharmacist. The extent to which the pharmacist practises these is positively related with his attitude, his relationship with GPs, the frequency of postgraduate training, being a pharmacist trainer, the tenure as second pharmacist and the presence of specialised technicians in the pharmacy.

In view of the important place drugs have in the treatment of patients and the important role that cooperation between care providers plays in this, the development of programmes focused on optimal attitude, and cooperation between pharmacists and GPs is recommended. The results of this study and the results of future prospective research will contribute to this.

## **Acknowledgements**

We thank the community pharmacists and GPs who participated in this study.

## **Funding**

Research grant from Dutch Pharmacist's Association and CZ (health insurance company).

## **Conflicts of interests:**

None.

## **References**

1. Tinke JL, Griens AM. Facts and figures 2003, cost development of pharmaceutical aid. The Hague The Netherlands: Foundation for Pharmaceutical Statistics;1999.
2. Hepler CD, Grainger-Rousseau TJ. Pharmaceutical care versus traditional drug treatment. Is there a difference? *Drugs* 1995;49(1):1-10.

3. Beney J, Bero LA, Bond C. Expanding the roles of outpatient pharmacists: effects on health services utilisation, costs, and patient outcomes (Cochrane Review). In: *The Cochrane Library*, 4, 2001. Oxford.
4. De Vries, C.S., Collaboration in healthcare. The tango to drug safety. (dissertation) Groningen; University of Groningen 1998. ISBN: 90-367-0978-4.
5. Van Mil JWF. Pharmaceutical Care, the future of pharmacy, theory, research and practice. Thesis. Groningen: J.W.F. van Mil; 1999. ISBN 90-9013367-4.
6. Muijters PEM, Knottnerus JA, Sijbrandij J, Janknegt R, Grol RPTM. Changing relationships: attitudes and opinions of general practitioners and pharmacists regarding the role of the community pharmacist. *Pharm World Sci* 2003;25(5):235-241.
7. De Gier JJ. The Electronic Pharmaceutical Dossier: an effective aid to documenting pharmaceutical care data. *Pharm World Sci* 1996;18(6):241-3.
8. Kirking DM, Thomas JW, Ascione FJ, Boyd EL. Detecting and preventing adverse drug interactions: the potential contribution of computers in pharmacies. *Soc Sci Med* 1986;22(1):1-8.
9. Van Mil JW, Dudok van Heel MC, Boersma M, Tromp TF. Interventions and documentation for drug-related problems in Dutch community. *Pharmacies. Am J Health Syst Pharm* 2001;58(15):1428-31.
10. Mason HL. Using attitudes and subjective norms to predict pharmacist counseling behaviors. *Patient Couns Health Educ* 1983;4(4):190-6.
11. Odedina FT, Hepler CD, Segal R, Miller D. The Pharmacists' Implementation of Pharmaceutical Care (PIPC) model. *Pharm Res* 1997;14(2):135-44.
12. Matheson C, Bond CM, Mollison J. Attitudinal factors associated with community pharmacists' involvement in services for drug misusers. *Addiction* 1999;94(9):1349-59.
13. Farris KB, Schopflocher DP. Between intention and behavior: an application of community pharmacists' assessment of pharmaceutical care. *Soc Sci Med* 1999;49(1):55-66.
14. Statistics Netherlands. Available at: <http://www.cbs.nl/en>. Accessed may 1, 2003.
15. The Dutch Pharmacist Organisation KNMP. Apotheekcheck op het basispakket farmaceutische zorg [Pharmacycheck for basic pharmaceutical care]. September 2000 KNMP Den Haag.
16. Questionnaires Hapo-project. Available at: [http://www.hag.unimaas.nl/onderzoek/Projecten/Frame\\_projecten.htm](http://www.hag.unimaas.nl/onderzoek/Projecten/Frame_projecten.htm). Accessed may 1, 2003.
17. Bond C, Matheson C, Williams S, Williams P, Donnan P. Repeat prescribing: a role for community pharmacists in controlling and monitoring repeat prescriptions. *Br J Gen Pract* 2000 Apr;50(453):27-5.
18. Timmer JW, de Smet PA, Schuling J, Tromp TF, de Jong-van den Berg LT. Patient education to users of oral hypoglycemic agents: the perspective of Dutch community pharmacists. *Pharm World Sci* 1999;21(5):200-4.
19. Strikwerda P, Bootsma-de Langen AM, Berghuis F, Meyboom-de Jong B. Farmacotherapie in een verzorgingshuis; gunstige invloed van feed-back door de apotheker op het voorschrijfgedrag van de huisarts. [Drug therapy in a nursing home; favorable effect of feedback by the pharmacist on family physician's prescribing behavior] *Ned Tijdschr Geneesk* 1994 27;138(35):1770-4.

20. Peterson GM, Stanton LA, Bergin JK, Chapman GA. Improving the prescribing of antibiotics for urinary tract infection. *J Clin Pharm Ther* 1997;22(2):147-53.



## **Chapter 5**

### **Prescribing indicators**

**Development and validation of guideline-based prescribing indicators as an instrument to measure the variation in the prescribing behaviour of general practitioners**

Paul E.M. Muijers, J. André Knottnerus, Jildou Sijbrandij, Rob Janknegt, Richard P.T.M. Grol

Published in the European Journal of Clinical Pharmacology 2004;60(10):739-746

## **Abstract**

*Background:* Differences in prescribing behaviour between general practitioners (GPs).

*Aim:* To formulate and validate clinical prescribing indicators based on general practice guidelines.

*Design:* Validatory study.

*Setting:* Pharmacies and general practices in the Netherlands in 2003.

*Participants:* A total of 379 pharmacies, 947 general practices and 3.8 million patients.

*Methods:* A total of 51 potential indicators were formulated, based on medicinal recommendations from the evidence based guidelines of the Dutch College of General Practitioners and the corresponding recommendations from the Commission Pharmaceutical Help of the Health Care Insurance Board. These indicators were submitted to an expert panel to assess content validity. The panel assessment was analysed using the RAND-UCLA appropriateness method (RAM). Then for the remaining indicators, it was assessed to what extent these could be used to determine the prescribing behaviour of GPs and the level to which this behaviour varies between GPs. This was done using a prescribing analyses and cost (PACT) database that was compiled from prescription databases from 379 pharmacies, with all prescriptions from 1,434 general practitioners over an entire year to 3.8 million patients.

*Results:* The panel considered 34 of the 51 potential indicators to be valid with respect to providing an adequate reflection of the central recommendations in the guideline and in terms of relevance with respect to health gain and/or efficiency. Of these 34 indicators, 20 revealed considerable differences in the prescribing behaviour of general practitioners.

*Conclusion:* On the basis of existing general practice guidelines, 20 prescribing indicators could be formulated that were assessed by an expert panel to be sufficiently valid and which could also discriminate the prescribing behaviour of GPs as reflected in the prescription databases of pharmacies.

## **Keywords**

Feedback, General practitioner, Guidelines, Indicators, Pharmacist, Pharmacy, Databases, Prescriptions, Primary health care.

## Introduction

Prescription of drugs is an important part of the general practitioner's (GPs) therapeutic activities. In the Netherlands, but also for example in the United Kingdom, a drug is prescribed in more than 60% of the cases in which a patient consults a GP. In Southern European countries this percentage can even increase to over 90 %<sup>1,2</sup>. There are considerable differences among GPs in terms of the choice of drugs and the quantities prescribed. This variation is not only caused by demographic differences in the patient population or differences in morbidity, but is also the consequence of differences in the prescribing behaviour and in the quality of prescribing<sup>3-6</sup>.

Good indicators are needed for a valid and reliable measurement of the quality of prescribing. This is understood to mean: measurable elements in the care provided for which there is consensus and which can be used to estimate and improve the quality of care provided<sup>7</sup>.

The indicators currently described in the literature with respect to the prescription of drugs are mainly formulated on the basis of general recommendations; they are rarely derived from existing, general practice guidelines that are more specific for GPs<sup>8-11</sup>. Such evidence-based guidelines are now available in several countries<sup>12-17</sup>. If variations in professional culture and clinical practice are allowed for, these guidelines and the indicators derived from these guidelines can be of value in different countries<sup>18</sup>.

This article describes the development of a number of prescribing indicators that are based on existing general practice guidelines and are suitable for use in existing sources, such as pharmacy databases or prescribing analysis and cost (PACT) data<sup>19</sup>.

We have tested these indicators against the following requirements:

- The formulated prescribing indicators must be relevant in light of the health gain and/or efficiency gain to be obtained, and they must adequately reflect the central recommendations in the guideline.
- The formulated prescribing indicators must make it possible to describe the prescribing behaviour of GPs and the variation that exists in this behaviour.

## Methods

On the basis of evidence-based general practice guidelines, we formulated prescribing indicators and subsequently investigated the content and construct validity of these prescribing indicators.

### ***Potential indicators based on general practice guidelines***

We formulated 51 potential indicators based on the medicinal recommendations in 32 guidelines from the Dutch College of General Practitioners (Dutch acronym: NHG) and the corresponding recommendations from the Commission Pharmaceutical Help (Dutch acronym: CFH) of the Health Care Insurance Board <sup>20,21</sup>. This was done by using the following method (Box 1):

#### **Box 1: Guidelines as the basis for potential indicators**

##### **Guidelines Dutch College of General Practitioners (NHG)**

- The first guideline was published in 1989
- Now (2004) 80 guidelines are available <sup>12,13</sup>
- Supported by relevant scientific literature
- Related to daily practice <sup>43</sup>
- >70% of general practitioners comply with these <sup>41</sup>

##### **Guidelines Commission Pharmaceutical Help (CFH)**

- Sent annually to all prescribers since 1982 <sup>20,21</sup>
- Widely-used source of information <sup>44</sup>

##### **Potential indicators were formulated on the basis of:**

- The medicinal recommendations in NHG standards and the corresponding CFH recommendations
- The measurability of the recommendations given in the guideline
- Outcome measure expressed as a percentage that is related to the compliance with the guideline

- Potential indicators with respect to first-choice drugs, combinations of drugs and the step-by-step prescription of drugs were formulated using the existing NHG guidelines.
- All medicinal recommendations in the NHG guidelines were itemised and compared with the CFH recommendations.
- If there was no agreement between the NHG and the CFH guidelines with respect to the drug choice (for example, depression, hay fever), no indicators were formulated.

- No potential indicators were formulated from guidelines concerning over-the-counter drugs (for example, antacids and painkillers) because no systematic registration of these drugs occurs and therefore they cannot be evaluated in pharmacy databases.
- The indicators were formulated as a fraction. For example, the numerator contains the quantity of a recommended drug that is prescribed and the denominator the total quantity of all drugs prescribed from the drug group in question. With this, the score on an indicator can be expressed as a percentage varying from 0% to 100%, and in the example given the optimum score approaches 100%.
- Drugs were classified in accordance with the anatomical therapeutic chemical drug classification system (ATC code); the number of defined daily doses (DDDs) was used as the measure of volume <sup>22</sup>. The number of prescriptions was chosen as the measure of volume, when the indicator was related to the choice of drugs used for a period of several days or weeks, and for which the use expressed in DDDs varied considerably. This is, for example, the case for externally applied drugs.
- For indicators directed towards making a limited choice from a group of drugs the DU90% method was used <sup>23</sup>. This method relates the quality of prescribing to the number of different drugs (in terms of DDDs) that are responsible for 90% of the drug use, the DU90% index. The method assumes that good prescribing is correlated with a relatively limited choice from the available range of drugs.

### ***Determining the validity***

The potential indicators were submitted to a panel of experts to assess content validity. The panel of experts consisted of six GPs and a pharmacist with a professor of general practice medicine as chair. In addition to proven scientific experience, all the panel members had more than 10 years of practice experience (average 21 years). The pharmacist had gained more than 20 years of practice experience in her own pharmacy. The GPs worked in various types of practices in geographically different areas. The 51 potential indicators were sent to the panel members by post and they assessed each indicator for three characteristics on a nine-point scale: relevance for health gain, relevance for efficiency, and providing an adequate reflection of the central recommendations in the guideline (Box 2).

**Box 2: Questions to panel members with respect to the content validity of the prescribing indicators formulated**

(Score ranging from 1 to 9)

- How relevant is this indicator in light of the health gain to be obtained?
- How relevant is this indicator in light of the efficiency gain to be obtained?
- How valid is this indicator for measuring the compliance with the central recommendations from the guideline?

The existing evidence-based guidelines provided the basis for assessing the potential indicators. We chose a small panel so that everyone could be involved in the group discussion. After the written assessment by the panel members, differences in the assessment of the indicators were discussed during a panel session (see Analysis). Following the discussion, each of the panel members had the opportunity to provide a new written assessment for each of these indicators.

Next, in the available prescription database, for all of the prescribing indicators remaining after the panel assessment, it was assessed to what extent these could be used to determine the prescribing behaviour of GPs and the level to which this behaviour varies among GPs. The prescription database was a compilation of pharmacy databases and was made available as PACT data by the health insurers, with due consideration to existing privacy legislation. Each month, health insurers in the Netherlands receive electronic declarations from the pharmacists; these are provided in a standardised format and contain information about the patient, the prescriber and the drug<sup>24</sup>. By linking these declaration databases, an extremely large database was created that contained detailed information about all the drugs supplied to 3.8 million patients in the year 2000 by 379 pharmacists, which had been prescribed by 1,434 GPs in 947 practices (Box 3).

**Box 3: Data available in the prescription databases used**

- Patients (3.8 million): code number, age, sex, postcode, general practitioner code, pharmacist code
- General practitioners (1434 in 947 practices): code number, practice number, age, sex, postcode, type of practice, practice size
- Pharmacies (379): code number, postcode, type of pharmacy, pharmacy size
- Drugs prescribed by GP and supplied by pharmacist in 2000: patient code, ATC code and article code, date supplied, number of prescriptions and/or DDDs<sup>22</sup>

## **Analysis**

The overriding criterion was that an indicator had to satisfy the requirement that it reflected the central recommendation in the guideline; in addition, the indicator also had to be sufficiently relevant for the health gain or efficiency gain. This was analysed using the RAM (RAND-UCLA Appropriateness Method) <sup>25</sup>. Sufficient validity with respect to the three previously mentioned characteristics (i.e. health gain, efficiency and adequate reflection) was considered to be present for an average panel score of seven or more, provided that the assessment of the individual panel members did not vary considerably. We determined this using the interpercentile range adjusted for symmetry (IPRAS) method developed in the RAM. A number of potential indicators were discarded on the basis of the RAM analysis.

To obtain an impression of the manner in which the different prescribing indicators reflected the prescribing behaviour of GPs and the variation within this, the mean, standard deviation (SD), coefficient of variation ( $CV = SD/mean \times 100\%$ ), the median and the interquartile range (iqr) were calculated for all of the potential indicators that remained in the available prescription databases after the RAM analysis.

The prescription indicators were separated into indicators for which, generally speaking, a high score or a low score is desirable based on the recommendations in the guideline. To obtain an impression of the prescription volume of the drug group related to an indicator, the percentage of the total number of prescriptions applicable to the indicator was calculated. For this, the number of prescriptions for drugs for which the indicator was relevant was divided by the total number of prescriptions.

The prescription figures were standardised for the age and sex profile of the practice so that practices could be readily compared <sup>26</sup>. Also, a minimum practice size of 800 patients was used, which is one-third that of the average practice size in the Netherlands.

## **Results**

After the panel assessment 34 of the 51 potential indicators remained. Tables 1 and 2 contain brief descriptions of these indicators.

**Table 1.** Prescribing indicators for which a higher score is desirable, based on the recommendations in the guidelines.

No		H <sub>1</sub>	E <sub>2</sub>	A <sub>3</sub>	Score Mean(sd)	Score median (iqr)	CV <sub>4</sub>	%presc <sup>5</sup>
01	DDD chlorothalidone and hydrochlorothiazide divided by DDDs for all diuretics X 100%	+	+	+	23.48(13.95)	21.19(19.77)	59	4.0
02	FNA <sup>6</sup> prescribed eardrops divided by all prescribed eardrops for the treatment of otitis externa X 100%	+	+	+	20.54(19.68)	14.49(26.40)	96	0.6
03	Patients who were prescribed a PPI (proton pump inhibitor) and who had been prescribed an H2 antagonist prior to this, divided by the patients who received a PPI X 100%	+	+	+	7.39(5.54)	6.31(6.74)	75	2.2
04	DDD atenolol and metoprolol divided by DDDs of all beta-blockers X 100%.	+	+	+	63.88(13.79)	65.18(19.57)	22	3.7
05	DDD enalapril and captopril divided by DDDs of all ACE inhibitors X 100%	+	+	+	50.10(20.93)	49.57(31.00)	42	1.8
06	DDD sub-50 single-phase preparations of the 2 <sup>nd</sup> generation divided by DDDs of all combined preparations of oral contraceptives X 100%	-	+	+	39.00(13.01)	38.49(18.37)	33	3.9
07	DDD tolbutamide and metformin divided by DDDs of all oral antidiabetics X 100%	+	-	+	40.58(16.25)	38.63(22.63)	40	2.2
08	Prescriptions for imidazole derivatives divided by all prescriptions for topical dermatological antimycotics X 100%	+	+	+	51.25(18.38)	51.38(26.99)	36	1.4
09	Prescriptions for triamcinolonacetone 0.1%, flumethasone pivalate and hydrocortisone butyrate cream/ointment/lotion divided by all prescriptions for class 2 topical corticosteroids X 100%	-	+	+	72.79(19.41)	77.64(29.97)	27	0.8
10	Prescriptions for betamethasone dipropionate, betamethasone valerate and fluocinonide ointment /cream/gel/solution/lotion divided by all prescriptions for all class 3 topical corticosteroids X 100%	-	+	+	57.53(20.31)	59.47(30.21)	35	0.7
11	Patients (18-45 yr) who received 0.25 DDD or more beta-mimetics per day and in addition to this 0.5 DDD or more inhaled corticosteroids or cromones, divided by patients (18-45 yr) who received 0.25 DDD or more beta-mimetics per day X 100%	+	+	+	25.59(16.91)	24.12(20.56)	66	2.1
12	Patients (18-45 yr) who received 0.5 DDD or more beta-mimetics per day and more than 0.5 DDD inhalation corticosteroids, divided by patients (18-45 yr) who received 0.5 DDD or more beta-mimetics on average per day X 100%	+	+	+	31.99(23.27)	30.85(31.30)	73	2.1
13	Patients treated with antidiabetics and statins divided by patients treated with antidiabetics X 100%	+	+	+	24.64(11.32)	23.51(14.16)	46	2.1
14	Patients who were prescribed an angiotensin II-antagonist (AT-2) and prior to this an ACE inhibitor, divided by patients who received an AT-2 X 100%	+	+	+	7.46(9.40)	4.94(10.74)	126	0.6
15	DDD diclofenac, ibuprofen and naproxen, divided by DDDs for all NSAIDs X 100%.	-	+	+	77.80(10.19)	79.25(13.47)	13	6.5
16	Prescriptions for chloroamphenicol, tetracycline fusidic acid and polymyxin B/trimethoprim eye ointment divided by all prescriptions for antimicrobial eye drugs X 100%.	+	+	+	94.56(8.59)	97.21(5.73)	9	0.9
17	Prescriptions for clotrimazole and miconazole divided by prescriptions for all drugs for candida vaginose X 100%.	+	+	+	93.87(11.16)	98.20(6.71)	12	0.4
18	DU 90% Oral contraceptives (n=14 -> DU90%=5) <sup>7</sup>	+	-	+	66.96(4.43)	66.67(0)	7	3.9
19	DU 90% NSAIDs(n= 21->DU90%= 4) <sup>7</sup>	+	+	+	79.42(7.39)	80.95(9.52)	9	6.5
20	DU 90% topical corticosteroids (n=21 ->DU90%=7) <sup>7</sup>	+	+	+	68.49(5.99)	66.67(5.56)	9	2.2
21	DU 90% ACE inhibitors (n=10->DU90%=4) <sup>7</sup>	+	+	+	59.09(10.50)	60.00(20.00)	18	3.3
22	DU 90% Beta-blockers (n=16->DU90%=5) <sup>7</sup>	-	+	+	68.78(6.49)	71.43(7.14)	9	3.7

Variation of the score among general practices (947 practices, 3.8 million patients).

<sup>1</sup>Health gain, <sup>2</sup>Efficiency gain, <sup>3</sup>'Adequate reflection' (+ = average panel score of 7 or more).

<sup>4</sup>CV = Coefficient of variation (sd/mean x100%). <sup>5</sup>percentage of all prescriptions. <sup>6</sup>Standardised pharmacy compounded ear drops containing acetic acid, corticosteroids and/or antibiotics according to 'Formularium of Dutch Pharmacists' (Dutch Pharmacists' formulary). <sup>7</sup>percentage DU90%: 100 - ( DU90% index X 100% )/n = ...% where n is all available drugs.

**Table 2.** Prescribing indicators for which a low score is desirable, based on the recommendations in the guidelines.

No		H <sub>1</sub>	E <sub>2</sub>	A <sub>3</sub>	Score Mean(sd)	Score Median(iqr)	CV <sub>4</sub>	%presc <sup>5</sup>
23	DDD's ferrosulphate 'slow release' divided by DDDs for all iron supplements X 100%	-	+	+	33.30(24.82)	28.52(36.93)	75	0.6
24	DDD's cyclo-oxygenase-2 divided by DDDs for all NSAIDs X 100%	-	+	+	8.09(6.34)	6.51(7.85)	78	6.5
25	Prescriptions for amoxicillin/clavulanic acid divided by prescriptions for all oral antibiotics X 100%	+	+	+	8.25(4.88)	7.42(5.96)	59	5.5
26	Prescriptions for quinolones divided by prescriptions for all oral antibiotics X 100% <sup>6</sup>	+	+	+	6.21(3.65)	5.53(4.49)	59	5.5
27	Percentage of patients in the practice who were prescribed a benzodiazepine more than 6 times per year	+	+	+	3.73(2.77)	3.40(1.98)	74	10.4
28	Percentage patients in the practice who were prescribed mebeverine.	-	+	+	1.07(0.96)	0.86(0.95)	90	0.3
29	<i>Number of children (&lt;4yr) who only received dectropine, divided by all children who were prescribed dectropine or other asthma medication X 100%.</i>	+	+	+	13.27(21.07)	0(19.65)	159	0.03
30	<i>Number of children (&lt;4yr) who only received ketotifen divided by all children who were prescribed ketotifen or another asthma medication X 100%.</i>	+	+	+	3.71(10.26)	0(0)	276	0.02
31	<i>Number of prescriptions for Whitfield<sup>6</sup> divided by the total number of prescriptions for dermatological antimycotics X 100%.</i>	+	+	+	0.64(2.41)	0(0)	377	0.00
32	<i>Number of patients &lt; 8 yr who were prescribed loperamide divided by the total number of patients &lt;8 yr X 100%.</i>	+	+	+	0.16(0.68)	0(0)	426	0.00
33	<i>Number of patients who were prescribed dihydroergotamine divided by the total number of patients X 100%.</i>	+	+	+	0.03(0.10)	0(0)	375	0.00
34	<i>Number of patients who were prescribed dextromoramide divided by the total number of patients X 100%.</i>	+	-	+	0.00(0.01)	0(0)	565	0.00

Variation of the score among general practices (947 practices, 3.8 million patients).

<sup>1</sup>Health gain, <sup>2</sup>Efficiency gain, <sup>3</sup>'Adequate reflection' (+ = average panel score of 7 or more).

<sup>4</sup>CV = Coefficient of variation (sd/mean x100%). <sup>5</sup>percentage of all prescriptions.

<sup>6</sup>Whitfield: Standardised pharmacy compounded ointment containing salicylic acid and benzoic acid

The panel considered these to be valid with respect to providing an adequate reflection of the central recommendations in the guideline, and relevant with respect to the health and/or efficiency gain to be obtained.

Taking into consideration the level of the score, and the range and prescription volume, 20 of the 34 indicators exhibited a considerable variation among GPs (CV >20). To illustrate this, 14 prescribing indicators are italicised in Tables 1 and 2. The italicised indicators shown in Table 1 concern drugs that the majority of practices prescribed in accordance with the guidelines (score >77, CV <14), or indicators related to the DU90% (score between 60 and 80%, CV ≤18).

The italicised indicators shown in Table 2 concern drugs that are prescribed in a very low volume; more than half of the practices never prescribe these drugs (median = 0).

The scores for the different indicators are taken from 947 general practices. They indicate the degree to which GPs prescribed in accordance with the guidelines. A number of scores for indicators concerning drugs regularly prescribed in general practice are particularly striking: for example, the low average scores on the indicators

01 and 02 for thiazide diuretics (23.48, SD 13.95) and standardised pharmacy compounded ear drops (20.54, SD 19.68). In view of the years of experience with these drugs and the good scientific basis for their preferred place in the guidelines, these drugs should have a high score. Equally striking is the low score on the indicator 03 for proton pump inhibitors (07.39, SD 5.54) which is based on a guideline published in 1996. It seems that GPs in 2000 were one step ahead of the new guideline, which was published in 2003. In this new guideline, the policy with respect to proton pump inhibitors was formulated less strictly than before <sup>13</sup>. The indicator no 23 for ferrosulphate 'slow release' preparations has a strikingly high score. The guideline advises against this drug for the treatment of anaemia due to the limited resorption <sup>21</sup>. Despite this, 32.89% of the drugs for iron preparations were ferrosulphate 'slow release'.

## Discussion

We formulated 34 prescription indicators on the basis of existing general practice guidelines and an expert panel assessed these as being sufficiently valid. Twenty of these indicators were also found to reveal considerable differences in the prescribing behaviour of GPs.

As the prescribing indicators were calculated using pharmacy databases, the link with individual prescription decisions is lacking for prescribers, and the indicators are limited to what is measurable in the pharmacy databases <sup>27</sup>. However, pharmacy databases do not register the drugs *prescribed* but the drugs *supplied* to the patient. The supply is influenced by the pharmacist; he advises patients and prescribers, intervenes in the case of drug-related problems and in partnerships with GPs and influences the decision-making process with respect to drug choices <sup>28-31</sup>.

A source of bias in the calculation of the indicators from pharmacy databases is the effect of the patient who, depending on the type of prescription, does not always submit all prescriptions to the pharmacist. As a consequence, an indicator might give an incorrect estimate of the degree to which prescribing is in accordance with the guideline; however this effect is limited as more than 90% of patients submit the prescriptions <sup>32-34</sup>. In addition to this, patients can take the initiative to purchase over-the-counter drugs.

This can have an effect on indicator 3. In the Netherlands, the low-dose administration forms of H<sub>2</sub> antagonists can be obtained over the counter. However, in view of the high price and the continued high volume of H<sub>2</sub> antagonists supplied on prescription, this over-the-counter availability is not likely to have a large effect on the score on indicator 3<sup>35</sup>.

The lack of an indicator for generic prescribing in our set of prescribing indicators is striking. In the pharmacy databases we used, it was not possible to calculate the degree to which GPs prescribed generically because, in the Netherlands, as in several other European countries, generic substitution can also take place on the initiative of the pharmacist<sup>36</sup>.

The small amount of variation for the indicators based on the DU90% is also striking. This might be due to the presence of guidelines for the drugs to which the indicators are related. It also must be taken into consideration when using DU90% indicators, that a good score can be achieved (c.q. a limited number of drugs from a group) without prescribing the drugs advised in the guideline.

The distinction made in the indicator feature 'relevant for health gain' and 'relevant for efficiency' is intended as an effort and a recommendation to systematically incorporate economic considerations in the formulation of prescribing indicators<sup>37</sup>. The panel considered a number of indicators to be relevant for efficiency gain, but not for health gain. An example of this is the indicator for ferrosulphate 'slow release': the same health gain, in this case the cure of anaemia, can be achieved both with slow-release preparations and with the recommended drugs. If only cost considerations are taken into account, the slow-release preparations would not be the drug of choice; the fact that in the guidelines these drugs are not recommended as first choice on the basis of other considerations as well (e.g. less resorption) illustrates the added value of an indicator based on guidelines.

The main use of the formulated prescribing indicators should be to monitor the structured cooperation between GPs and pharmacists, for example in pharmacotherapeutic audit meetings<sup>38-40</sup>. However, they can also be used as a basis for initiating improvement programmes; for example with respect to thiazide diuretics.

Another use of the prescription indicators can be found in the research into clarifying variables for differences in prescribing behaviour. In a multivariate analysis the prescription indicators, or reliable sum scores of these, can be used as independent variables alongside patient and practice characteristics and other clarifying variables which are thought to be correlated with prescribing, such as degree of urbanisation, type of practice, work pressure experienced, etc. We have started to further investigate this matter.

General practice guidelines are widely supported by GPs and the indicators derived from these guidelines provide more specific information than prescription figures, which are solely based on volume measurements<sup>41</sup>. The life span of existing guidelines, and therefore the indicators derived from these, is however dependent on new developments and changing insights. It is therefore recommended that guidelines and indicators are reassessed regularly, preferably every 3 years<sup>42</sup>.

An important area of application for prescribing indicators is their use as an instrument to estimate and improve the quality of pharmacotherapeutic care, for example that given in the mutual cooperation between GPs and pharmacists. As a pharmacist only possesses the supply data without the diagnosis, it is recommended that, with due consideration to aspects of privacy, the indicators described are further validated in a database derived from GPs' information systems, which state both the diagnosis and the pharmacotherapy provided.

Finally, in the future development and updating of prescribing indicators, we recommend to strive for the use of uniform indicator software for pharmacy information systems.

### **Acknowledgements**

We thank the following persons for their contribution towards the assessment of prescribing indicators: Luc Peeters, pharmacist, and the following general practitioners Sjoerd Hobma, Jean Muris, Paul Stalenhoef, Frans Vissers, Ron Winkens, and George Wolfs. We thank Alfons Schroten for translating the indicators into computer language.

### **Funding**

This research was funded by the Dutch Pharmacist's Association and CZ (health insurance company).

## References

1. RCGP information sheets no 10: prescribing in general practice. Oct. 2000. London, UK: Royal College of General Practitioners.
2. Van der Heide H, Tinke JL (1999) Facts and figures, cost development of pharmaceutical aid. The Hague, The Netherlands: Foundation for Pharmaceutical Statistics.
3. Watkins C, Harvey I, Carthy P, Moore L, Robinson E, Brawn R (2003) Attitudes and behaviour of general practitioners and their prescribing costs: a national cross sectional survey. *Qual Saf Health Care* 12(1):29-34.
4. Bjerrum L, Bergman U (2000) Wide variation in the number of different drugs prescribed by general practitioners. A prescription database study. *Scand J Prim Health Care* 18(2):94-8.
5. Mantyselka P, Ahonen R, Kumpusalo E, Takala J (2001) Variability in prescribing for musculoskeletal pain in Finnish primary healthcare. *Pharm World Sci* 23(6):232-6.
6. Jones MI, Greenfield SM, Jowett S, Bradley CP, Seal R (2001) Proton pump inhibitors: a study of GPs' prescribing. *Fam Pract* 18(3):333-8.
7. Lawrence M, Olesen F et al (1997) Indicators of quality in healthcare. *Eur J Gen Pract* 3:103-8.
8. Lloyd DC, Scrivener G (2001) Prescribing at the Primary Care Group level: census data and prescribing indicators. *J Clin Pharm Ther* 26(2):93-101.
9. Cantrill JA, Sibbald B, Buetow S (1998) Indicators of the appropriateness of long-term prescribing in general practice in the United Kingdom: consensus development, face and content validity, feasibility, and reliability. *Qual Health Care* 7(3):130-5.
10. Avery AJ, Heron T, Lloyd D, Harris CM, Roberts D (1998) Investigating relationships between a range of potential indicators of general practice prescribing: an observational study. *J Clin Pharm Ther* 23(6):441-50.
11. Osborne CA, Batty GM, Maskrey V, Swift CG, Jackson SH (1997) Development of prescribing indicators for elderly medical inpatients. *Br J Clin Pharmacol* 43(1):91-7.
12. Geijer RMM, Burgers JS, van der Laan JR, Wiersma Tj, Rosmalen CFH, Thomas S (1999) *Standaarden voor de huisarts [Practice guidelines for general practitioners]*. Utrecht, The Netherlands: Nederlands Huisartsen Genootschap.
13. The Dutch guidelines for general practitioners <http://nhg.artsennet.nl> (English). Cited 1 April, 2004.
14. The Scottish Intercollegiate Guidelines Network: [www.sign.ac.uk/about/introduction.html](http://www.sign.ac.uk/about/introduction.html). Cited 1 April, 2004.
15. New Zealand Guidelines Group: [www.nzgg.org.nz](http://www.nzgg.org.nz). Cited 1 April, 2004.
16. Guideline Development Project Consortium, Australia. [www.health.gov.au/nhmrc/publications/cphome.htm](http://www.health.gov.au/nhmrc/publications/cphome.htm). Cited 1 April, 2004.
17. NCG (National Guideline Clearinghouse), USA: [www.guideline.gov/](http://www.guideline.gov/). Cited 1 April, 2004.
18. Marshall MN, Shekelle PG, McGlynn EA, Campbell S, Brook RH, Roland MO (2003) Can health care quality indicators be transferred between countries? *Qual Saf Health Care* 12(1):8-12.
19. Majeed A, Evans N, Head P (1997) What can PACT tell us about prescribing in general practice? *BMJ* 315(7121):1515-9.

20. Taspinar A (2000) Pharmacotherapeutic compass 2000/2001. [Article in Dutch] Ned Tijdschr Geneeskd 9;144(37):1774-8.
21. Farmacotherapeutisch Kompas [Pharmacotherapeutic compass]. Amstelveen, The Netherlands: Health Care Insurance Board. 2000/2001. (<http://www.fk.cvz.nl/>). Cited 1 April 2004.
22. Guidelines for ATC classification and DDD assignment. Oslo: World Health Organization Collaborating Centre for Drug Statistics Methodology. 2004 (<http://www.whocc.no/atcddd/indexdatabase/index.php>). Cited 1 April, 2004.
23. Bergman U, Popa C, Tomson Y, Wettermark B, Einarson TR, Aberg H, Sjoqvist F (1998) Drug utilization 90%--a simple method for assessing the quality of drug prescribing. Eur J Clin Pharmacol 54(2):113-8.
24. Vektis BV (1995) Externe integratie declaratie farmaceutische hulp [External integration of declaration of Pharmaceutical help]. Available at <http://www.vektis.nl/index.php>. Cited 1 April, 2004.
25. Kathryn Fitch, Steven J. Bernstein, Maria Dolores Aguilar, Bernard Burnand, Juan Ramon LaCalle, Pablo Lazaro et al. The RAND/UCLA Appropriateness Method User's Manual. Santa Monica: RAND 2001. ISBN: 0-8330-2918-5 (<http://www.rand.org/publications/MR/MR1269/>). Cited 1 April 2004.
26. Olesen F, Vedsted P, Norskov Nielsen J (1996) Change in ranking order of prescribing patterns by age and sex standardization of the practice population. Scand J Prim Health Care 14(3):159-64.
27. Avery AJ (1998) Appropriate prescribing in general practice: development of the indicators. Qual Health Care 7(3):123.
28. Beney J, Bero LA, Bond C (2001) Expanding the roles of outpatient pharmacists: effects on health services utilisation, costs, and patient outcomes (Cochrane Review). In: The Cochrane Library 4, Oxford.
29. Van Mil JW, Dudok van Heel MC, Boersma M, Tromp TF (2001) Interventions and documentation for drug-related problems in Dutch community. Pharmacies. Am J Health Syst Pharm 58(15):1428-31.
30. Muijters PEM, Knottnerus JA, Sijbrandij J, Janknegt R, Grol RPTM (2003) Changing relationships: attitudes and opinions of general practitioners and pharmacists regarding the role of the community pharmacist. Pharm World Sci 25(5):235-241.
31. De Vries CS, Tromp TF, Blijleven W, de Jong-van den Berg LT (1999) Prescription data as a tool in pharmacotherapy audit (I). General considerations. Pharm World Sci 21(2):80-4.
32. Van den Berg Jeths A, Peters-Volleberg GWM 2002 Geneesmiddelen en medische hulpmiddelen: trends en dilemma's. [Pharmaceuticals and medical devices: trends and dilemmas]. Bilthoven, The Netherlands: RIVM rapport. ISBN 90-313-3915-6.
33. Ekedahl A, Mansson N (2004) Unclaimed prescriptions after automated prescription transmittals to pharmacies. Pharm World Sci;26(1):26-31.
34. Beardon PH, McGilchrist MM, McKendrick AD, McDevitt DG, MacDonald TM (1993) Primary non-compliance with prescribed medication in primary care. BMJ 307(6908):846-8.
35. Foundation for Pharmaceutical Statistics (2001) Toenemend gebruik maagzuurremmers. [Increasing use of PPIs and H2 blockers]. Pharm Weekbl;136(20):701.

36. Bauer E (2001) Pharma-Länder-Dossiers, Die Arzneimittelversorgung in Europa [Drug dispensing in Europe]. Eschbarn: Gavi-Verlag. ISBN: 3774108994.
37. Wallace JF, Weingarten SR, Chiou CF, Henning JM, Hohlbauch AA, Richards MS, et al (2002) The limited incorporation of economic analyses in clinical practice guidelines. *J Gen Intern Med* 17(3):210-20.
38. Kocken GA (1999) Medication discussion groups in the Netherlands: five years of experience. *Med Educ* 33(5):390-3.
39. Bradley CP, Taylor RJ, Blenkinsopp A (1997) Primary care-opportunities and threats. Developing prescribing in primary care. *BMJ* 314(7082):744-7.
40. Hakansson A, Andersson H, Cars H, Melander A (2001) Prescribing, prescription costs and adherence to formulary committee recommendations: long-term differences between physicians in public and private care. *Eur J Clin Pharmacol* 57(1):65-70.
41. Grol R, Dalhuijsen J, Thomas S, Veld C, Rutten G, Mookink H (1998) Attributes of clinical guidelines that influence use of guidelines in general practice: observational study. *BMJ* 317(7162):858-61.
42. Shekelle PG, Ortiz E, Rhodes S, Morton SC, Eccles MP, Grimshaw JM, Woolf SH (2001) Validity of the Agency for Healthcare Research and Quality clinical practice guidelines: how quickly do guidelines become outdated? *JAMA* 286(12):1461-7.
43. Burgers JS, Zaat JOM, Spies TH, van der Bij AK, Mookink HGA, Grol RPTM (2002) De kwaliteit van de NHG-Standaarden. Beoordeling van 130 kernaankbevelingen uit 28 standaarden. [The quality of Dutch clinical guidelines for general practice. Appraisal of 130 key recommendations from 28 guidelines developed by the Dutch College of General Practitioners]. *Huisarts Wet* 45(7):349-53.
44. Den Hoedt M, Ruiterkamp G (2003) De raadpleegfunctie van het Farmacotherapeutisch Kompas [The consultative function of the Pharmacotherapeutic Compass]. Houten, The Netherlands: Ipso Facto ([http://www.ipsosfacto.nl/B218\\_FarmaKompas.htm](http://www.ipsosfacto.nl/B218_FarmaKompas.htm)). Cited 1 April 2004.



## **Chapter 6**

### **Differences in prescribing between general practitioners**

#### **Impact of the cooperation with pharmacists and visits from pharmaceutical industry representatives**

Paul E.M. Muijers, Richard P.T.M. Grol, Jildou Sijbrandij, Rob Janknegt, J. André Knottnerus

Submitted for publication

## **Abstract**

*Background:* Differences in prescribing between general practitioners (GPs).

*Objective:* To clarify the role of the pharmacists and pharmaceutical industry representatives.

*Design:* Cross-sectional.

*Setting:* 1434 GPs, Netherlands, 2001.

*Methods:* Prescribing indicators based on general practice guidelines were used to assess the quality of prescribing. Three constructs, based on survey questions, were used as possible determinants for the quality of prescribing: cooperation with the pharmacist, quality of the pharmacotherapeutic audit meeting (PTAM), and the GP's attitude towards the pharmacist's role. Data were collected about the frequency of visits by pharmaceutical industry representatives. Responses from 324 solo GPs were analysed using multiple linear regression.

*Results:* Response rate: 71%. The quality of prescribing was not correlated with the GP's attitude towards the pharmacist's role, the way in which general practitioners cooperated with pharmacists or the quality of the PTAM. More frequent visits from pharmaceutical industry representatives was associated with a lower quality of prescribing.

*Conclusion:* There was a negative correlation between quality of prescribing and frequency of visits by pharmaceutical industry representatives. In day-to-day practice, no measurable effects of the cooperation between GP and pharmacist on the quality of prescribing were observed. A possible explanation of this finding could be that this cooperation is only effective if the pharmacist has a clearly structured advisory and intervening role. Since positive results of the cooperation between GPs and pharmacists have been observed under controlled conditions, we recommend that a more clear-cut structure be sought for implementing the pharmacist's advisory and intervening role.

## **Keywords**

Co-operation, General practitioner, Indicators, Pharmacist, Pharmaceutical industry.

## Introduction

Drugs play an important role in the treatment of patients in the general practice setting. In Western Europe, a drug is prescribed in more than 60 percent of the cases that a patient consults a general practitioner<sup>1</sup>. Due to an ageing population and the increasing possibility of treating many chronic diseases with drugs, it is becoming increasingly difficult to provide adequate pharmacotherapy<sup>2</sup>. In many countries, evidence-based guidelines are available to support general practitioners in making a choice from the extensive range of drugs available, although the compliance with these varies<sup>3</sup>. There are considerable variations between general practitioners with respect to the prescription of drugs<sup>4,5</sup>. Prescribing indicators derived from existing evidence-based guidelines can make this variation visible and also provide an impression of the quality of the prescribing<sup>6,7</sup>.

The pharmacist usually supplies the drugs prescribed by the general practitioner. In recent years, the pharmacist has increasingly focused on advising patients and informing physicians. A number of studies have shown that recommendations and interventions from pharmacists can lead to an optimisation of drug use and to a better prescription policy<sup>8-11</sup>.

The advice provided to physicians is based on the pharmacist's expertise and concerns drug-related problems seen in the pharmacy on a day-to-day basis. In various countries, this has led to a closer cooperation between general practitioners and pharmacists and to pharmacotherapeutic audit meetings (PTAMs) between general practitioners and pharmacists being held on a regular basis<sup>12,13</sup>. However, general practitioners have differing attitudes towards the role of the pharmacist and the extent to which they wish to cooperate with pharmacists<sup>14-18</sup>. In the literature, little attention has yet been paid to the extent to which differences in prescribing between general practitioners are actually correlated with differences of opinion concerning the pharmacist's role, differences in how the general practitioner cooperates with the pharmacist, and differences in how this cooperation is experienced by general practitioners. Earlier research has revealed, however, that general practitioners with a positive attitude towards the pharmacist's care-providing function have a better

relationship with pharmacists than general practitioners with a less positive attitude in this respect<sup>14,19</sup>. We therefore hypothesise that a positive attitude has a favourable effect on the cooperation between general practitioners and pharmacists and accordingly a positive effect on prescribing behaviour.

In addition to advice from pharmacists, general practitioners receive information from the pharmaceutical industry. Together with a wide range of favours, an efficient form of providing information, the one-to-one outreach visit, is used to increase the turnover of branded drugs<sup>20,21</sup>. It is known that general practitioners who receive regular visits from pharmaceutical industry representatives are responsible for higher prescribing costs and prescribe in a less rational manner<sup>5,22</sup>. We therefore hypothesised that frequent visits from pharmaceutical industry representatives have a negative effect on the quality of the prescribing behaviour.

In view of this influence of pharmacists and pharmaceutical industry representatives on the quality of prescribing, our study set out to answer the following question: Is the quality of the prescribing of drugs by general practitioners correlated with their attitude towards the pharmacist's role and how they cooperate with the pharmacist on a day-to-day basis and in the PTAM, and is there a correlation between the quality of prescribing and the frequency of visits from pharmaceutical industry representatives?

## **Methods**

### ***General design and study population***

We carried out a cross-sectional study into differences between general practitioners (n = 1434) in the south of the Netherlands with respect to their prescribing behaviour and the possible determinants thereof. We did this by means of a survey and by using prescribing indicators to analyse the quality of prescribing in existing pharmacy data. As the prescription figures in pharmacy databases cannot be traced back to individual general practitioners within group practices, we used responding solo practices for the study on possible determinants.

## **Variables, instruments and data**

We used 20 prescribing indicators based on general practice guidelines to gain an impression of the variation in prescribing behaviour between general practitioners (see Box: Prescribing indicators).

### **Box: Prescribing indicators**

#### ***Prescribing indicators for which a high score is desirable:***

1. DDDs<sup>a</sup> chlorothalidone and hydrochlorothiazide divided by DDDs for all diuretics X 100%.
2. FNA<sup>b</sup> prescribed eardrops divided by number of all prescribed eardrops for the treatment of otitis externa X 100%.
3. Patients who were prescribed a PPI (proton pump inhibitor) and who had been prescribed an H2 antagonist prior to this, divided by number of the patients who received a PPI X 100%.
4. DDDs atenolol and metoprolol divided by DDDs of all  $\beta$ -blockers X 100%.
5. DDDs enalapril and captopril divided by DDDs of all ACE inhibitors X 100%.
6. DDDs sub-50 single-phase preparations of the 2nd generation divided by DDDs of all combined preparations of oral contraceptives X 100%.
7. DDDs tolbutamide and metformin divided by DDDs of all oral antidiabetics X 100%.
8. Prescriptions for imidazole derivatives divided by number of all prescriptions for topical dermatological antimycotics X 100%.
9. Prescriptions for triamcinolonacetonide 0.1%, flumethasone pivalate and hydrocortisone butyrate cream/ointment/lotion divided by number of all prescriptions for class-2 topical corticosteroids X 100%.
10. Prescriptions for betamethasone dipropionate, betamethasone valerate and fluocinonide ointment /cream/gel/solution/lotion divided by number of all prescriptions for all class-3 topical corticosteroids X 100%.
11. Patients (18-45 yr) who received 0.25 DDD or more  $\beta$  mimetics per day and in addition to this 0.5 DDD or more inhaled corticosteroids or cromones, divided by number of patients (18-45 yr) who received 0.25 DDD or more  $\beta$  mimetics per day X 100%.
12. Patients (18-45 yr) who received 0.5 DDD or more  $\beta$  mimetics per day and more than 0.5 DDD inhalation corticosteroids, divided by number of patients (18-45 yr) who received 0.5 DDD or more  $\beta$  mimetics on average per day X 100%.
13. Patients treated with antidiabetics and statins divided by number of patients treated with antidiabetics X 100%.
14. Patients who were prescribed an angiotensin II-antagonist (AT-2) and prior to this an ACE inhibitor, divided by number of patients who received an AT-2 X 100%.

#### ***Prescribing indicators for which a low score is desirable:***

15. DDDs ferrosulphate 'slow release' divided by DDDs for all iron supplements X 100%.
16. DDDs cyclo-oxygenase-2 divided by DDDs for all NSAIDs X 100%.
17. Prescriptions for amoxicillin/clavulanic acid divided by number of prescriptions for all oral antibiotics X 100%.
18. Prescriptions for quinolones divided by number of prescriptions for all oral antibiotics X 100%.
19. Percentage of patients in the practice who were prescribed a benzodiazepine more than 6 times per year.
20. Percentage patients in the practice who were prescribed mebeverine.

<sup>a</sup>DDD: Defined Daily Dose, <sup>b</sup>Standardized pharmacy compounded ear drops containing acetic acid, corticosteroids and/or antibiotics according to 'Formularium of Dutch Pharmacists' (FNA)

An expert panel assessed the indicators to be valid and they were found to have sufficient discriminating power to characterise the prescribing behaviour of general practitioners. We have already published on these indicators and their development <sup>7</sup>. The general construct 'adherence to guidelines' was formed as the dependent variable by calculating a weighted average score on these prescribing indicators per general practitioner (see the Analysis).

The prescribing indicators were calculated using a prescription database compiled by linking pharmacy databases from 379 pharmacies, which was made available as a prescribing analysis database by health insurers with due consideration to the existing privacy legislation. Each month, health insurers in the Netherlands receive electronic declarations from the pharmacies; these are provided in a standardised format and contain detailed information about the patient, the prescriber and the drug delivered. The database contained information on all drugs supplied to three million patients in the year 2000 by 379 pharmacies as prescribed by 1434 general practitioners.

First of all, three constructs were formed as independent variables. The first construct concerns the actual cooperation and is based on seven survey questions related to the frequency of various forms of cooperation between general practitioners and pharmacists on a day-to-day basis. The second construct concerns the quality of the PTAM and is based on nine survey questions about a number of elementary quality requirements that can be applied to this meetings <sup>23</sup>. The third construct concerns the general practitioner's attitude towards the pharmacist's care-providing function. For this, use was made of a previously-developed attitude scale based on 17 statements. These statements enquired about the attitudes of general practitioners concerning the task, role, responsibility and expertise of the pharmacist. We have previously published an article on this attitude scale <sup>14</sup>.

The frequency of visits by pharmaceutical industry representatives also served as an independent variable. This was expressed as the number of visits made by pharmaceutical industry representatives to a general practitioner per month. It indicates the current level of interaction between individual physicians and sales representatives from the pharmaceutical industry. In addition to this, the following data were collected: the frequency of pharmacotherapeutic postgraduate training, the use of an electronic formulary, perceived workload, age, gender, practical experience, part-time work, practice size, degree of urbanisation, and whether the respondent was a general practice trainer. The data on general practitioners and pharmacists were collected by means of a survey that was sent in 2001 to general practitioners (n = 1434) practising in the south of the Netherlands. We have already published an article about the survey, the response to it and the results it yielded <sup>14</sup>.

## ***Analysis***

The general construct 'adherence to guidelines' was formed by calculating the weighted average of the score on the 20 prescribing indicators per general practitioner. A weighting factor was calculated based on the percentage of the total number of prescriptions for which an indicator is applicable. For example, an indicator related to a drug group that constituted 5% of the total number of prescriptions had a weighting factor 10 times greater than an indicator pertaining to 0.5% of the total number of prescriptions. This approach provided an impression about the degree to which the practice population was treated according to the existing guidelines. Before the calculation of the weighted average, the scores pertaining to the prescribing indicators for drugs for which a lower score is desirable were inverted (100% minus the score). Consequently, the average score can be interpreted as: the higher the score, the more the general practitioner complies with existing guidelines. Theoretically, the score lies between 0 and 100%. In order to verify whether there was sufficient internal consistency of the construct 'adherence to guidelines' a reliability analysis was performed (Cronbach's alpha = 0.59). So that general practitioners could be readily compared, the prescription figures were standardised for the age and gender profile of the practice, whereby the total population was the standard.

A reliability analysis was also performed to verify whether there was enough internal consistency for the three constructs 'cooperation with the pharmacist', 'quality of the PTAM', and 'attitude regarding the pharmacist's care-providing function' (Cronbach's alpha 0.79, 0.75, and 0.84, respectively).

In order to determine which factors were correlated with the differences in prescribing between general practitioners, an analysis was performed for the variables hypothesised to be correlated with these differences. So as to allow for possible clustering in the data, caused by the cooperation of general practitioners in PTAM groups, a mixed model with a random intercept was chosen. Simple regression analyses were performed separately for each predictor. A multiple regression analysis that simultaneously included all predictors at once was carried out to obtain adjusted coefficients. P-values lower than 0.05 were considered to be significant. All of the

analyses were performed using SAS version 8.02 (SAS Institute Inc., Cary, North Carolina).

## Results

The response to the survey was 71% (1019 general practitioners, of which 324 were solo general practitioners). Table 1 shows the personal and practice characteristics investigated as well as the differences between solo and non-solo practices.

**Table 1.** Characteristics of the survey population

Variable	Solo practices (n=324)	Non-solo practices (n=567)
Visits by pharmaceutical industry representatives/month	5.7(4.5)	3.8(4.2)
Frequency of postgraduate training focused on pharmacotherapy Never/occasionally/regularly/often (%)	8.7/56/33/2.2	9.8/57/32/1.9
Using an electronic formulary (%)	57	61
Perceived workload Comfortable/ acceptable/ heavy/ very heavy/ too heavy (%)	13/20/42/17/7.8	11/26/42/15/6.3
Age in years: mean (SD)	49(6.5)	46(6.6)
Female (%)	4.6	26
Work experience in years: mean (SD)	18(7.5)	16(8.0)
Fulltime work %	93	50
Size of practice, number of patients: total (SD)	2151(693)	1506(742)
Trainer of GPs (%)	21	38
Urbanisation: urban/ suburban/ rural <sup>a</sup> (%)	27/29/44	31/26/42
Adherence score on prescribing indicators % (SD)*	64(3.7)	65(3.8)

Descriptive statistics of questionnaire items, differences between solo and non-solo practices.

<sup>a</sup>Urban >2500 addresses/km<sup>2</sup>, Suburban: 1000-1500 addresses/km<sup>2</sup>, Rural <500 addresses/km<sup>2</sup>

\*significant differences (t-test) between solo and non-solo practices (p<0.005)

For the 324 solo general practitioners, the weighted average score for the 20 prescribing indicators was 64% (SD 3.7). For the non-solo general practitioners this score was 65% (SD 3.8, p<0.05). Table 2 shows the results of the univariate and multivariate analyses of the solo general practitioners.

In the univariate analysis, more frequent visits from pharmaceutical industry representatives, a higher age, a larger practice, and running a practice in suburban areas (1000-1500 addresses/km<sup>2</sup>) were found to have a significant negative correlation with adherence to guidelines. In the same analysis, the use of an electronic formulary was found to have a significant positive correlation with adherence to prescription guidelines. In the multivariate analysis, more frequent visits from pharmaceutical industry representatives and running a practice in suburban areas were found to have a significant negative correlation with adherence to guidelines for qualitatively good prescribing.



**Table 2.** Regression coefficients and 95% CIs of predictors of adherence to guidelines (solo practices, n = 322)

Predictor	Simple linear regression			Multiple linear regression	
	Intercept (se)	$\beta$	95% CI	$\beta$	95% CI
Attitude of GP (construct) <sup>a</sup>	65(1.1)	-0.012	-0.049; 0.025	0.012	-0.030; 0.054
Cooperation GP-CP (construct) <sup>a</sup>	65(0.91)	-0.038	-0.15; 0.072	-0.032	-0.17; 0.10
Performance of PTAM (construct) <sup>a</sup>	64(1.2)	0.0051	-0.093; 0.10	-0.011	-0.12; 0.10
Visits by pharmaceutical industry representatives <sup>a</sup> (represent./month)	66(0.34)	-0.26	-0.34; -0.17*	-0.23	-0.32; -0.15*
Age (years) <sup>a</sup>	68(1.5)	-0.072	-0.13; -0.012*	-0.062	-0.15; 0.028
Gender (1=female) <sup>b</sup>	64(0.25)	0.63	-1.2; 2.5	-0.068	-1.9; 1.8
Work experience (years) <sup>a</sup>	65(0.54)	-0.051	-0.10; 0.0008	-0.013	-0.091; 0.064
Workload <sup>a</sup>	65(0.58)	-0.12	-0.49; 0.24	-0.059	-0.41; 0.29
Full/part-time (1=fulltime) <sup>b</sup>	66(0.78)	-1.2	-2.8; 0.34	-0.25	-1.8; 1.3
Size of practice (in hundreds of patients) <sup>a</sup>	66(0.72)	-0.065	-0.13; -0.003*	-0.039	-0.099; 0.022
Urbanisation <sup>b</sup>	65(0.47)				
Rural (<500 addresses/km <sup>2</sup> )		-1.0	-2.2; 0.16	-0.37	-1.5; 0.75
Suburban (1000-1500 addresses/km <sup>2</sup> )		-2.1	-3.4; -0.82*	-1.5	-2.7; -0.34*
Urban (>2500 addresses/km <sup>2</sup> )		0(ref)		0(ref)	
Trainer of GPs (1=trainer) <sup>b</sup>	64(0.27)	0.95	-0.0012; 1.9	0.69	-0.26; 1.6
Postgraduate education <sup>b</sup>	67(1.3)	-1.6	-4.2; 1.1	-1.8	-4.4; 0.78
1=never, occasionally, regularly.					
Electronic formulary <sup>b</sup>	64(0.34)	0.88	0.073; 1.7*	0.60	-0.20; 1.4
(1= using an electronic formulary)					
Intercept				72	67; 78

<sup>a</sup>included as continuous variables (see also table1)

<sup>b</sup>included as categorical variable, indicated as 0/1, 0=reference category (see also table 1)

\*P<0.05

'Adherence to guidelines' was not found to correlate with one or more of the constructs developed with regard to cooperation with the pharmacist, the quality of the PTAM, and the general practitioner's attitude towards the pharmacist's care-providing function. There was also no correlation with gender, practical experience, perceived workload, part-time work, being a trainer of general practitioners, or the frequency of pharmacotherapeutic postgraduate training.

## Discussion

First of all, we found a negative relationship between prescribing according to the guidelines and the frequency of visits by pharmaceutical industry representatives: More contact with pharmaceutical industry representatives is associated with less prescribing in accordance with professional guidelines. In contrast to our hypothesis we found no relationship between prescribing according to guidelines by general practitioners and how they cooperated with pharmacists on a day-to-day basis.

In other studies, a correlation has been found between contacts with pharmaceutical industry representatives and the unnecessary and more frequent prescription of drugs<sup>5,21,22,,24</sup>. Our study revealed, moreover, that there is a negative correlation between

contacts with pharmaceutical industry representatives and the score on prescribing indicators derived from evidence-based general practice guidelines. This correlation is probably due to the marketing strategy of the pharmaceutical industry, which is focused on promoting new products and has undergone a longer and stronger development than the care providing function of the pharmacist.

The quality of prescribing based on compliance with general practice guidelines was not associated with the general practitioner's attitude towards the pharmacist's care-providing function or the degree of cooperation with pharmacists, i.e. the regularity in which the pharmacist's advisory and feedback role takes place. There was also no correlation with the quality of the PTAM. Other Dutch studies, which did not use prescribing indicators but did use the same assessment criteria for the functioning of the PTAM, have found that a well-structured PTAM led to a more consistent prescribing policy. Although there was less variation within groups that made agreements, this did not result in less frequent or cheaper prescriptions<sup>23</sup>.

The lack of a correlation between prescribing according to guidelines by general practitioners and their cooperation with pharmacists is surprising. A number of studies have revealed that recommendations and interventions from pharmacists can result in an optimisation of drug use and a better prescribing policy<sup>8-11</sup>. In our study, however, we observed no effects of the recommendations and interventions on day-to-day practice, such as that described under controlled conditions. Contrary to what we expected, the quality of prescribing shows no correlation with the general practitioner's attitude towards the pharmacist's role, the way in which general practitioners and pharmacists cooperate and the quality of the PTAM. There is a gap between the potential and actual influence of the pharmacist on the general practitioner's prescribing behaviour. This might be due to the considerable degree of freedom that characterises the current cooperation between general practitioners and pharmacists in both day-to-day practice and the PTAM<sup>23</sup>.

Since positive results of the cooperation between general practitioners and pharmacists have been observed under controlled conditions, we recommend that a more clear-cut structure be sought for implementing the pharmacist's advisory and intervening role. A favourable circumstance with respect to this is the widespread support amongst general

practitioners for the feedback given by pharmacists on prescriptions and the advice they give to general practitioners and patients <sup>14</sup>.

The cross-sectional character of our study, among solo general practitioners only, can be seen as a limitation. We therefore recommend that this study be repeated with a prospective design. This would provide more insight into the effect of the cooperation between general practitioners and pharmacists on the general practitioner's prescribing behaviour, as it would make causal relationships more visible. The strong points of our study are: the real-life character of the data, the large number of general practitioners, the good response to the survey, and the large number of validated prescribing indicators that we could calculate for each general practitioner over an entire year.

### **Acknowledgements**

We thank the general practitioners who participated in this study.

### **Funding**

Dutch Pharmacist's Association and the CZ health insurance company.

### **Conflicts of interests:**

None.

### **References**

1. Van der Heide H, Tinke JL. Facts and figures, cost development of pharmaceutical aid. The Hague, The Netherlands: Foundation for Pharmaceutical Statistics;1999.[www.sfk.nl](http://www.sfk.nl) (accessed 1 Nov 2004).
2. Linjakumpu T, Hartikainen S, Klaukka T, Veijola J, Kivela SL, Isoaho R. Use of medications and polypharmacy are increasing among the elderly. *J Clin Epidemiol* 2002;55(8):809-17.
3. 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. The Cochrane Effective Practice and Organization of Care Review Group. *BMJ* 1998;317:465-8.
4. Bjerrum L, Sogaard J, Hallas J, Kragstrup J. Polypharmacy in general practice: differences between practitioners. *Br J Gen Pract* 1999;49(440):195-8.
5. Watkins C, Harvey I, Carthy P, Moore L, Robinson E, Brawn R. Attitudes and behaviour of general practitioners and their prescribing costs: a national cross sectional survey. *Qual Saf Health Care* 2003;12(1):29-34.

6. Cantrill JA, Sibbald B, Buetow S. Indicators of the appropriateness of long-term prescribing in general practice in the United Kingdom: consensus development, face and content validity, feasibility, and reliability. *Qual Health Care* 1998;7(3):130-5.
7. Muijrs PEM, Janknegt R, Sijbrandij J, Grol RPTM, Knottnerus JA. Prescribing indicators, development and validation of guideline-based prescribing indicators as an instrument to measure the variation in the prescribing behaviour of general practitioners. *Eur J Clin Pharmacol* 2004. Oct 26; [Epub ahead of print].
8. Beney J, Bero LA, Bond C. Expanding the roles of outpatient pharmacists: effects on health services utilisation, costs, and patient outcomes. *Cochrane Database Syst Rev* 2000(3):CD000336.
9. Krska J, Cromarty JA, Arris F, Jamieson D, Hansford D, Duffus PR, et al. Pharmacist-led medication review in patients over 65: a randomized, controlled trial in primary care. *Age Ageing* 2001;30(3):205-11.
10. Bernsten C, Bjorkman I, Caramona M, Crealey G, Frokjaer B, Grundberger E, et al. Improving the well-being of elderly patients via community pharmacy-based provision of pharmaceutical care: a multicentre study in seven European countries. *Drugs Aging* 2001;18:63-77.
11. Sellors J, Kaczorowski J, Sellors C, Dolovich L, Woodward C, Willan A, et al. A randomized controlled trial of a pharmacist consultation program for family physicians and their elderly patients. *Can Med Assoc J.* 2003;169(1):17-22.
12. Kocken GA. Medication discussion groups in the Netherlands: five years of experience. *Med Educ* 1999;33(5):390-3.
13. Bradley CP, Taylor RJ, Blenkinsopp A. Primary care, opportunities and threats. Developing prescribing in primary care. *BMJ* 1997;314:744-7.
14. Muijrs PEM, Knottnerus JA, Sijbrandij J, Janknegt R, Grol RPTM. Changing relationships: attitudes and opinions of general practitioners and pharmacists regarding the role of the community pharmacist. *Pharm World Sci* 2003;25(5):235-241.
15. Hughes CM, McCann S. Perceived interprofessional barriers between community pharmacists and general practitioners: a qualitative assessment. *Br J Gen Pract* 2003;53(493):600-6.
16. Howard M, Trim K, Woodward C, Dolovich L, Sellors C, Kaczorowski J, et al. Collaboration between community pharmacists and family physicians: lessons learned from the Seniors Medication Assessment Research Trial. *J Am Pharm Assoc (Wash DC)* 2003;43(5):566-72.
17. Edmunds J, Calnan MW. The reprofessionalisation of community pharmacy? An exploration of attitudes to extended roles for community pharmacists amongst pharmacists and General Practitioners in the United Kingdom. *Soc Sci Med* 2001;53(7):943-55.
18. Spencer JA, Edwards C. Pharmacy beyond the dispensary: general practitioners' views. *BMJ* 1992;304:1670-2.
19. Nathan A, Sutters CA. A comparison of community pharmacists' and general practitioners' opinions on rational prescribing, formularies and other prescribing related issues. *J R Soc Health* 1993;113(6):302-7.
20. Thomson O'Brien MA, Oxman AD, Davis DA, Haynes RB, Freemantle N, et al. Educational outreach visits: effects on professional practice and health care outcomes. *Cochrane Database Syst Rev* 2000(2):CD00049.

21. Prosser H, Almond S, Walley T. Influences on GPs' decision to prescribe new drugs- the importance of who says what. *Fam Pract* 2003;20(1):61-8.
22. Wazana A. Physicians and the pharmaceutical industry: is a gift ever just a gift? *Jama* 2000;283(3):373-80.
23. Van Dijk L, Barnhoorn H, De Bakker D. Het Farmacotherapie Overleg in 1999, stand van zaken en effecten op voorschrijven [Pharmaco-therapeutic audit meeting in 1999, stand at present and effects on prescribing]. Nivel, Utrecht, 2001.
24. Watkins C, Moore L, Harvey I, Carthy P, Robinson E, Brawn R. Characteristics of general practitioners who frequently see drug industry representatives: national cross sectional study. *BMJ* 2003;326(7400):1178-9.



## **Chapter 7**

### **General practitioner and pharmacist**

#### **Differences in prescribing and their relationship to pharmaceutical care**

Paul E.M. Muijrs, Richard P.T.M. Grol, Jildou Sijbrandij, Rob Janknegt, J. André Knottnerus

Submitted for publication

## **Abstract**

*Background:* Variations in prescribing routines among general practitioners (GPs); pharmaceutical care provided by community pharmacists (CPs).

*Objective:* To explain the variation in prescribing routines among GPs in light of the care providing function of the pharmacist.

*Design:* Cross-sectional.

*Setting:* 201 pharmacies, 408 general practices, The Netherlands, 2001.

*Methods:* The variation in prescribing behaviour was characterised using 20 validated prescribing indicators based on general practice guidelines. The general construct 'adherence to guidelines' served as the dependent variable and was formed by summing the scores of the prescribing indicators. Four possible determinants of the variation were determined on the basis of survey questions: the construct 'the pharmacist's *attitude* towards the care-providing function', and three partial constructs derived from the pharmacist's care-providing function: the *care for the individual patient*, the *cooperation with general practitioners* and the *registration of the care provided*. A multiple linear regression analysis was then performed.

*Results:* The weighted average score for the prescribing indicators was 65% (sd 3.7). The response rate to the survey was 71%. The pharmacist's attitude to the care-providing function, as well as the degree to which the pharmacist provided care for the individual patient, the degree to which he cooperated with the general practitioner and the degree to which he registered the care provided were not correlated with the 'adherence to guidelines' by the general practitioner with whom the pharmacist frequently cooperated.

*Conclusion:* Variations between general practitioners in the quality of prescribing, as measured by their adherence to guidelines, were not correlated with the exercise of a care-providing function by the pharmacist with whom they cooperated on a day-to-day basis.

## **Keywords**

Cooperation, General practitioner, Indicators, Pharmacist, Pharmaceutical care.

## Introduction

There is a considerable variation between general practitioners in the treatment of patients with prescription drugs; this variation cannot be completely accounted for by demographic differences in the patient population or differences in morbidity. It is also the consequence of differences in prescribing behaviour and in the quality of prescribing<sup>1-7</sup>. Differences in prescribing behaviour can be made visible with the help of 'prescribing indicators', which also provide an indication of the quality of prescribing<sup>8,9</sup>.

Alongside the general practitioner, the pharmacist is becoming increasingly involved in the treatment of patients with prescription drugs. The role of the pharmacist has changed in recent years. It now consists less of preparing drugs and more of providing a 'care-providing function'; the pharmacist focuses more on the patient and cooperates more with other care providers<sup>10</sup>.

Variations in prescribing routines among general practitioners are visible in the pharmacy. In many countries, the work of general practitioners and pharmacists is community based; hence, a pharmacy receives dozens of prescriptions each day for patients of the same group of general practitioners<sup>11</sup>. This gives the pharmacist an insight into the prescribing behaviour of the general practitioners who constitute the regular prescribers for his pharmacy. A good registration of the pharmacotherapy supplied increases this insight and the registration is just as essential for noting drug interactions and undesirable trends as it is for providing recommendations to patients and general practitioners<sup>12-14</sup>.

The term 'pharmaceutical care' was first defined at the start of the 1990s and since then, the care-providing function of the pharmacist has undergone a clear development in many countries<sup>10,15</sup>. In many areas, this increasing focus of the pharmacist on patients and prescribers has resulted in a cooperation between pharmacists and general practitioners, with the objective of realising a high quality of pharmacotherapy<sup>16-18</sup>. However, there are differences in the extent to which a pharmacist is involved in the treatment of patients with prescription drugs. Partly as a result of the rapidly changing role of the pharmacist in healthcare in recent years, there are differences between pharmacists with regard to both their attitude towards the care-providing function and the extent to which they actually exercise it<sup>19-22</sup>.

This study concerns the extent to which the variations in the quality of prescribing between general practitioners are correlated with a care-providing function practised by the pharmacist. Previous research into the role of the pharmacist revealed that ‘there is some evidence to support an expansion of the pharmacist’s role in health management and counselling’, and further research was therefore deemed necessary<sup>23</sup>.

For our investigation, we formulated the following research question:

Are the differences in the quality of prescribing among general practitioners correlated with the exercise of a care-providing function by the pharmacist with whom they most often cooperate in day-to-day practice?

## **Methods**

### ***General design and study population***

In order to answer our research question, we carried out a cross-sectional study into the variations among general practitioners in the South of the Netherlands with respect to the prescribing of drugs and into the possible determinants of these variations that are related to the exercise of a care-providing function by the pharmacist. We used prescribing indicators to estimate the quality of prescribing by general practitioners (n=1434), and we sent a questionnaire to pharmacies (n=379) located in the South of the Netherlands.

### ***Variables and instruments***

We used twenty prescribing indicators based on general practice guidelines to chart the variation in prescribing behaviour between general practitioners. An expert panel assessed the indicators as sufficiently valid, and these were also found to have sufficient discriminating power to characterise the prescribing behaviour of general practitioners<sup>8</sup>. The Box provides an overview of the prescribing indicators used.

### **Box: Prescribing indicators**

#### ***Prescribing indicators for which a high score is desirable:***

1. DDDs<sup>a</sup> chlorothalidone and hydrochlorothiazide divided by DDDs for all diuretics X 100%.
2. FNA<sup>b</sup> prescribed eardrops divided by number of all prescribed eardrops for the treatment of otitis externa X 100%.
3. Patients who were prescribed a PPI (proton pump inhibitor) and who had been prescribed an H2 antagonist prior to this, divided by number of the patients who received a PPI X 100%.
4. DDDs atenolol and metoprolol divided by DDDs of all  $\beta$ -blockers X 100%.
5. DDDs enalapril and captopril divided by DDDs of all ACE inhibitors X 100%.
6. DDDs sub-50 single-phase preparations of the 2nd generation divided by DDDs of all combined preparations of oral contraceptives X 100%.
7. DDDs tolbutamide and metformin divided by DDDs of all oral antidiabetics X 100%.
8. Prescriptions for imidazole derivatives divided by number of all prescriptions for topical dermatological antimycotics X 100%.
9. Prescriptions for triamcinolonacetonide 0.1%, flumethasone pivalate and hydrocortisone butyrate cream/ointment/lotion divided by number of all prescriptions for class-2 topical corticosteroids X 100%.
10. Prescriptions for betamethasone dipropionate, betamethasone valerate and fluocinonide ointment /cream/gel/solution/lotion divided by number of all prescriptions for all class-3 topical corticosteroids X 100%.
11. Patients (18-45 yr) who received 0.25 DDD or more  $\beta$  mimetics per day and in addition to this 0.5 DDD or more inhaled corticosteroids or cromones, divided by number of patients (18-45 yr) who received 0.25 DDD or more  $\beta$  mimetics per day X 100%.
12. Patients (18-45 yr) who received 0.5 DDD or more  $\beta$  mimetics per day and more than 0.5 DDD inhalation corticosteroids, divided by number of patients (18-45 yr) who received 0.5 DDD or more  $\beta$  mimetics on average per day X 100%.
13. Patients treated with antidiabetics and statins divided by number of patients treated with antidiabetics X 100%.
14. Patients who were prescribed an angiotensin II-antagonist (AT-2) and prior to this an ACE inhibitor, divided by number of patients who received an AT-2 X 100%.

#### ***Prescribing indicators for which a low score is desirable:***

15. DDDs ferrosulphate 'slow release' divided by DDDs for all iron supplements X 100%.
16. DDDs cyclo-oxygenase-2 divided by DDDs for all NSAIDs X 100%.
17. Prescriptions for amoxicillin/clavulanic acid divided by number of prescriptions for all oral antibiotics X 100%.
18. Prescriptions for quinolones divided by number of prescriptions for all oral antibiotics X 100%.
19. Percentage of patients in the practice who were prescribed a benzodiazepine more than 6 times per year.
20. Percentage patients in the practice who were prescribed mebeverine.

<sup>a</sup>DDD: Defined Daily Dose<sup>37</sup>, <sup>b</sup>Standardised pharmacy compounded ear drops containing acetic acid, corticosteroids and/or antibiotics according to 'Formularium of Dutch Pharmacists' (FNA)

The general construct 'adherence to guidelines' served as the dependent variable, and was formed by summing the scores of the prescribing indicators (see Analysis).

The prescribing indicators were calculated using data from a research database compiled for this purpose by linking the pharmacy databases from 379 pharmacies. With due consideration to existing privacy legislation, this was made available as a 'prescribing analyses' database by health insurers. Each month, health insurers in the Netherlands receive electronic declarations from pharmacists; these are provided in a standardised format and contain information about the patient, the prescriber and the drug supplied<sup>24</sup>. By linking these declaration databases, an extremely large database was created containing detailed information on all prescription drugs prescribed in the year 2000 by 1434 general practitioners and supplied by 379 pharmacists to 3 million patients. Pharmacies, general practitioners and patients are linked to each other

anonymously in these databases. This was realised by linking a unique patient code to a unique general practitioner's code as well as a unique pharmacy code.

The link between a general practice and a pharmacy was made on the basis of the number of deliveries: a general practice was linked to the pharmacy that supplied the most prescriptions for its patients. As the minimum practice size, we adopted the legal standard of 800 patients <sup>25</sup>.

Four constructs were used as independent variables: the construct '*attitude*' of the pharmacist towards the 'care-providing function' and three partial constructs derived from the actual care-providing function of the pharmacist: the *care for the individual patient*, the *cooperation with general practitioners* and the *registration of the care provided*.

For the first construct (*attitude*), use was made of an attitude scale we developed and which was published previously <sup>26</sup>. This scale is based on 17 statements. These statements enquire about attitudes concerning the task, role, responsibility and expertise of the pharmacist. The higher the score, the more positive the pharmacist's attitude towards exercise of the care-providing function.

The actual care-providing function constructs were based on a number of questions from a survey among 379 pharmacies in the South of the Netherlands. We have already published on this survey, the response to it and the results it yielded <sup>27</sup>. This survey contained several questions about the *care for the individual patient*, the *cooperation with general practitioners* and the *registration of the care provided*, that provided an indication of the regularity with which the pharmacist practised these care providing activities. Table 1 lists the questions on which these three constructs are based.

**Table 1** Independent variables and dependent variable.

Description of care-providing function items distributed over three constructs (1-3).  
Results of the reliability analyses. Mean and standard deviation.

<b>Independent variables</b>	<b>Cr. a<sup>a</sup></b>	<b>Mean(sd)</b>
1. Individual patient care (construct) <sup>b</sup>  How often does your pharmacy use a structured set of questions when supplying self-care remedies? How often does your pharmacy provide supplementary information with home deliveries? How often does your pharmacy provide information about the use and side effects of a drug which is supplied to a given patient for the first time? How often do you enquire about a patient's experience with a given drug before providing that same drug for the second time to that patient? How often do you engage in a personal consultation with a patient in a separate area?	0.67	14(2.6)
2. Cooperation with GPs (construct) <sup>b</sup>  How often do you discuss the care provided by your pharmacy with GPs? How often do GPs contact you for advice about a patient's medication? How often do you contact a GP about a patient's medication? How often do you participate in a Pharmacotherapy Audit Meeting (PTAM)? How often do you provide agenda items for the PTAM as a consequence of noteworthy prescriptions? How often do you supply prescription statistics from your pharmacy to your PTAM group? How often do you use prescription statistics to evaluate whether agreements made within your PTAM group are honoured? How often do you generate prescription statistics for the PTAM in cooperation with other pharmacies? How often do you provide individual GPs with feedback on the extent to which they have complied with agreements? How many times per year does your PTAM group meet?	0.83	27(5.0)
3. Care registration (construct) <sup>b</sup>  Besides files of supplied medication, does your pharmacy keep other medical records in a database, e.g. pregnancy, allergies, breast cancer? How often do you register the supply of self-care remedies? How often do you register care interventions that take place in your pharmacy?	0.59	7.7(1.8)
4. Attitude (construct) <sup>c</sup>	0.83	72(6.5)
<b>Dependent variable</b>		
Prescribing indicators (construct) <sup>d</sup>	0.59	65(3.7)

<sup>a</sup> Cr. a = Cronbach's alpha

<sup>b</sup> Frequency scale of all questions: never/ occasionally/ regularly/ often

<sup>c</sup> Attitude scale based on 17 statements concerning the task, role, responsibility and expertise of the pharmacist (previously published 26).

<sup>d</sup> see Box

## Analysis

The general construct 'adherence to guidelines' was formed as the dependent variable by summing the score on the twenty prescribing indicators. Before the calculation of the summed score, the scores related to the prescribing indicators for drugs for which a

lower score is desirable were inverted (100% minus the actual score is the calculated score). Consequently, a sum score can be interpreted as follows: the higher the score, the more the general practitioner complies with existing evidence-based guidelines. A reliability analysis was performed to verify whether there was sufficient internal consistency of the construct 'adherence to guidelines' (Cronbach's alpha = 0.59).

To gain an impression as to the treatment of the total practice population according to the existing guidelines, a weight factor was used for each indicator during the calculating of the sum score. This weight factor was determined by the ratio between the number of prescriptions related to the indicator and the total number of prescriptions. For example, an indicator related to a drug group that constituted 5% of the total number of prescriptions had a weight factor of 10 times greater than an indicator pertaining to only 0.5% of the total number of prescriptions.

So that general practitioners could be readily compared, the prescription figures were standardised for the age and gender profile of the practice, with the total population being the standard <sup>28</sup>. The previously mentioned four constructs we used as independent variables.

First of all, a bivariate analysis was carried out to determine whether the differences in prescribing routines among general practitioners were correlated with the exercise of a care-providing function by the pharmacist with whom they had most contact in day-to-day practice, or with this pharmacist's attitude towards the exercise of a care-providing function. After this first analysis, a multivariate analysis was carried out.

To account for possible clustering of the data, caused by pharmacies linked to more than one GP, a linear mixed model with peripheral intercept was used to analyse the data. Simple regression analyses were performed separately for each predictor. A multiple regression analysis that simultaneously included all predictors at once was carried out to obtain adjusted coefficients. P-values lower than 0.05 were considered to be significant. All of the analyses were performed using SAS version 8.02 (SAS Institute Inc., Cary, NC, USA).

## Results

Of the 379 pharmacists written to, 270 responded, resulting in a response rate of 71%. Bearing in mind the conditions stated in the methods section, 408 general practices (with a total of 1.2 million patients who received 6.6 million prescriptions) could be linked to 201 of the 270 pharmacies. The pharmacies that could not be linked to general practitioners were located mainly in the geographical boundary areas of the population. It was found that per general practice, an average of 69% (SD 25) of the patients used the same pharmacy.

The constructs investigated are described in Table 1. This table also details the results from the reliability analyses and the average values and standard deviations. The weighted average score for the 20 prescribing indicators was 65% (SD 3.7).

Table 2 details the results of the univariate and multivariate analyses.

**Table 2.** Mixed model regression coefficients and 95% CIs of predictors of adherence to guidelines (408 practices, 201 pharmacies, 1.2 million patients and 6.6 million prescriptions)

Predictor	Simple linear regression			Multiple linear regression	
	Intercept (se)	$\beta$	95%CI	$\beta$	95% CI
Attitude of the pharmacist towards the care-providing function (construct)*	66(2.30)	-0.010	-0.073; 0.053	-0.006	-0.074; 0.063
Care for the individual patient (construct)*	65(1.19)	-0.028	-0.197; 0.141	-0.018	-0.229; 0.194
Cooperation with general practitioners (construct)*	66(1.18)	-0.043	-0.130; 0.043	-0.048	-0.146; 0.049
Registration of the care provided (construct)*	65(0.94)	0.040	-0.195; 0.275	0.087	-0.192; 0.366
Intercept (se)				66(2.42)	61; 71

\*included as continuous variables

In both analyses, the quality of prescribing by general practitioners, measured on the basis of 'adherence to guidelines', was not correlated with the formulated constructs. The attitude of the pharmacist towards the care-providing function, as well as the extent to which the pharmacist provided care to the individual patient, the extent to which he cooperated with the general practitioner and the extent to which he registered the care provided, were not correlated with the quality of prescribing by the general practitioner from whom the pharmacist frequently received prescriptions.

## Discussion

In our investigation, in which we related the quality of prescribing by general practitioners to the adherence to evidence based primary care guidelines, the variations

in the quality of prescribing among general practitioners were not found to be correlated with the exercise of a care-providing function by the pharmacist that supplied prescription drugs to most of the general practitioner's patients. This is not what we expected. After all, one would expect that more cooperation with the general practitioner and more attention by the pharmacist for optimal pharmacotherapy of the patient would lead to more interactions between the general practitioner and the pharmacist and that this would have a favourable effect on the quality of prescribing. Moreover, a good registration of the care provided and a positive attitude of the pharmacist towards his care-providing function strengthen this expectation<sup>26</sup>. In our investigation, we were unable to measure any effect of the pharmacist's care-providing function on the quality of the general practitioners' prescribing behaviour in a day-to-day practice setting.

It would seem that general practitioners are hardly receptive to the influence that pharmacists try to exert on optimal drug use. There is an apparent discrepancy between the potential and actual influence of the pharmacist on the general practitioner's prescribing behaviour. The possible influence of the pharmacist has been described in several trials. A number of studies have shown that recommendations and interventions from pharmacists, under controlled circumstances, can lead to an optimisation of drug use and a better prescription policy<sup>23, 29-33</sup>. We also found indications for the existence of this gap in previous research we carried out among general practitioners: also in this study, the quality of prescribing by the general practitioner was not correlated with the general practitioner's attitude towards the pharmacist's role, the way in which general practitioners cooperated with pharmacists, or the quality of the PTAM<sup>34</sup>. The cause of this gap possibly lies in the rather noncommittal nature that characterises the present cooperation between general practitioners and pharmacists, both in day-to-day practice and in the PTAM<sup>32, 35</sup>. We recommend that this non-committal character be reduced by structuring the cooperation between general practitioners and pharmacists more strictly. This might create more opportunities for the advisory and interventional role of the pharmacist so that the positive result of the cooperation between general practitioners and pharmacists that has been described under controlled conditions could also be achieved in day-to-day practice. The positive attitude of general practitioners towards

the provision of prescription feedback and advising physicians and patients by the pharmacist has already created a favourable climate for this<sup>26,36</sup>.

The cross-sectional character of our study can be seen as a limitation. A prospective study is needed to gain more insight into the causal relationships between the exercise of a care-providing function by the pharmacist and the prescribing behaviour of the general practitioner, and in such a study the survey elements could be replaced by more objective measurements.

Using a considerable number of validated prescribing indicators in a real-life setting, this study enabled us to gain an impression as to the quality of prescribing by general practitioners over an entire year. By combining this information with the results of a survey held among pharmacists (to which there was a high response) we were able to study the relationship between the quality of prescribing and the care-providing function of the pharmacist in a day-to-day practice setting.

### **Acknowledgements**

We thank the community pharmacists who participated in this study.

### **Funding**

Dutch Pharmacist's Association and CZ health insurance company.

### **Conflicts of interests:**

None.

### **References**

1. Watkins C, Harvey I, Carthy P, Moore L, Robinson E, Brawn R. Attitudes and behaviour of general practitioners and their prescribing costs: a national cross sectional survey. *Qual Saf Health Care* 2003;12(1):29-34.
2. Mantyselka P, Ahonen R, Kumpusalo E, Takala J. Variability in prescribing for musculoskeletal pain in Finnish primary health care. *Pharm World Sci* 2001;23(6):232-6.
3. Jones MI, Greenfield SM, Jowett S, Bradley CP, Seal R. Proton pump inhibitors: a study of GPs' prescribing. *Fam Pract* 2001;18(3):333-8.
4. Bjerrum L, Bergman U. Wide variation in the number of different drugs prescribed by general practitioners. A prescription database study. *Scand J Prim Health Care* 2000;18(2):94-8.

5. Bjerrum L, Sogaard J, Hallas J, Kragstrup J. Polypharmacy in general practice: differences between practitioners. *Br J Gen Pract* 1999;49(440):195-8.
6. Guillemot D, Carbon C, Vauzelle-Kervroedan F, Balkau B, Maison P, Bouvenot G, Eschwege E. Inappropriateness and variability of antibiotic prescription among French office-based physicians. *J Clin Epidemiol* 1998;51(1):61-8.
7. McBride JE, Pater JL, Dorland JL, Lam YM. Extent and variation of omeprazole prescribing in an elderly population of Ontario. *Ann Pharmacother* 1997;31(4):411-6.
8. Muijrs PEM, Janknegt R, Sijbrandij J, Grol RP, Knottnerus JA. Prescribing indicators. Development and validation of guideline-based prescribing indicators as an instrument to measure the variation in the prescribing behaviour of general practitioners. *Eur J Clin Pharmacol* 2004;60(10):739-746.
9. Lawrence M, Olesen F. Indicators of quality in healthcare. *Eur J Gen Pract* 1997; 3: 103-8.
10. Van Mil JWF. *Pharmaceutical Care, the future of pharmacy. Theory, research and practice.* (Dissertation). University of Groningen. The Netherlands; 2000. ISBN: 90-9013367-4.
11. Van der Heide H, Tinke JL. *Facts and figures, cost development of pharmaceutical aid.* The Hague, The Netherlands: Foundation for Pharmaceutical Statistics;1999.
12. Van Mil JW, Dudok van Heel MC, Boersma M, Tromp TF. Interventions and documentation for drug-related problems in Dutch community. Pharmacies. *Am J Health Syst Pharm* 2001;58(15):1428-31.
13. De Gier JJ. The Electronic Pharmaceutical Dossier: an effective aid to documenting pharmaceutical care data. *Pharm World Sci* 1996;18(6):241-3.
14. Kirking DM, Thomas JW, Ascione FJ, Boyd EL. Detecting and preventing adverse drug interactions: the potential contribution of computers in pharmacies. *Soc Sci Med* 1986;22(1):1-8.
15. Hepler CD, Strand LM. Opportunities and responsibilities in pharmaceutical care. *Am J Hosp Pharm* 1990;47(3):533-43.
16. Hakansson A, Andersson H, Cars H, Melander A (2001) Prescribing, prescription costs and adherence to formulary committee recommendations: long-term differences between physicians in public and private care. *Eur J Clin Pharmacol* 57(1):65-70.
17. Kocken GA (1999) Medication discussion groups in the Netherlands: five years of experience. *Med Educ* 33(5):390-3.
18. Bradley CP, Taylor RJ, Blenkinsopp A. Primary care--opportunities and threats. Developing prescribing in primary care. *BMJ* 1997;314(7082):744-7.
19. Matheson C, Bond CM, Mollison J. Attitudinal factors associated with community pharmacists' involvement in services for drug misusers. *Addiction* 1999;94(9):1349-59.
20. Farris KB, Schopflocher DP. Between intention and behavior: an application of community pharmacists' assessment of pharmaceutical care. *Soc Sci Med* 1999;49(1):55-66.
21. Odedina FT, Hepler CD, Segal R, Miller D. The Pharmacists' Implementation of Pharmaceutical Care (PIPC) model. *Pharm Res* 1997;14(2):135-44.
22. Mason HL. Using attitudes and subjective norms to predict pharmacist counseling behaviors. *Patient Couns Health Educ* 1983;4(4):190-6.

23. Beney J, Bero LA, Bond C. Expanding the roles of outpatient pharmacists: effects on health services utilisation, costs, and patient outcomes (Cochrane Review). In: *The Cochrane Library*, 4, 2001. Oxford.
24. Vektis BV. Externe integratie declaratie farmaceutische hulp 1995 [External integration of declarations for pharmaceutical help]; available at <http://www.vektis.nl/index.php>. Accessed 1 February 2005.
25. Koninklijke Nederlandsche Maatschappij tot bevordering der Geneeskunst: Eisen en voorwaarden herregistratie huisartsen. [The Royal Dutch Medical Association: requirements and conditions for reregistration of general practitioners]. *Staatscourant* 2003;47:18.
26. Muijrsers PEM, Knottnerus JA, Sijbrandij J, Janknegt R, Grol RPTM. Changing relationships: attitudes and opinions of general practitioners and pharmacists regarding the role of the community pharmacist. *Pharm World Sci* 2003;25(5):235-241.
27. Muijrsers PEM, Knottnerus JA, Sijbrandij J, Janknegt R, Grol RPTM. Pharmacists in Primary Care, Determinants of the care-providing function of Dutch community pharmacists in primary care. *Pharm World Sci* 2004;26(5):256-262.
28. Olesen F, Vedsted P, Norskov Nielsen J. Change in ranking order of prescribing patterns by age and sex standardization of the practice population. *Scand J Prim Health Care* 1996;14(3):159-64.
29. Sellors J, Kaczorowski J, Sellors C, Dolovich L, Woodward C, Willan A, et al. A randomized controlled trial of a pharmacist consultation program for family physicians and their elderly patients. *Can Med Assoc J*. 2003;169(1):17-22.
30. Krska J, Cromarty JA, Arris F, Jamieson D, Hansford D, Duffus PR, Downie G, Seymour DG. Pharmacist-led medication review in patients over 65: a randomized, controlled trial in primary care. *Age Ageing* 2001;30(3):205-11.
31. Bernsten C, Bjorkman I, Caramona M, Crealey G, Frokjaer B, Grundberger E, et al. Improving the well-being of elderly patients via community pharmacy-based provision of pharmaceutical care: a multicentre study in seven European countries. *Drugs Aging* 2001;18:63-77.
32. De Vries CS, Collaboration in healthcare. The tango to drug safety. (Dissertation) University of Groningen, the Netherlands;1998.
33. Hamley JH, MacGregor SH, Dunbar JA, Cromarty JA. Integrating clinical pharmacists into the primary health care team: a framework for rational and cost-effective prescribing. *Scott Med J* 1997;42(1):4-7.
34. Muijrsers PEM, Grol RP, Sijbrandij J, Janknegt R, Knottnerus JA. Differences in prescribing between general practitioners. Impact of the cooperation with pharmacists and visits from pharmaceutical industry representatives. (Internal publication Maastricht University, dept. of general practice. Submitted for publication).
35. Van Dijk L, Barnhoorn H, De Bakker D. Het Farmacotherapie Overleg in 1999, stand van zaken en effecten op voorschrijven [The Pharmacotherapeutic audit meeting in 1999, current state of affairs and effects on prescribing]. Nivel, Utrecht, The Netherlands; 2001.
36. Nathan A, Sutters CA. A comparison of community pharmacists' and general practitioners' opinions on rational prescribing, formularies and other prescribing related issues. *J R Soc Health* 1993;113:302-7.

37. Guidelines for ATC classification and DDD assignment. Oslo: World Health Organization Collaborating Centre for Drug Statistics Methodology. 2004. Available at: <http://www.whocc.no/atcddd/indexdatabase/index.php>. Accessed 1 february 2005.

## **Chapter 8 General discussion**

### **Introduction**

This chapter will discuss the most important results of the study; in addition, attention will be given to a number of methodological aspects of the study, including both its strong points and its limitations and a number of practical points. Finally, we will compare our results with the results of similar studies and make a number of recommendations regarding the practical application of the study results and further research.

### **Most important findings**

In the review of the literature in chapter 2 it was stated that more than 90% of the drugs prescribed by general practitioners are supplied by pharmacists and that differences in prescribing behaviour are visible in the pharmacy <sup>1-5</sup>. We also saw that since the start of the 1990s, the pharmacist has played a much more active role in guiding patients and advising doctors. The concept 'Pharmaceutical care' that was introduced by Hepler in 1990 made an important contribution to this <sup>6</sup>. In many countries, the changed role of the pharmacist seems to have led to a situation in which the pharmacist increasingly exercises an advisory function for both the patient and the general practitioner that is aimed at an optimal pharmacotherapy for the patient. In this chapter, we will discuss the most important findings of this study against this background. Special attention will be given to the quality of prescribing by the general practitioner, the care providing function of the pharmacist and the connection between them.

### ***Attitudes***

We have carried out a cross-sectional study among general practitioners and pharmacists. For this purpose, we distributed a questionnaire to 1434 general practitioners and 379 pharmacists. The study indicates that Dutch general practitioners have a positive impression regarding the pharmacist's expertise and that there is sufficient support for the exercise of a care providing function by the pharmacist. Moreover general practitioners look upon the giving of prescription feedback and advice

to doctors and patients as elementary parts of the care providing function of the pharmacist. There also seems to be a great deal of support among general practitioners for a policy of generic substitution in the pharmacy. This means that proprietary drugs are replaced by chemically identical, generic drugs.

There would seem to be very little support among general practitioners for a more than advisory role for the pharmacist in the sense of joint responsibility for what is prescribed. In contrast, more than two-thirds of the pharmacists do wish to bear joint responsibility. There is also a difference of opinion between general practitioners and pharmacists with regard to informing the pharmacist about the patient's diagnosis, the distribution of repeat prescriptions and therapeutic substitution by the pharmacist: two-thirds of the general practitioners oppose this and two-thirds of the pharmacists favour it. By therapeutic substitution we mean the supply of a drug that is therapeutically identical but not chemically identical to the prescribed drug.

More than two-thirds of the general practitioners indicate that they have a good or very good relationship with pharmacists. Both the relationship, and whether or not the doctor dispenses drugs himself are found to be intimately related to the attitude of the general practitioner regarding the role, task, expertise and responsibility of the pharmacist in primary care. This attitude could be measured quite well using an attitude scale that we constructed: the better the relationship the higher the score. Dispensing general practitioners score significantly lower on the attitude scale.

We also determined the attitude of pharmacists towards the care providing function with the aid of this attitude scale. The score was found to be positively related to the provision of individual patient care, the cooperation with general practitioners and the registration of the care. More than two thirds of the pharmacists also indicate that they have a good or very good relationship with general practitioners.

There is a great deal of support among pharmacists for the type of cooperation between general practitioners and pharmacists seen in the Pharmacotherapy Audit Meeting (PTAM). Most pharmacists participate in a PTAM more than four times a year and almost two-thirds of them give prescription feedback in this meeting. There is a negative relationship between the cooperation with general practitioners and the number of years of work experience of the pharmacist.

With regard to the exercise of the care providing function by pharmacists when they give recommendations for self care, it turns out that the approach of the pharmacist is often recorded in a protocol and that registration of the drugs delivered is a regular part of the procedure. With regard to the type of employment contract, second pharmacists seem to be more involved in patient care than the managing pharmacists.

The finding that almost one third of the pharmacists indicate that they never inquire about the patient's experiences when a drug is supplied for the second time is striking.

Our findings with regard to the attitudes and beliefs of general practitioners and pharmacists provide clear indications that, as far as the cooperation general practitioners and pharmacists is concerned, important prerequisites are being met to make possible a joint effort to optimise the patient's pharmacotherapeutic care. The relationships are good and there is regular consultation. The expertise of the pharmacist is not questioned and there is considerable support for the advisory and feedback function and/or care providing function that is derived from it. One could expect that increased mutual collaboration and more attention from the pharmacist for the optimal pharmacotherapy of the patient will lead to more interaction between the general practitioner and the pharmacist and have a favourable effect of the quality of prescribing.

In the following paragraphs we will delve further into our findings with regard to the impact of the pharmacist's care providing function of the quality of prescribing by general practitioners.

### ***Prescribing routines***

Because our study is directed at the quality of prescribing by general practitioners and the pharmacist's role therein, we required an instrument with which the quality of the pharmacotherapeutic care that is provided can be assessed. At the start of our study, the concept of 'quality indicators' had been defined several years earlier as: measurable elements in the care provided for which there is consensus and which can be used to estimate and improve the quality of care provided <sup>7</sup>. However, there were no prescription indicators based on guidelines in force among Dutch general practitioners that could be used in our study as a measure of the quality of prescribing. On the basis

of the existing evidence-based general practice guidelines of the NHG (Dutch College of General Practitioners), we formulated 34 prescription indicators that were considered by a panel of experts to have sufficient validity. Twenty of these reveal significant differences in the prescribing behaviour of general practitioners.

In addition to the purpose for which we developed these indicators, they might possibly also be used for monitoring purposes in the future in the PTAM as well as to start improvement trajectories.

We used the formulated prescription indicators to investigate whether the quality of drug prescribing by general practitioners is related to the attitude of general practitioners regarding the role of the pharmacist and the way in which they cooperate with pharmacists in practice and in the PTAM. Contrary to our hypothesis, we found no relationship between prescribing according to the guidelines by solo general practitioners and their cooperation with pharmacists. There was a clear relationship, however, with the frequency with which they were visited by medical representatives: more visits by medical representatives was associated with a lower quality of prescribing. There was no relationship between the quality of prescribing and age, gender, size of practice, trainership, professional experience, workload, working part-time, post-graduate training or the use of an electronic formulary. There was a significant negative correlation between having a practice in smaller suburban areas and the adherence to guidelines. We also found the adherence to prescription guidelines to be significantly lower in solo practices as compared to non-solo practices; this difference was however small.

We also used the formulated prescription indicators to investigate whether the differences among general practitioners with regard to the quality of prescribing are related to the exercise of a care providing function by the pharmacist with whom they have the most contact in daily practice (in the population that we studied, we found that, on average, 69% (SD 25) of the patients of a particular general practitioner visit the same pharmacy).

In our study, we observed no effect in daily practice of the care providing function of the pharmacist on the quality of the prescribing behaviour of the general practitioners with whom they frequently cooperate. The attitude of the pharmacist, the degree to which he

provides patient care, the degree to which he cooperates with the general practitioner and the degree to which he records the care given were not measurably related to the quality of prescribing by the general practitioner.

Based on the existence of a number of favourable prerequisites for the cooperation between general practitioner and pharmacist, we expected that more mutual collaboration and more attention from the pharmacist for the optimal pharmacotherapy of the patient would have a favourable effect on the quality of prescribing by the general practitioner. In our study, however, this expectation was not confirmed by measurable results. The explanation for this may lie in the structure of this collaboration as is found in The Netherlands. Even though agreements are often reached, there is a high level of permissiveness in which the responsibilities are not clearly assigned<sup>8</sup>. This is in contrast to the measurable effect that medical representatives have on general practitioners. This is probably related to an effective marketing strategy of the pharmaceutical industry in which medical representatives target their activities at the promotion of a limited number of new products. In light of this, in addition to the granting of all sorts of favours, use is made of an effective way to provide information: 'the one-to-one outreach visit', by a medical representative, to increase the turnover of proprietary drugs<sup>9-11</sup>.

## **Methodological aspects of the study: strengths and limitations**

### ***Population and database***

Our study was carried out on a large, representative study population and the response to the questionnaires was high. During the study, we had access to a unique and extremely large database containing information on all drugs prescribed by 1434 general practitioners and delivered by 379 pharmacies in 2000 to almost three million patients with national health insurance in the South of The Netherlands who were insured by the two large health insurance companies that are located there. The database contains information of the patient, the prescriber and the drug and was created by linking independent pharmacy files. These files were created primarily for the automated processing of invoices between the pharmacies and the insurers. The system by which the recorded information is coded is documented in detail, the control

over the coding is severe and is regulated by contracts between the pharmacists and the insurers<sup>12</sup>. As a result, the reliability of the information in the database that we used is high.

When analysing the variation in prescribing behaviour among general practices with the aid of the prescription indicators, we used 800 patients as the minimum practice size<sup>13</sup>. The average practice size or 'standard practice' in the Netherlands is about 2400 patients<sup>14,15</sup>. We have restricted the analyses to those patients registered in the general practitioner's practice who are covered by national health insurance. The reason for this is that the information for patients covered by private health insurance is incomplete due to the existence of a deductible amount for the insured party. However, since about two-thirds of the Dutch population and hence two-thirds, on average, of the patients in a general practice are covered by national health insurance, this yielded a good picture of the way in which the prescription guidelines are being followed in each practice.

Data from the Dutch National Information Network for General Practitioner Care (LINH) indicate that more drugs are prescribed for patients covered by national health insurance than those with private health insurance<sup>14</sup>. The expenditures on drugs for patients covered by national health insurance are also higher<sup>16</sup>. The differences in prescription volume between patients covered by national health insurance and those with private health insurance may be explained by differences in the age structure of those covered by the two types of insurance and by differences in their socio-economic status. People with a lower socio-economic status make more use of practically all forms of health care than do those with a higher socio-economic status, which is completely in agreement with the differences in the frequency of health-related problems<sup>17-19</sup>. In view of the explicable differences in prescription volume, it does not seem likely that general practitioners allow the type of insurance of the patient to affect whether or not they follow the prescription guidelines; however further research would be required to exclude this possibility.

In the database that we used, prescription indicators can be calculated only per practice. In the case of a solo practice, one can observe the prescribing behaviour of the general practitioner who runs the practice, while in the case of a non-solo practice

(partnership or group practice) one can observe the prescribing behaviour of the group of general practitioners that runs the practice jointly. Data on the prescribing behaviour of the individual members of a group practice are not available; this is a consequence of the fact that there are several doctor's names on one prescription, so that the prescription is not registered under the doctor's name but under that of the group practice.

### ***Prescription indicators***

The prescription indicators are expressed as a percentage between 0 and 100%, the optimal score being close to 100%. For the calculation of the prescription indicators the ATC classification of a number of drugs is insufficiently specific; in these cases we have also specified the article code of the Royal Netherlands Association for the Advancement of Pharmacy (KNMP) <sup>12,20</sup>.

In order to assess the content validity, we submitted the draft prescription indicators to a panel of experts. This panel consisted of six general practitioners and a pharmacist, with a professor of general practice medicine as chairman. We decided on a small panel to ensure everyone's involvement in the group discussion. One of the panel's important tasks was to determine whether an indicator satisfied the requirement that there be an adequate reflection of the central recommendation in the guideline. Indicators that did not meet this requirement were eliminated. Because no 'Gold Standard' is available, adherence to the guidelines of the Dutch College of General Practitioners (NHG) was looked upon as adequate behaviour.

It was therefore not a task of the panel to assess the content of the NHG guidelines. However, a guideline is based on the state of knowledge at the time that it is drawn up. As a consequence of scientific progress, guidelines become out-of-date and are replaced by new ones <sup>21</sup>. We have tried to solve this problem to the extent possible by comparing the NHG guideline with the guideline in the Pharmacotherapeutic Compass ['Farmacotherapeutisch Kompas'], which is published annually. If there was no agreement between the NHG guideline and the Pharmacotherapeutic Compass with regard to the choice of drug, then no indicator was formulated. The most important

result of this policy was that no prescription indicator was formulated on the basis of the NHG guideline 'Depressive disorder' from 1994.

During the formulating of the indicators, we took the existing guidelines for diseases and syndromes as the starting point. A number of drugs have such a limited area of application that it is very likely that the patient has been diagnosed as having the condition for which the drug is indicated. The delivered drug is then a 'proxy for diagnosis'; for example, a patient for whom insulin is prescribed is suffering from diabetes mellitus and a patient that is given iron is considered to have anaemia. A further validation of the indicators for which the delivery data are used as a proxy for diagnosis is to be recommended and may be possible in the future in a database that records both the drug prescribed and the diagnosis. Recent studies demonstrate that care must be taken in using prescribing indicators for assessing prescribing quality in patients diagnosed with asthma (see appendix B).

The value of the prescription indicators as we have calculated them from the available pharmacy files is limited for general practitioners in that there is no link with the individual prescription decision and that the indicators are limited to the measurable parameters in the pharmacy files. However, they offer the advantage for estimating the quality of the care provided as they are based on the drugs actually supplied to the patient which can be influenced by the pharmacist. He can advise both the patients and the prescribers and he can intervene in case of drug-related problems. In his collaboration with general practitioners, he can also influence the decisions as to the choice of drugs<sup>22-25</sup>. A consequence of the use of prescription indicators as a measure of quality is that this is limited to the measurable parameters in the files used and to matters on which there is consensus. The measurements that can be carried out with the available files are limited to drugs that can be obtained in the pharmacy on prescription only. With regard to the formulated prescription indicators, this is hardly a limitation, since only a few antacids and some NSAIDs are available over-the-counter. This can be taken into consideration when interpreting the measurements. If there is no consensus regarding the prescription of drugs from a certain group, then it is impossible to formulate a prescription indicator for them. As indicated above, this was the case for antidepressants, for which the guidelines from the Dutch College of General

Practitioners differ from those from the Committee on Pharmaceutical Assistance ['Commissie Farmaceutische Hulp'].

When the formulated prescription indicators are used for estimating the prescribing quality, it is theoretically possible to achieve a high score by means of the frequent prescribing of all drugs to which an indicator pertains. This is due to the fact that in such a case, both the numerator and the denominator of the fraction by which the indicator is calculated become larger. With the formulated DU90% indicators, it is theoretically also possible to achieve a high score, i.e. to prescribe a limited number of drugs from a group without prescribing the drugs that are recommended in the guideline. This theoretical possibility can be taken into consideration when the prescription indicators are used.

In our study, the indicators as we formulated them have been used to obtain a picture of the prescribing behaviour of general practitioners and the variation in this behaviour at the level of the individual practice. At a higher level of aggregation, they reflect the treatment of the patients in the practice. By means of the formulated prescription indicators we measure the extent to which the prescribers generally follow the guidelines.

Despite their limitations, we believe that the prescription indicators mentioned above provide extra power to the study that we carried out in comparison with data on volume or costs. The indicators used are based on evidence-based guidelines for general practice and pertain to more than half of the prescription volume. Prescription data that are used frequently, are expressed in measures of volume (number of prescriptions or number of DDDs) and are less specific than the prescription indicators formulated by us. They indicate only the amount of a drug that has been delivered and are usually not related to the existing guidelines.

The formulated prescription indicators are not quality indicators in the sense that they themselves are a measure of the quality of the care provided. They give an impression of the degree to which a prescriber follows the generally accepted evidence-based guidelines for the prescription of drugs. The prescription indicators are not far removed

from the care process as encountered in daily practice and can be regarded as a proxy of the quality.

### ***The survey***

In our study we distributed two written questionnaires: one for general practitioners and one for pharmacists. Because the address files used were about 6 months old, it was practically unavoidable that general practitioners and pharmacists who were no longer practising also received the questionnaires; a number of these returned the questionnaire without completing it. With regard to the remaining non-respondents, we determined at a later stage whether or not they were practising at the time of the survey with the aid of the most up-to-date files.

Despite the fact that these questionnaires were mailed out in a period in which there was considerable commotion among general practitioners in connection with what they felt to be too great a workload, the response from the general practitioners was just as high as from the pharmacists. In order to obtain a good response, we took the recommendations of Streiner and Norman into consideration when we mailed out the questionnaires<sup>26</sup>. A clear explanation of the need for the study and the importance of the cooperation of general practitioners and community pharmacists were given in an accompanying personal letter, together with a stamped return envelope. The amount of time required, as well as the fact that the data from the questionnaires would be processed anonymously were emphasised. The anonymous processing was carried out using a bar code<sup>27</sup>. The compensation given was in kind (a gift certificate), the value of which was comparable to the rate for a single consultation.

When a questionnaire study is carried out in the way that we chose, it is possible that the failure to respond will be selective. This is unlikely in our study, however, in view of the high response to the questionnaires and the results of the investigation of the non-respondents.

### **The influence of the patient**

The influence of the patient on the prescription process pertains mainly to the decision to prescribe and to a lesser degree to the choice of drug. Expectations and emotions

play a role in this regard and the effect is seen mainly in the *volume* of drugs for symptomatic treatment, tranquillisers and antibiotics<sup>28,29</sup>.

When interpreting the score on the prescription indicators for benzodiazepines and mebeverine, one should realise that this score is also determined by the frequency with which the general practitioner yields to the perceived pressure from the patient. For the benzodiazepines it is recommended to prescribe at most the amount needed for two months and the prescription of mebeverine is not recommended at all.

The age and gender of the patients in the practice may influence the score on the prescription indicators. For this reason, to improve the comparability of the general practices, we standardised the prescription data for the age- and gender distribution of the practice, using the total population as the standard<sup>30</sup>.

The ethnic background can also affect the use of drugs. More drugs are prescribed for foreign immigrants than for native Dutch citizens. The influence of ethnic background on the score for prescription indicators was reduced, however, by the fact that the prescription of drugs for foreign immigrants is more often done in accordance with the recommendations in the NHG guidelines<sup>31</sup>. Since the differences in ethnic background cannot be seen in the available database, we were unable to correct for this factor. Based on the considerations indicated above (see under 'Population and database'), we have also not taken into consideration the differences between patients with regard to their socio-economic status.

This does not take away, that, in view of the strengths and limitations of the chosen methodology, as discussed above, we feel that we have gained a good impression of the attitude and opinions of general practitioners and pharmacists regarding the role of the pharmacist and the existing relationship between the professional work of the pharmacist, and whether or not general practitioners prescribe in accordance with the guidelines.

## **Comparison with other studies**

We have investigated the prescribing behaviour of general practitioners and its correlation with the exercise of a care-providing function by the pharmacist. For this purpose, we have studied the situation as it existed in 2000 and 2001 in the South of

The Netherlands. We have related the prescribing behaviour of general practitioners to the existing general practice guidelines. Using questionnaires, we collected data on general practitioners and pharmacists that pertained to the setting in which they work and to their opinions, experiences and behaviour in the area of pharmacotherapeutic care. With regard to a number of aspects of the pharmacist's role, such as giving advice to general practitioners and to patients and the monitoring of medication, other studies have also found that there is a basis of support for these activities among general practitioners. In agreement with our findings, there is a smaller basis of support for the role that the pharmacist could play in the prescribing of drugs or the adjustment of the medication<sup>32-35</sup>. Our study provides a recent picture of the situation in 2001 in a study population that is representative of The Netherlands as a whole<sup>36</sup>.

There has been little attention in the literature for the variation within the professionalism of the pharmacist that is described in our study. Besides by factors that are linked to the pharmacy and the individual, this variation is affected by the opinions and attitudes of pharmacists<sup>37-40</sup>. In the literature, the concept 'attitude' is used more selectively for the attitude with regard to specific groups of patients<sup>38</sup>, the attitude with regard to the specific advisory function<sup>40</sup> and the attitude with regard to pharmaceutical patient care<sup>37,39</sup>. In the attitude scale that we constructed, all these aspects have been included and the attitude of general practitioners and pharmacists is measured with regard to the role, task, expertise and responsibility of the pharmacist in primary care. In comparison with other studies, the concept 'attitude' has been defined much more broadly in our study and pertains more to an important aspect of our study: the position of the pharmacist in primary care. The position that is assigned to the pharmacist in primary care by both pharmacists and general practitioners is indeed much broader than the pharmacist's original role in the preparation and distribution of drugs. In our study, in contrast to most other studies that have been carried out under controlled conditions, we studied 'normal daily practice'. Studies addressing the effect of the care providing function of the pharmacist that are carried out under controlled conditions concentrate on the care of the individual patient, the cooperation with the prescriber or the registration of the care provided<sup>24, 41-54</sup>. In a number of studies, the interventions of the pharmacists under these conditions have led to a desirable effect (see chapter 2).

In our study of daily practice, we have distinguished three important tasks with regard to the exercise of a care providing function by the pharmacist. We have described these tasks as independent constructs next to the construct 'total care providing function': the *care of the individual patient* in direct contact with the patient, the *cooperation with general practitioners* and the *registration of the care provided*. Comparable studies that made use of prescription indicators that are based on existing, specific general practice guidelines have not been carried out before. However, we did find a number of studies which used descriptive indicators, or indicators that were based on generally valid clinical criteria or on the unnecessary prescribing of drugs. These studies mainly relied on volume measures. If one uses volume measures such as the number of prescriptions or the number of DDDs for the assessment of prescribing behaviour, literature suggests that there may be a positive relationship between frequent prescriptions and male gender of the doctor, the running of a large practice and not being a trainer of general practitioners<sup>2, 55-58</sup>.

We used 'volume independent' prescription indicators, and we did not find this relationship. This may indicate that general practitioners that frequently prescribe medication tend to follow the guidelines for the choice of a drug - a phenomenon that has been described previously<sup>31</sup>. These different findings are due to the use of different measuring instruments. Volume measures are less specific than prescription indicators. In most cases, they only provide an indication of the amount of a drug that has been delivered and not of the appropriateness of the drug.

We found one study in which adherence to first-line guidelines was used as a criterion for appropriate prescribing. This study was carried out in the Netherlands. The guidelines used in this study were identical to the recommendations from a regional formulary, and such recommendations are generally based on existing general practice guidelines<sup>59</sup>. In this study, adherence to guidelines was defined as the prescription of a drug from the formulary. In accordance with our findings, this study showed that there was a significant negative relationship between running a practice in smaller urban areas (1000-1500 addresses/km<sup>2</sup>), compared to running a practice in large cities (> 100,000 inhabitants, >2500 addresses/km<sup>2</sup>), and the adherence to guidelines. A possible explanation for this may be the higher level of organisation of primary care in

large cities; in the population that we investigated, as well as the broad range of activities carried out in general practices by two medical faculties and two university institutes of general practice in three of the five large cities. A well-founded explanation of this finding will however require further investigation.

In our study which relied on real-life data, which we used to create an image of the existing situation, we were unable to find any relationship between the exercise of a care providing function by the pharmacist and more frequent adherence to prescription guidelines by general practitioners. The measuring instruments used in our study were based on objective guidelines and on the answers to a number of survey questions. As indicated in chapter 2, a number of studies have shown that a favourable effect on both health and efficiency can be achieved in various categories of patients if good agreements are made between general practitioners and pharmacists. This is especially the case for patients given repeat prescriptions, patients who receive antibiotics, patients with an elevated serum cholesterol, patients with heart failure, asthma patients and the elderly<sup>24, 41-44, 46-52, 60</sup>.

The fact that we have found no relationship between the exercise of a care providing function by the pharmacist and prescribing more in accordance with the guidelines by general practitioners is probably due to the lack of a well-organised structure for the collaboration between general practitioners and pharmacists. The collaboration is in principle free of obligation.

As a result, the influence of the pharmacist on prescribing in accordance with the guidelines is overshadowed by the influence of the pharmaceutical industry, which has put an effective strategy for this into practice for many years already<sup>2,8,10,11, 63,66</sup>.

The most important influence exerted by the pharmacist can be characterised as 'reactive' and concerns the daily processing of the medication monitoring. Alerting the prescriber to drug-related problems occurs regularly and often leads to an active intervention by which unnecessary hospitalisation can be prevented<sup>23,67,68</sup>. In view of the existence of a number of favourable prerequisites with regard to the collaboration between general practitioner and pharmacist and in view of the possibilities apparently created by well-structured collaboration under controlled conditions, taking on a 'proactive' role as well deserves careful consideration.

## **Recommendations for the practical application of the study results and for further research**

We investigated the expectations and attitudes of general practitioners and pharmacists with regard to the role of the pharmacist in primary care. We also investigated whether the quality of prescribing is related to the way in which general practitioners and pharmacists cooperate in daily practice. We related the quality of prescribing to existing evidence-based guidelines for general practice. Based on the results of our study, we make the recommendations that are discussed below.

We found that the pharmacist's feedback function fulfils a need perceived by general practitioners and that there is a broad basis of support for this role among pharmacists. We also found a broad basis of support for the cooperation between general practitioners and pharmacists such as may take place in the PTAM. In a number of prospective comparative studies under controlled conditions, moreover, the feedback function of the pharmacist in the direction of the general practitioner has been shown to have a favourable effect <sup>69-75</sup>. The incorporation of the pharmacist's feedback function in a structured cooperation with general practitioners would therefore seem promising and useful. In comparison with the existing structure, the choice of a less permissive structure is to be recommended.

In light of these findings, it would be advisable and in the interest of good cooperation to define carefully not only the tasks but also the responsibilities of the pharmacist. Their responsibilities were recognised to a great extent in our study by both general practitioners and pharmacists, but until now they have not been described with sufficient clarity <sup>76</sup>. In view of the good organisational preconditions and the pleasant atmosphere in most PTAM groups, we recommend that the composition of the local cooperative structures be maintained for the time being and that a more solid structure be chosen <sup>8</sup>. The attitude of both general practitioners and pharmacists with regard to the position of the pharmacist in primary care has been found to depend on the relationship between the pharmacists and the general practitioners. Because most general practitioners and pharmacists indicate that they have a good relationship with each other in their region of professional activity, it is also advisable for this reason to maintain the composition of

the local cooperative structures for the time being. In view of the positive opinions of dispensing general practitioners regarding the expertise and advisory role of pharmacists, it is to be recommended, however, that the dispensing general practitioner also be given a place in the cooperative structures between general practitioners and pharmacists. In view of the positive opinions of most dispensing general practitioners regarding the pharmacist's role in the PTAM, we recommend that the value to the dispensing general practitioner of a role for the pharmacist be investigated. The same is true of the advisory role that the pharmacist can play in problems connected with the prescription of the proper pharmacotherapy for a dispensing general practitioner's patients.

Based on our finding that general practitioners who more often receive visits from medical representatives adhere less well to the guidelines, we recommend that attention be given in the structured collaboration between general practitioners and pharmacists to the influence of the pharmaceutical industry on the quality of prescribing, for example by monitoring the agreements reached concerning new drugs or drugs that are actively promoted by the industry and then discussing the results of such monitoring in the PTAM.

With reference to the exercise of a care providing function by the pharmacist, the results of our study lead us to make three recommendations:

- Almost one-third of the pharmacists fail to follow the procedure recommended by the pharmacists' professional association, i.e. to enquire as to the experiences of the patient whenever a drug is dispensed for the second time. Enquiring as to the patient's experiences can lead to the timely detection of drug-related problems and is therefore to be recommended<sup>47,77</sup>. This can be implemented in daily practice with the aid of the information system that is present in all pharmacies, by means of which the dispensing of a second supply can be signalled so that the recommended procedure can be followed.
- In view of our finding that second pharmacists are more interested in patient care than managing pharmacists, we recommend that possible ways be looked for to

make maximum use of the professional expertise of the pharmacist and to delegate as much as possible of the administrative work to other disciplines.

- As described in chapter 4, there seems to be a positive relationship between the presence of assistants with a specialised task and the provision of individual patient care, cooperation with general practitioners and the recording of the care provided. We therefore recommend that pharmacies should be of sufficient size so that the use of specialised assistants is possible. Against this background, the setting up of numerous small 'dispensing posts' is not advisable.

We would also like to make a number of recommendations regarding the use of the prescription indicators that we have formulated in pharmacy databases:

- Since the pharmacist often does not know the patient's diagnosis and since opinions as to the need for this are divided, it is advisable that prescription indicators be used in addition to data on prescription volume so as to make it possible for the pharmacist to assess the quality of the prescribed pharmacotherapy<sup>78-82</sup>. When the formulated prescription indicators are used, the diagnosis is not absolutely needed. Compared to volume data, these indicators are related more directly to the specific topic of the guideline on which they are based. In many indicators, this topic either will correspond to the patient's diagnosis or to a recommended drug of choice from a pharmaceutical category.
- In view of the limited life-span of existing guidelines and hence also of the indicators derived from them, we recommend that the indicators be re-evaluated systematically, once every three years<sup>21</sup>. It would therefore be advisable to take the international developments and opinions regarding the formulation of prescription indicators into consideration<sup>83</sup>.
- During the future development and updating of the prescription indicators, it would be advisable with regard to user friendliness to strive for uniform indicator software that is compatible with the information systems in use by general practitioners and pharmacies.
- Because the prescription indicators described above were developed for use in prescription files in which the diagnosis is not indicated, it would also be advisable

to validate the described indicators further in a database derived from general practitioner information systems in which not only the pharmacotherapy given but also the diagnosis is recorded. A first step in this direction has been made in the form of a proposed project in which the Scientific Institute of Dutch Pharmacists (WINAp), the Centre for Quality of Care Research (WOK) of the University of Nijmegen and Maastricht, and the LINH (National Information Network for General Practitioner Care) will work together. The LINH is a cooperative arrangement between the National Association of General Practitioners (LHV), the Dutch College of General Practitioners (NHG), the Dutch Institute for Healthcare Research (Nivel) and the WOK and comprises a representative national network of 100 general practitioner practices. In the registration system of this network, prescriptions are recorded with a specific diagnosis code.

### **How to proceed?**

With reference to the PTAM, one could decide, in connection with the re-registration that is required every five years, to oblige general practitioners and pharmacists to participate in an accredited PTAM. This is comparable to the existing obligation to participate in accredited follow-up training <sup>13</sup>. The current views with regard to communicative self-direction would have to be taken into consideration in this regard and one would have to be careful not to introduce a rigid system of regulations <sup>84</sup>. The diagnostic assessment meeting (DTO) as recently presented is an example of a well-structured approach and may perhaps serve as a model <sup>85</sup>.

As a follow-up and for the benefit of the cooperation, pharmacists might take on the management of an electronic prescribing system. Not only guidelines but also agreements reached by the group could be included in and monitored by this system, resulting in a 'final common pathway'. Because pharmacotherapy constitutes an important part of the daily work of both a general practitioner and a pharmacist, and in view of the monitoring activity with the aid of prescription data that 60% of the pharmacists regularly to often display in the PTAM, it would be useful to investigate the extent to which the pharmacist could play a role in the future, in a well-structured PTAM and in intercollegial testing meetings of general practitioners that should be organised.

Therefore, the pharmacist could take advantage of the possibility to assess the fulfilment of agreements and the adherence to generally accepted guidelines with the aid of prescription data. It is of interest to mention, that as a follow-up to our study, a project was already started in 2005 in which the expertise and responsibilities of the pharmacist are described in more concrete terms and linked to a monitoring function. This project is being carried out in a cooperative arrangement between the Scientific Institute of Dutch Pharmacists (WINAp), the Centre for Quality of Care Research' (WOK) of the University of Nijmegen and Maastricht and 'CZ Care Insurance'.

In our study, we were unable to observe any measurable effects of the cooperation between general practitioner and pharmacist on the quality of prescribing by general practitioners in daily practice. Because there were such effects in earlier studies under controlled conditions, a possible explanation for our findings is that cooperation is only effective if there is also a clear structure for the advisory and interventional function of the pharmacist.

In view of the important role that drugs play in the treatment of patients and the significant effect that the cooperation between general practitioner and pharmacist may have herein, a clear position for the pharmacist is desirable. Further research, preferably prospective, into the optimal form of cooperation between general practitioners and pharmacists is therefore necessary. Due consideration should be given here to the recommendations made on the basis of our study regarding the cooperative structure, the care providing function of the pharmacist and the use of prescription indicators.

## References

1. Tinke JL, Griens AMGF. Data en feiten [Facts and figures]. The Hague. The Netherlands: Foundation for Pharmaceutical Statistics; 2003.
2. Watkins C, Harvey I, Carthy P, Moore L, Robinson E, Brawn R. Attitudes and behaviour of general practitioners and their prescribing costs: a national cross sectional survey. *Qual Saf Health Care* 2003;12(1):29-34.
3. Mantyselka P, Ahonen R, Kumpusalo E, Takala J Variability in prescribing for musculoskeletal pain in Finnish primary healthcare. *Pharm World Sci* 2001; 23(6):232-6.
4. Jones MI, Greenfield SM, Jowett S, Bradley CP, Seal R Proton pump inhibitors: a study of GPs' prescribing. *Fam Pract* 2001;18(3):333-8.

5. Bjerrum L, Bergman U Wide variation in the number of different drugs prescribed by general practitioners. A prescription database study. *Scand J Prim Health Care* 2000;18(2):94-8.
6. Hepler CD, Strand LM. Opportunities and responsibilities in pharmaceutical care. *Am J Hosp Pharm* 1990;47(3):533-43.
7. Lawrence M, Olesen F. Indicators of quality in healthcare. *Eur J Gen Pract* 1997; 3: 103-8.
8. Van Dijk L, Barnhoorn H, De Bakker D. Het Farmacotherapie Overleg in 1999, stand van zaken en effecten op voorschrijven [Pharmaco-therapeutic audit meeting in 1999, current situation and effects on prescribing]. Utrecht. The Netherlands. Nivel;2001.
9. Thomson O'Brien MA, Oxman AD, Davis DA, Haynes RB, Freemantle N, et al. Educational outreach visits: effects on professional practice and health care outcomes (Cochrane Review). In: *The Cochrane Library*, Issue 3, 2004.
10. Prosser H, Almond S, Walley T. Influences on GPs' decision to prescribe new drugs-the importance of who says what. *Fam Pract* 2003;20: 61-8.
11. Somerset M, Weiss M, Fahey T. Dramaturgical study of meetings between general practitioners and representatives of pharmaceutical companies; Commentary: dramaturgical model gives valuable insight. *BMJ* 2001;323:1481-4.
12. Vektis BV. Externe integratie declaratie farmaceutische hulp 1995 [External integration of declarations for pharmaceutical help]; available at <http://www.vektis.nl/index.php>. Accessed 1 February 2005.
13. Koninklijke Nederlandsche Maatschappij tot bevordering der Geneeskunst: Eisen en voorwaarden herregistratie huisartsen. [The Royal Dutch Medical Association: requirements and conditions for reregistration of general practitioners]. *Staatscourant* 2003;47:18.
14. Verheij RA, Jabaaij L, Abrahamse H, Van den Hoogen H, Braspenning J, Van Althuis T. Landelijk Informatienetwerk Huisartsenzorg. Feiten en cijfers over huisartsenzorg in Nederland. Utrecht: LINH. (<http://www.linh.nl>. Accessed 1 February 2005).
15. Facts and figures available at: [www.rivm.nl](http://www.rivm.nl). Accessed 1 February 2005.
16. Van der Heide H, Tinke JL. Facts and figures, cost development of pharmaceutical aid. The Hague, The Netherlands: Foundation for Pharmaceutical Statistics;1999 ([www.sfk.nl/english/index.html](http://www.sfk.nl/english/index.html). Accessed 1 February 2005).
17. Odubango E, Bennett K, Feely J. Influence of socioeconomic status on the quality of prescribing in the elderly - a population based study. *Br J Clin Pharmacol* 2004;58(5):496-502.
18. Van Lenthe FJ, Schrijvers CT, Droomers M, Joung IM, Louwman MJ, Mackenbach JP. Investigating explanations of socio-economic inequalities in health: the Dutch GLOBE study. *Eur J Public Health* 2004;14(1):63-70.
19. Mackenbach JP. [Socioeconomic health differences] *Ned Tijdschr Geneesk* 1994;138(25):1259-61.
20. Guidelines for ATC classification and DDD assignment. Oslo: World Health Organization. Collaborating Centre for Drug Statistics Methodology. 2004 (<http://www.whocc.no/atcddd/indexdatabase/index.php>. Accessed 1 February 2005).

21. Shekelle PG, Ortiz E, Rhodes S, Morton SC, Eccles MP, Grimshaw JM, Woolf SH: Validity of the Agency for Healthcare Research and Quality clinical practice guidelines: how quickly do guidelines become outdated? *JAMA* 2001;286(12):1461-7.
22. Muijters PEM, Knottnerus JA, Sijbrandij J, Janknegt R, Grol RPTM Changing relationships: attitudes and opinions of general practitioners and pharmacists regarding the role of the community pharmacist. *Pharm World Sci* 2003;25(5):235-241.
23. Van Mil JW, Dudok van Heel MC, Boersma M, Tromp TF Interventions and documentation for drug-related problems in Dutch community. *Pharmacies. Am J Health Syst Pharm* 2001;58(15):1428-31.
24. Beney J, Bero LA, Bond C (2001) Expanding the roles of outpatient pharmacists: effects on health services utilisation, costs, and patient outcomes (Cochrane Review). In: *The Cochrane Library* 4,. Oxford.
25. De Vries CS, Tromp TF, Blijleven W, de Jong-van den Berg LT Prescription data as a tool in pharmacotherapy audit (I). General considerations. *Pharm World Sci* 1999;21(2):80-4.
26. Streiner DL, Norman GR. *Health measurements scales, a practical guide to their development and use*. Second edition. Oxford University Press;1994.
27. Rappoport AE. A hospital patient and laboratory machine-readable identification system (MRIS) revisited. *J Med Syst* 1984;8(1-2):133-56.
28. Cockburn J, Pit S. Prescribing behaviour in clinical practice: patients' expectations and doctors' perceptions of patients' expectations--a questionnaire study. *BMJ* 1997;315: 520-3.
29. Bradley CP. Uncomfortable prescribing decisions: a critical incident study. *BMJ* 1992;304:294-6.
30. Olesen F, Vedsted P, Norskov Nielsen J. Change in ranking order of prescribing patterns by age and sex standardization of the practice population. *Scand J Prim Health Care* 1996;14(3):159-64.
31. Van Dijk L. Geneesmiddelengebruik verschilt tussen allochtonen en autochtonen. *Huisarts Wet* 2003;46(9):481.
32. Nathan A, Sutters CA. A comparison of community pharmacists' and general practitioners' opinions on rational prescribing, formularies and other prescribing related issues. *J R Soc Health* 1993;113(6):302-7.
33. Ellis BC, Dovey SM, Collins DM, Tilvard MW, Clark DW. General practitioners' views on the role of the community pharmacist. *N Z Med J* 1992;105(943):403-5.
34. Spencer JA, Edwards C. Pharmacy beyond the dispensary: general practitioners' views. *BMJ*. 1992;304(6843):1670-2.
35. Klopfer JD, Einarson TR. Acceptance of pharmacists' suggestions by prescribers: a literature review. *Hosp Pharm* 1990;25:830-2, 834-6.
36. Statistics Netherlands. Available at: <http://www.cbs.nl/en>. Accessed 1 February 2005.
37. Farris KB, Schopflocher DP. Between intention and behavior: an application of community pharmacists' assessment of pharmaceutical care. *Soc Sci Med* 1999;49(1):55-66.

38. Matheson C, Bond CM, Mollison J. Attitudinal factors associated with community pharmacists' involvement in services for drug misusers. *Addiction* 1999;94(9):1349-59.
39. Odedina FT, Hepler CD, Segal R, Miller D. The Pharmacists' Implementation of Pharmaceutical Care (PIPC) model. *Pharm Res* 1997;14(2):135-44.
40. Mason HL. Using attitudes and subjective norms to predict pharmacist counseling behaviors. *Patient Couns Health Educ* 1983;4(4):190-6.
41. Bouvy ML, Heerdink ER, Urquhart J, Grobbee DE, Hoes AW, Leufkens HG, et al. Effect of a pharmacist-led intervention on diuretic compliance in heart failure patients: a randomized controlled study. *J Card Fail* 2003;(5):404-11.
42. Weinberger M, Murray MD, Marrero DG, Brewer N, Lykens M, Harris LE, et al. Effectiveness of pharmacist care for patients with reactive airways disease: a randomized controlled trial. *JAMA* 2002;288(13):1594-602.
43. Tsuyuki RT, Johnson JA, Teo KK, Simpson SH, Ackman ML, Biggs RS, et al. A randomized trial of the effect of community pharmacist intervention on cholesterol risk management: the Study of Cardiovascular Risk Intervention by Pharmacists (SCRIP). *Arch Intern Med* 2002;162(10):1149-55.
44. Morrison A, Wertheimer AL. Evaluation of studies investigating the effectiveness of pharmacists' clinical services. *Am J Health Syst Pharm* 2001;58(7):569-77.
45. Krska J, Cromarty JA, Arris F, Jamieson D, Hansford D, Duffus PR, et al. Pharmacist-led medication review in patients over 65: a randomized, controlled trial in primary care. *Age Ageing* 2001;30(3):205-11.
46. Zermansky AG, Petty DR, Raynor DK, Freemantle N, Vail A, Lowe CJ. Randomised controlled trial of clinical medication review by a pharmacist of elderly patients receiving repeat prescriptions in general practice. *BMJ* 2001;323(7325):1340-3.
47. Bond C, Matheson C, Williams S, Williams P, Donnan P. Repeat prescribing: a role for community pharmacists in controlling and monitoring repeat prescriptions. *Br J Gen Pract* 2000;50(453):271-5.
48. Sondergaard B, Thorleifsson S, Herborg H, Frokjaer B, Hepler CD, Ersboll BK. Quality assurance of drug therapy for patients with asthma. Health economic analysis *Ugeskr Laeger* 2000;162(4):480-6.
49. Zunker RJ, Carlson DL. Economics of using pharmacists as advisers to physicians in risk-sharing contracts. *Am J Health Syst Pharm* 2000;57(8):753-5.
50. Llett KF, Johnson S, Greenhill G, Mullen L, Brockis J, Golledge CL, Reid DB. Modification of general practitioner prescribing of antibiotics by use of a therapeutics adviser (academic detailer). *Br J Clin Pharmacol* 2000;49(2):168-73.
51. Dowell J, Cruikshand J, Staines H. Repeat dispensing by community pharmacists: advantages for patients and practitioners. *Br J Gen Pract* 1998;48(437):1858-9.
52. Dijkers, FWD. Repeat prescriptions. A study in general practice in the Netherlands. Dissertation. Erasmus University of Rotterdam. The Netherlands;1997.
53. De Gier JJ. The Electronic Pharmaceutical Dossier: an effective aid to documenting pharmaceutical care data. *Pharm World Sci* 1996;18(6):241-3.
54. Kirking DM, Thomas JW, Ascione FJ, Boyd EL. Detecting and preventing adverse drug interactions: the potential contribution of computers in pharmacies. *Soc Sci Med* 1986;22(1):1-8.

55. Bjorner T, Laerum E. Factors associated with high prescribing of benzodiazepines and minor opiates. A survey among general practitioners in Norway. *Scand J Prim Health Care* 2003;21(2):115-20.
56. Steffensen FH, Sorensen HT, Olesen F. Diffusion of new drugs in Danish general practice. *Fam Pract* 1999;16(4):407-13.
57. Wilson RP, Hatcher J, Barton S, Walley T. The association of some practice characteristics with antibiotic prescribing. *Pharmacoepidemiol Drug Saf* 1999;8(1):15-21.
58. Wilson RP, Hatcher J, Barton S, Walley T. The influence of practice characteristics on the prescribing of benzodiazepines and appetite suppressant drugs. *Pharmacoepidemiol Drug Saf* 1998;7(4):243-51.
59. Stewart RE, Vroegop S, Kamps GB, van der Werf GT, Meyboom-de Jong B. Factors influencing adherence to guidelines in general practice. *Int J Technol Assess Health Care* 2003;19(3):546-54.
60. Sturgess IK, McElnay JC, Hughes CM, Crealey G. Community pharmacy based provision of pharmaceutical care to older patients. *Pharm World Sci* 2003;(5):218-26.
61. Thomson O'Brien MA, Oxman AD, Davis DA, Haynes RB, Freemantle N, et al. Educational outreach visits: effects on professional practice and health care outcomes (Cochrane Review). In: *The Cochrane Library*, Issue 3, 2004.
62. Hughes CM, McCann S. Perceived interprofessional barriers between community pharmacists and general practitioners: a qualitative assessment. *Br J Gen Pract* 2003;53(493):600-6.
63. Watkins C, Moore L, Harvey I, Carthy P, Robinson E, Brawn R. Characteristics of general practitioners who frequently see drug industry representatives: national cross sectional study. *BMJ* 2003;326:1178-9.
64. Howard M, Trim K, Woodward C, Dolovich L, Sellors C, Kaczorowski J, Sellors J. Collaboration between community pharmacists and family physicians: lessons learned from the Seniors Medication Assessment Research Trial. *J Am Pharm Assoc (Wash DC)* 2003;43(5):566-72.
65. Edmunds J, Calnan MW. The reprofessionalisation of community pharmacy? An exploration of attitudes to extended roles for community pharmacists amongst pharmacists and General Practitioners in the United Kingdom. *Soc Sci Med* 2001;53(7):943-55.
66. Wazana A. Physicians and the pharmaceutical industry: is a gift ever just a gift? *JAMA* 2000;283(3):373-80.
67. Beijer HJ, de Blaey CJ. Hospitalisations caused by adverse drug reactions (ADR): a meta-analysis of observational studies. *Pharm World Sci* 2002;24(2):46-54.
68. Van Mil JWF, Tromp TFJ. Apotheek ageert bij een op de tien recepten. *Pharm Weekbl* 2001;136(28):1018-22).
69. Sbarbaro JA. Can we influence prescribing patterns? *Clin Infect Dis* 2001;33 Suppl 3:S240-4.
70. Van Eijk MEC. Effects of outreach strategies on quality of pharmacotherapy. Dissertation. University of Utrecht. The Netherlands;2001. ISBN 90 5054 155 0.
71. Veninga CCM. Improving prescribing in general practice. Dissertation. University of Groningen. The Netherlands;2000.

72. De Vries CS. Collaboration in healthcare. The tango to drug safety. Dissertation. University of Groningen. The Netherlands;1998.
73. Peterson GM, Stanton LA, Bergin JK, Chapman GA. Improving the prescribing of antibiotics for urinary tract infection. *J Clin Pharm Ther* 1997;22(2):147-53.
74. Ferguson RI, Salmond CE, Maling TJ. The Nelson Prescribing Project. A programmed intervention in general practice in New Zealand. *Pharmacoeconomics* 1995;(6):555-61.
75. Strikwerda P, Bootsma-de Langen AM, Berghuis F, Meyboom-de Jong B. [Drug therapy in a nursing home; favorable effect of feedback by the pharmacist on family physician's prescribing behavior] *Ned Tijdschr Geneesk* 1994;138(35):1770-4.
76. Hoopen ten MM. Zorg op recept. De relatie apotheker- geneesmiddelengebruiker in veranderend maatschappelijk en juridisch perspectief [The relationship between the pharmacist and the patiënt in a changing social and legal perspective]. Dissertation. University of Maastricht. The Netherlands;2001. ISBN 90 5454 120 2.
77. De Nederlandse Apotheeknorm (NAN) [The Dutch Pharmacy Standard]. The Hague. The Netherlands: Royal Dutch Association for the Advancement of Pharmacy (KNMP);1996.
78. Muijers PEM. De arts en de indicatie op recept. Praten met elkaar niet over elkaar. *Pharm Weekbl* 2002;137:419.
79. De Smet PAGM, de Blaey CJ. Moet de indicatie nu wel of niet op het recept? *Pharm Weekbl* 2000;135(1):2-3.
80. De Blaey CJ. Indicatie hoort niet op recept. *Medisch Contact* 1999;54:871.
81. Gebhardt DOE. Indicatie op recept is in belang van de patient. *Pharm Weekbl* 1999;133(27):918.
82. KNMG. "Geen indicatie op recept" of "de indicatie hoort niet op het recept". *Medisch Contact* 1999;54:630.
83. Haaijer-Ruskamp FM, Hoven JL, Mol PG (2004). A conceptual framework for constructing prescribing quality indicators: a proposal. WHO Regional Office for Europe, Copenhagen.
84. Cornelis A., Logica van het gevoel. Filosofie van de stabiliteitslagen in de cultuur als nesteling der emoties. Amsterdam: Stichting Essence. 1995.
85. Verstappen WHJM. Towards optimal test ordering in primary care. Dissertation. University of Maastricht. The Netherlands ;2004.

## Chapter 9 Summary

The subject of this dissertation is the quality of the pharmacotherapy prescribed by general practitioners and the role of pharmacists therein. The quality of pharmacotherapy is related to the adherence to generally accepted guidelines issued by the Dutch College of General Practitioners (NHG) and the Commission Pharmaceutical Help of the Health Care Insurance Board. The study was carried out against the background of the increased attention from pharmacists for patient care and the cooperation between general practitioners and pharmacists that has begun to develop as a result.

**Chapter 1** contains a brief introduction and describes the purpose and relevance of the study. The structure of the dissertation is also discussed in this chapter. An important starting point is the fact that general practitioners frequently prescribe drugs and that there are significant differences between general practitioners, despite the existing guidelines, partly due to differences in the quality of prescribing. These differences are visible in the pharmacy. During the last two decades, the attention of pharmacists has clearly shifted from drug-oriented to patient-oriented work, such that their tasks are currently characterised more by giving advice to patients and providing information to doctors than by the preparation of drugs. In many places, there is currently cooperation between general practitioners and pharmacists in the form of a regularly scheduled pharmacotherapy audit meeting.

In view of the background described above, there is a need for more insight into the factors with which the differences in quality of prescribing are related and especially into the influence of the pharmacist on them. Gaining more insight is relevant for both the quality and the costs of pharmacotherapeutic care. If the exercise of a care providing function by the pharmacist fulfils a need perceived by the general practitioner and is associated with a prescribing behaviour characterised by better adherence to generally accepted guidelines, then it would be advisable to intensify the process of creating a care providing function for the pharmacist in primary care. Should this not be the case, then one might ask what the consequences are for the costs incurred for

pharmaceutical care, and particularly the costs incurred for compensating the pharmacy.

**Chapter 2** provides an overview of the background of the study on the basis of the state of knowledge as reported in the literature. In addition, the chapter defines the questions to be answered by the study and describes the measuring instruments used.

There have been found to be significant differences between general practitioners in the prescribing of drugs. The general characteristics of the individual doctor and the practice, pharmaceutical aspects, the effect of guidelines, the effect of information (postgraduate training, the pharmacist, the pharmaceutical industry) and the influence of the patient all play a role in this. In connection with our study, we have directed our attention especially at the effect of pharmacotherapeutic guidelines and the effect of the advisory and informative role that pharmacists have begun to play by offering the patient pharmaceutical patient care. These two effects have a relatively short history, since the 1990s.

An outline is given of the development of guidelines by the Health Care Insurance Board (Ziekenfondsraad) and the Dutch College of General Practitioners as it has taken place in the Netherlands. This development indicates that the effect of guidelines is increased by embedding them in existing structures. As is made clear by the literature, there is little point in merely distributing prescription guidelines.

This chapter also describes the changed role of the pharmacist. It is concluded that the concept of 'pharmaceutical care' is widely accepted and disseminated in the world of pharmacy, but that its implementation in health care is proceeding slowly in most countries and that the form it will ultimately take is not yet fixed.

The effects of the exercise of a care providing function by the pharmacist as this was investigated in various studies became manifest under the controlled conditions of a prospective comparative study design. In daily practice, however, these controlled conditions are absent. General practitioners and pharmacists differ in the degree to which they are willing to cooperate, and there are differences among pharmacists regarding the way in which they wish to exercise a care providing function. Furthermore, the cooperation is in principle free of obligations. It is unclear what consequences this

may have for the effective exercise of a care providing function by the pharmacist in daily practice, one of the goals of which is an optimal pharmacotherapy for the patient.

On the basis of the background described above, the following research questions are formulated in this chapter:

1. What is the opinion of general practitioners concerning the expertise, task, responsibility and role of the pharmacist in pharmacotherapy; on what extent do their views differ from those of pharmacists? (chapter 3).
2. Which factors are associated with the attitude of general practitioners towards the pharmacist's role? (chapter 3).
3. What effect do pharmacy-specific and person-specific factors have on the care-providing processes in the pharmacy (i.e. on individual patient care, the cooperation with prescribers and the registration of the care provided)? (chapter 4).
4. Can prescribing indicators be formulated on the basis of existing general practice guidelines, which are suitable for describing the prescribing behaviour of general practitioners and the variation that exists in this behaviour? (chapter 5).
5. Is the quality of prescribing drugs by general practitioners related to their attitude towards the pharmacist's role and how they cooperate with the pharmacist on a day-to-day basis and in the PTAM? (chapter 6).
6. Is the quality of prescribing drugs by general practitioners related to the care-providing function practised by the pharmacist with whom they cooperate in day to day practice? (chapter 7).

**Chapter 3** deals with the attitude and opinions of general practitioners and pharmacists regarding the role of the public pharmacist. Whether the opinions of general practitioners regarding the expertise, tasks, responsibility and role of the pharmacist differ from those of pharmacists is investigated. The factors related to the attitude of general practitioners with regard to the care providing function of the pharmacist are also investigated. For this purpose, a cross-sectional study was carried out by means of a written questionnaire distributed to 1434 general practitioners and 379 pharmacists. The response rate was 71% in both groups. A study of 15% of the non-respondents revealed no significant differences between respondents and non-respondents

questioned by telephone. With the aid of separate questionnaires for general practitioners and pharmacists, data were collected on age, gender, practical experience, trainership, type and size of practice, electronic prescription processing, degree of urbanisation, part-time work, workload, postgraduate training, the pharmacotherapy audit meeting, and the mutual relationship with and role desired for the pharmacist. Both questionnaires also included 17 statements regarding the role of the pharmacist in primary care. The general construct "attitude regarding the care providing function of the pharmacist" was created by summing the scores on the 17 statements. Analysis of the collected data indicated that there is a high level of agreement between general practitioners and pharmacists regarding the role of pharmacists in alerting general practitioners. Bringing prescribing patterns noted in the pharmacy up for discussion as part of the pharmacotherapy audit meeting, as well as the provision of prescription feedback, were considered to be a task of the pharmacist by more than 80% of the general practitioners and pharmacists. An advisory role for the pharmacist is desired by the majority of the general practitioners, but only a minority of the general practitioners are willing to give the pharmacist a contributory role.

There are only a few differences of opinion between general practitioners and pharmacists with regard to generic substitution. On the contrary the extreme differences of opinion with regard to therapeutic substitution and the right of the pharmacist to issue repeat prescriptions are striking. More than two-thirds of the general practitioners feel that the pharmacist should not have a role in this, in contrast to almost two-thirds of the pharmacists, who would like to do just that.

The attitude of general practitioners with regard to the care providing function of the pharmacist depends primarily on how the general practitioner experiences the relationship and whether or not he is a dispensing general practitioner. Dispensing general practitioners give the pharmacist a less important role than their non-dispensing colleagues and also achieve a lower score on the attitude scale. They consider the pharmacist's expertise to be important in the PTAM and when he gives advice in more complex cases. Finally, this cross sectional study revealed that the responsibility of the pharmacist for providing pharmacotherapeutic care to the patient is described with insufficient clarity.

**Chapter 4** deals with the determinants of the pharmacist's care providing function. With the aid of questionnaires, data were collected on the care that is given in the pharmacy. Three partial constructs: 'individual patient care', 'registration of the care', and 'cooperation with general practitioners', and one overall construct: 'the care providing function' were created. These constructs served as dependent variables. The independent variables included: gender, work experience, attitude with respect to the care providing function, conditions of employment, relationship with general practitioners, a position as trainer of pharmacists, the frequency of postgraduate training, workload, part-time work, the frequency of contact with pharmaceutical industry representatives, the presence of specialised assistants, size of the pharmacy, degree of urbanisation, competition, formula pharmacy and the presence of sufficient personnel. To investigate which factors were related to the pharmacist's care-providing function, a multiple linear regression analysis was performed for each construct.

There is a significant positive relation between a number of variables and the exercise of a care providing function: the attitude of the pharmacist, his relationship with the general practitioner, the presence of specialised assistants, the frequency of postgraduate training and the conditions of employment (second pharmacists turned out to be more interested in patient care than managing pharmacists). Three variables were found to depend on one of the partial constructs: there is a significant positive relation between being a trainer of pharmacists and 'individual patient care' and between the frequency of postgraduate training and 'registration of the care', while there is a significant negative relation between the number of years of professional experience and 'cooperation with general practitioners'. The remaining variables listed above did not seem to have any effect in any of the four analyses.

It is also striking that 29% of the respondents never enquire as to the experiences of the patient when supplying a drug for the second time and that the participation in a PTAM is high: 90% of the pharmacists participate over 4 times a year.

It is concluded that the degree to which a pharmacist exercises a care providing function is positively related to his attitude, his relationship with general practitioners, the frequency of postgraduate training, whether or not he trains pharmacists, employment

as a second pharmacist and the presence of specialised assistants in the pharmacy. There is a negative relationship between cooperation with general practitioners and the number of years of professional experience of the pharmacist.

**Chapter 5** reports on the creation of 20 prescription indicators. On the basis of the pharmaceutical recommendations in the evidence-based guidelines of the Dutch College of General Practitioners (NHG) and the similar recommendations from the Commission Pharmaceutical Help (Dutch acronym: CFH) of the Health Care Insurance Board, 51 draft indicators were formulated and submitted to a panel of experts for an assessment of the validity of their content. The assessment of the panel was analysed with the aid of the RAND-UCLA Appropriateness Method.

The remaining indicators were used to determine whether a picture of the prescribing behaviour of general practitioners and the variation therein could be obtained with their help. For this purpose, a PACT (Prescribing analyses and cost) file was used that had been compiled from the prescription files of 379 pharmacies, containing the prescriptions issued by 1434 general practitioners in the course of one whole year to three million patients.

Of the 51 draft indicators, 34 were felt by the panel to be valid in that they not only provided an adequate reflection of the central recommendations in the guideline but were also relevant with respect to health improvement and/or efficiency. Of these 34 indicators, 20 revealed significant differences in the prescribing behaviour of general practitioners.

On the basis of existing general practice guidelines, it was thus possible to formulate 20 prescription indicators that were assessed by a panel of experts to have sufficient validity and by means of which it was possible to distinguish the prescribing behaviour of general practitioners from one another in the prescription files of pharmacies.

**Chapter 6** describes the differences in prescribing among general practitioners and the role herein of the cooperation with the pharmacist. The quality of prescribing was related to the prescription indicators described in chapter 5. On the basis of questions from the questionnaire described above, three constructs were formulated as possible

determinants of the quality of prescribing: the cooperation with the pharmacist in daily practice, the quality of the PTAM and the attitude of the general practitioner with regard to the role of the pharmacist. In addition to the characteristics of the pharmacy and of the individual pharmacist, data were also collected on the frequency of visits from pharmaceutical industry representatives, the frequency of postgraduate training, the use of an electronic formulary and the perceived workload. A multiple linear regression analysis was then carried out for the 324 solo general practitioners that responded.

The attitude of general practitioners with regard to the role of the pharmacist, the way in which they cooperate with pharmacists and the quality of the pharmacotherapy audit meeting were found to be unrelated to the quality of prescribing. There was a negative relationship between the quality of prescribing and the frequency of visits from pharmaceutical industry representatives, i.e. more visits from pharmaceutical industry representatives was associated with a lower quality of prescribing. A possible explanation for this is an effective marketing strategy on the part of the pharmaceutical industry. Under the normal conditions of daily practice, the cooperation between general practitioner and pharmacist had no measurable effect on the quality of prescribing by solo general practitioners. A possible explanation for this is that cooperation is only effective if it embodies a clear structure for the advisory and interventional function of the pharmacist. Because positive effects of the cooperation between general practitioners and pharmacists have been seen previously, under controlled conditions, it would be advisable to look for a cooperative structure in which the advisory and interventional function of the pharmacist can play its deserved role.

**Chapter 7** deals with the differences in prescribing among general practitioners and studies the relationship with pharmaceutical patient care from the pharmacist with whom they have the most contact in their daily practice. The quality of prescribing was again related to the prescription indicators described in chapter 5. On the basis of questions from the questionnaire described above, four constructs were formulated as possible determinants of the quality of prescribing: the construct *attitude* of the pharmacist with regard to the care providing function and three partial constructs derived from the care providing function of the pharmacist: the *care of the individual patient*, the *cooperation*

*with general practitioners and the registration of the care provided.* The differences among general practitioners with regard to the quality of prescribing, which are related to the adherence to guidelines, were found to be independent of the exercise of a care providing function by the pharmacist with whom they have the most contact in their daily practice. A possible explanation is again that cooperation is only effective if it embodies a clear structure for the advisory and interventional function of the pharmacist. Because previous research under controlled conditions has demonstrated effects from the exercise of a care providing function, this study again confirms the advisability of bringing more structure into the cooperation between general practitioners and pharmacists in daily practice.

**Chapter 8** presents the most important results of the study. Attention is given to a number of methodological aspects of the study, including both the strong points and the limitations of the study and a number of practical aspects. This chapter also compares the results of this study with the results of similar studies. Finally, recommendations are made concerning the practical application of the results and for future research.

We found that the pharmacist's feedback function fulfils a need felt by general practitioners and that there is a broad basis of support for this function among pharmacists. We also observed a broad basis of support for the cooperation between general practitioners and pharmacists as can take place in the pharmacotherapy audit meeting. Moreover, a number of prospective comparative studies under controlled conditions have demonstrated a favourable effect from a feedback function from the pharmacist in the direction of the general practitioner. It would therefore seem promising and useful to embed the pharmacist's feedback function in a structure for the cooperation with general practitioners that would be less permissive than the present system.

Our study revealed no measurable effects in daily practice of the cooperation between general practitioners and pharmacists on the quality of prescribing by general practitioners. Because such effects were present in previous research under controlled conditions, a possible explanation for our findings is that cooperation is only effective if it embodies a clear structure for the advisory and interventional function of the

pharmacist. In view of the important role of drugs in the treatment of patients and the important role that cooperation between the general practitioner and the pharmacist can play here, a clear role for the pharmacist is desirable. Further research into the optimisation of the cooperation between general practitioners and pharmacists is necessary. The recommendations made on the basis of our study with regard to the cooperative structure, the care providing function of the pharmacist and the use of prescription indicators should be taken into consideration.

Finally, the **appendices** contain an overview of the questionnaires sent out and a reference to the prescription indicators.



## Hoofdstuk 10 Samenvatting

Dit proefschrift gaat over de kwaliteit van farmacotherapie door huisartsen en over de rol die apothekers daarbij hebben. De kwaliteit van farmacotherapie is gerelateerd aan het opvolgen van algemeen aanvaarde richtlijnen die worden uitgegeven door het Nederlands Huisartsengenootschap en door de Commissie Farmaceutische Hulp van het College Voor Zorgverzekeringen. Het onderzoek heeft plaatsgevonden tegen de achtergrond van de toegenomen aandacht van apothekers voor de zorg voor de patiënt en de als gevolg daarvan op gang gekomen samenwerking tussen huisartsen en apothekers.

**Hoofdstuk 1** bevat een korte inleiding en behandelt het doel en de relevantie van het onderzoek. Tevens wordt in dit hoofdstuk de structuur van het proefschrift besproken. Een belangrijk uitgangspunt is het gegeven dat huisartsen vaak geneesmiddelen voorschrijven en dat er ondanks bestaande richtlijnen aanzienlijke verschillen tussen huisartsen blijken te bestaan die mede veroorzaakt worden door verschillen in de kwaliteit van het voorschrijven. Deze verschillen zijn zichtbaar in de apotheek. De laatste twee decennia is de aandacht van apothekers duidelijk verschoven van geneesmiddelgericht werken naar patiëntgericht werken en hun taak wordt daardoor tegenwoordig meer gekenmerkt door het adviseren van patiënten en het voorlichten van artsen dan door het bereiden van geneesmiddelen. Inmiddels vindt er ook op veel plaatsen samenwerking tussen huisartsen en apothekers plaats in de vorm van een regelmatig terugkerend Farmacotherapieoverleg.

Gezien tegen de hierboven geschetste achtergrond, bestaat er behoefte aan meer inzicht in factoren waarmee de verschillen in kwaliteit van voorschrijven samenhangen en in het bijzonder naar de invloed van de apotheker daarop. Het vergroten van dit inzicht is zowel voor de kwaliteit als voor de kosten van de farmacotherapeutische zorg relevant omdat als het uitoefenen van een zorgfunctie door de apotheker bij huisartsen in een behoefte voorziet en samenhangt met een voorschrijfgedrag dat gekenmerkt wordt door het beter opvolgen van algemeen aanvaarde richtlijnen, het is aan te bevelen om het vormgeven van de zorgfunctie van de apotheker in de eerstelijns

gezondheidszorg te intensiveren. Indien dat niet het geval is kan men zich afvragen welke consequenties dit heeft voor de kosten die worden gemaakt voor farmaceutische hulp en met name de kosten die worden gemaakt voor de apotheekvergoeding.

**Hoofdstuk 2** geeft een overzicht van de achtergronden van het onderzoek op grond van de stand van kennis zoals gerapporteerd in de literatuur. In dit hoofdstuk worden ook de onderzoeksvragen gedefinieerd en de meetinstrumenten beschreven.

Bij het voorschrijven van geneesmiddelen blijken tussen huisartsen grote verschillen te bestaan. Algemene persoons- en praktijkenmerken, farmaceutische aspecten, de invloed van richtlijnen, de invloed van informatie (nascholing, apotheker, farmaceutische industrie) en de invloed van de patiënt spelen daarbij een rol. In het kader van ons onderzoek hebben wij ons vooral gericht op de invloed van farmacotherapeutische richtlijnen en op de invloed van de adviserende en informerende rol die apothekers zijn gaan uitoefenen door farmaceutische patiëntenzorg aan te bieden. Deze invloeden bestaan relatief kort, sinds de jaren negentig van de vorige eeuw.

De ontwikkeling van richtlijnen door de Ziekenfondsraad en het Nederlands Huisartsen Genootschap zoals die zich in Nederland heeft voorgedaan, is geschetst. Deze ontwikkeling duidt erop dat de invloed van richtlijnen toeneemt als deze in bestaande structuren worden ingebed. Het uitsluitend verspreiden van prescriptierichtlijnen heeft zoals uit de literatuur blijkt weinig zin.

In dit hoofdstuk wordt ook de veranderde rol van de apotheker geschetst. Geconcludeerd wordt dat in de wereld van de farmacie het 'pharmaceutical care' concept breed geaccepteerd en wijd verspreid is, maar dat de implementatie ervan in de gezondheidszorg in de meeste landen langzaam verloopt en de uiteindelijke vorm ervan nog niet vast staat. De effecten van het uitoefenen van een zorgfunctie door de apotheker zoals die onderzocht zijn in de verschillende studies werden zichtbaar onder de gecontroleerde omstandigheden van een prospectief-vergelijkende studieopzet. In de praktijk van alledag ontbreken deze gecontroleerde omstandigheden echter. Huisartsen en apothekers verschillen in de mate waarin zij met elkaar willen samenwerken en bij apothekers bestaan verschillen in de wijze waarin zij een zorgfunctie willen uitoefenen. Bovendien is de samenwerking in principe vrijblijvend van

aard. Het is onduidelijk welke consequenties dit heeft voor het in de dagelijkse praktijk effectief uitoefenen van een zorgfunctie door de apotheker die mede gericht is op optimale farmacotherapie voor de patiënt.

Voortvloeiend uit de geschetste achtergronden zijn in dit hoofdstuk de volgende onderzoeksvragen geformuleerd:

1. Hoe denkt de huisarts over de deskundigheid, de taak, de verantwoordelijkheid en de rol van de apotheker in de farmacotherapie en in hoeverre verschillen zijn opvattingen van die van de apotheker? (hoofdstuk 3).
2. Met welke factoren hangt de attitude van huisartsen ten aanzien van de rol van de apotheker samen? (hoofdstuk 3).
3. Welke invloed hebben apotheek- en persoonsgebonden factoren op het zorgverleningproces in de apotheek? (hoofdstuk 4).
4. Kunnen op basis van bestaande huisartsgeneeskundige richtlijnen prescriptie-indicatoren worden geformuleerd die geschikt zijn om bij huisartsen het prescriptiegedrag in beeld te brengen? (hoofdstuk 5).
5. Hangt de kwaliteit van voorschrijven van geneesmiddelen door huisartsen samen met de wijze waarop zij in de dagelijkse praktijk en in het Farmacotherapieoverleg (FTO) samenwerken met apothekers? (hoofdstuk 6).
6. Hangt de kwaliteit van voorschrijven van geneesmiddelen door huisartsen samen met het uitoefenen van een zorgfunctie door de apotheker met wie zij samenwerken? (hoofdstuk 7).

**Hoofdstuk 3** behandelt de attitude en de opinie van huisartsen en apothekers met betrekking tot de rol van de apotheker in de eerste lijn . Onderzocht wordt of opvattingen van huisartsen verschillen van die van apothekers over deskundigheid, taak, verantwoordelijkheden en rol van de apotheker. Ook wordt onderzocht waarmee de attitude van huisartsen ten aanzien van de zorgfunctie van de apotheker samenhangt. Hiervoor is een cross-sectioneel onderzoek verricht met een schriftelijke enquête onder 1434 huisartsen en 379 apothekers in Zuid-Nederland. De respons bij beide beroepsgroepen was 71%. Het onderzoek onder vijftien procent van de non-respondenten toonde geen significante verschillen tussen respondenten en

getelefoneerde non-respondenten. Met behulp van aparte vragenlijsten voor huisarts en apotheker zijn data verzameld over leeftijd, geslacht, praktijkervaring, opleiderschap, praktijkvorm, praktijkgrootte, elektronisch receptenverkeer, urbanisatiegraad, deeltijdwerk, werkdruk, nascholing, Farmacotherapieoverleg, onderlinge relatie en gewenste rol van de apotheker. In beide vragenlijsten waren onder andere 17 stellingen opgenomen over de positionering van de apotheker in de eerste lijn. Door sommering van de scores op de 17 stellingen werd het algemene construct 'attitude ten aanzien van de zorgfunctie van de apotheker' gevormd. Na analyse van de verzamelde gegevens bleek dat huisartsen en apothekers het in hoge mate met elkaar eens zijn over de signalerende taak van apothekers naar huisartsen. Het in de structuur van het Farmacotherapieoverleg ter discussie stellen van in de apotheek opgemerkte prescriptiepatronen en het geven van prescriptiefeedback wordt door meer dan tachtig procent van de huisartsen en de apothekers als taak voor de apotheker gezien. Een adviserende rol van de apotheker wordt door het merendeel van de huisartsen gewenst, slechts een minderheid van de huisartsen wil de apotheker een medebepalende rol geven.

Verschillen in opvattingen tussen huisartsen en apothekers over generieke substitutie zijn slechts in geringe mate aanwezig. Opvallend zijn echter de zeer grote verschillen in opvattingen over therapeutische substitutie en de mogelijkheid tot het verstrekken van herhaalreceptuur door de apotheker. Meer dan tweederde van de huisartsen ziet hierin geen rol voor de apotheker weggelegd, dit in tegenstelling tot bijna tweederde van de apothekers die dat juist wel zou willen.

De attitude van huisartsen ten aanzien van de zorgfunctie van de apotheker hangt vooral samen met de ervaren relatie en met het al of niet-apotheekhoudend zijn. Apotheekhoudende huisartsen kennen de apotheker een minder zware rol toe dan hun niet-apotheekhoudende collega's en zij scoren lager op de attitudeschaal. De deskundigheid van de apotheker achten zij van belang in het Farmacotherapieoverleg en bij het geven van advies in meer complexe gevallen. Tenslotte komt in deze cross-sectionele studie naar voren dat de verantwoordelijkheid van de apotheker voor de farmacotherapeutische zorg voor de patiënt onvoldoende helder is omschreven.

**Hoofdstuk 4** gaat over determinanten van de zorgfunctie van de apotheker. Met behulp van vragenlijsten zijn gegevens verzameld over de zorg zoals die in de apotheek wordt gegeven. Er werden drie deelconstructen: 'individuele patiëntenzorg', 'registratie van de zorg' en 'samenwerking met huisartsen', en één totaalconstruct: 'zorgfunctie' gevormd. Deze constructen dienden als afhankelijke variabelen. Onafhankelijke variabelen waren: geslacht, werkervaring, attitude met betrekking tot de zorgfunctie, dienstverband, relatie met huisartsen, functie als apothekeropleider, frequentie van nascholing, werkdruk, parttime werken, frequentie van contact met artsenbezoekers, aanwezigheid van gespecialiseerde assistentes, apotheekgrootte, urbanisatiegraad, concurrentie, formule apotheek en aanwezigheid van voldoende personeel. Vervolgens is een multipole lineaire regressieanalyse uitgevoerd.

Een aantal variabelen hangt significant positief samen met het uitoefenen van een zorgfunctie: attitude van de apotheker, relatie met de huisarts, aanwezigheid van gespecialiseerde assistentes, frequentie van nascholing en het soort dienstverband, waarbij tweede apothekers meer op zorg gericht blijken te zijn dan beherend apothekers. Drie variabelen blijken samen te hangen met een van de deelconstructen: apothekeropleider zijn hangt significant positief samen met 'individuele patiëntenzorg', de frequentie van nascholing hangt significant positief samen met 'registratie van de zorg' en het aantal jaren werkervaring hangt significant negatief samen met 'samenwerking met huisartsen'. De overige genoemde variabelen bleken in geen van de vier analyses van invloed. Opvallend is verder dat 29% van de respondenten nooit naar de ervaring van de patiënt vraagt bij de tweede uitgifte van een geneesmiddel en dat deelname aan het Farmacotherapieoverleg hoog is: 90% van de apothekers neemt vaker dan 4 keer per jaar deel.

Geconcludeerd wordt dat de mate waarin een zorgfunctie door de apotheker wordt uitgeoefend positief samenhangt met zijn attitude, zijn relatie met huisartsen, de frequentie van nascholing, het apothekeropleider zijn, het dienstverband als tweede apotheker en het aanwezig zijn van gespecialiseerde assistentes in de apotheek. Er bestaat een negatief verband tussen de samenwerking met huisartsen en het aantal jaren werkervaring van de apotheker.

**Hoofdstuk 5** rapporteert over het tot stand komen van een 20-tal prescriptie-indicatoren. Op basis van medicamenteuze adviezen in de ‘evidence-based’ richtlijnen van het Nederlands Huisartsen Genootschap en de hiermee overeenkomende adviezen van de Commissie Farmaceutische Hulp van het College Voor Zorgverzekeringen werden 51 conceptindicatoren geformuleerd, die ter beoordeling van de inhoudsvaliditeit werden voorgelegd aan een expertpanel.

Met behulp van de RAND-UCLA Appropriateness Method werd de panelbeoordeling geanalyseerd.

Vervolgens is voor de overgebleven indicatoren nagegaan of hiermee het prescriptiegedrag van huisartsen en de variatie die daarin bestaat in beeld gebracht kan worden. Hiervoor is een bestand gebruikt dat was samengesteld uit prescriptiebestanden van 379 apotheken, met voorschriften van 1434 huisartsen over een heel jaar aan drie miljoen patiënten.

Van de 51 conceptindicatoren werden er 34 door het panel valide geacht zowel met betrekking tot het geven van een adequate afspiegeling van de centrale aanbevelingen in de richtlijn als met betrekking tot de relevantie ten aanzien van gezondheidswinst en/of doelmatigheid. Van deze 34 indicatoren lieten er 20 aanzienlijke verschillen zien in het voorschrijfgedrag van huisartsen.

Op basis van bestaande huisartsgeneeskundige richtlijnen bleek het mogelijk om 20 prescriptie-indicatoren te formuleren die door een deskundigenpanel als voldoende valide beoordeeld werden en die tevens in staat zijn om voorschrijfgedrag van huisartsen van elkaar te onderscheiden in prescriptiebestanden van apotheken.

**Hoofdstuk 6** beschrijft verschillen in voorschrijven tussen huisartsen en de rol van de samenwerking met de apotheker. De kwaliteit van voorschrijven is gerelateerd aan de in hoofdstuk 5 beschreven prescriptie-indicatoren. Als mogelijke determinanten van de kwaliteit van voorschrijven zijn op basis van vragen uit de eerder beschreven enquête drie constructen gevormd: de samenwerking met de apotheker in de dagelijkse praktijk, de kwaliteit van Farmacotherapieoverleg en de attitude van de huisarts ten aanzien van de rol van de apotheker. Tevens werden naast persoons- en praktijkkenmerken data verzameld over de frequentie van het ontvangen van artsenbezoekers, de frequentie

van nascholing, het gebruik van een elektronisch formulier en de ervaren werkdruk. Vervolgens is een multiple lineaire regressieanalyse uitgevoerd bij de responderende 324 solohuisartsen.

De attitude van huisartsen ten aanzien van de rol van de apotheker, de wijze waarop zij samenwerken met apothekers en de kwaliteit van het Farmacotherapieoverleg blijken niet samen te hangen met de kwaliteit van het voorschrijven. Er blijkt een negatieve correlatie te bestaan tussen de kwaliteit van voorschrijven en de frequentie van het ontvangen van artsenbezoekers. Meer bezoek van artsenbezoekers blijkt samen te gaan met een lagere kwaliteit van voorschrijven. Een mogelijke verklaring hiervoor is een effectieve marketingstrategie van de farmaceutische industrie. Onder normale omstandigheden van de dagelijkse praktijk werden geen meetbare effecten van de samenwerking tussen huisarts en apotheker op de kwaliteit van het voorschrijven door solohuisartsen waargenomen. Een mogelijke verklaring is dat samenwerking alleen effectief is indien daarbinnen de advies- en interventiefunctie van de apotheker duidelijk is gestructureerd. Omdat eerder, onder gecontroleerde omstandigheden, positieve effecten zijn gezien van de samenwerking tussen huisartsen en apothekers is het aan te bevelen om naar een samenwerkingstructuur te zoeken waarin de advies- en interventiefunctie van de apotheker tot zijn recht komt.

**Hoofdstuk 7** gaat ook over verschillen in voorschrijven tussen huisartsen en bestudeert de relatie met farmaceutische patiëntenzorg door de apotheker met wie zij in de dagelijkse praktijk het meest te maken hebben. De kwaliteit van voorschrijven is ook hier gerelateerd aan de in hoofdstuk 5 beschreven prescriptie-indicatoren. Als mogelijke determinanten van de kwaliteit van voorschrijven werden op basis van vragen uit de eerder beschreven enquête vier constructen gevormd: het construct *attitude* van de apotheker ten aanzien van de zorgfunctie en drie van de zorgfunctie van de apotheker afgeleide deelconstructen: de *zorg voor de individuele patiënt*, de *samenwerking met huisartsen* en de *registratie van de verleende zorg*. Verschillen tussen huisartsen met betrekking tot de kwaliteit van voorschrijven, gerelateerd aan het opvolgen van richtlijnen, blijken niet samen te hangen met het uitoefenen van een zorgfunctie door de apotheker met wie zij in de dagelijkse praktijk het meest te maken hebben. Een

mogelijke verklaring is ook hier dat samenwerking alleen effectief is indien daarbinnen de advies- en interventiefunctie van de apotheker duidelijk is gestructureerd. Omdat in eerder onderzoek onder gecontroleerde omstandigheden wel effecten van het uitoefenen van een zorgfunctie aanwezig bleken is het op grond van ons onderzoek aan te bevelen om de samenwerking tussen huisartsen en apothekers in de dagelijkse praktijk strakker te structureren.

**Hoofdstuk 8** laat achtereenvolgens de belangrijkste resultaten van het onderzoek zien. Hierna is aandacht besteed aan een aantal methodische aspecten van het onderzoek waarbij de sterke kanten en de beperkingen van het onderzoek en een aantal praktische punten aan de orde komen. Ook worden in dit hoofdstuk de resultaten van het onderzoek vergeleken met de resultaten van gelijksoortige studies. Tenslotte zijn aanbevelingen gegeven met betrekking tot de praktische toepassing van de onderzoeksresultaten en voor verder onderzoek.

Wij concludeerden dat de feedbackfunctie van de apotheker bij huisartsen in een behoefte voorziet en dat bij apothekers hiervoor ruim draagvlak bestaat. Bovendien vonden wij ook ruim draagvlak aanwezig voor de samenwerking tussen huisartsen en apothekers zoals die in het Farmacotherapieoverleg kan plaatsvinden. In een aantal prospectief-vergelijkende studies onder gecontroleerde omstandigheden, is bovendien met betrekking tot de feedbackfunctie van de apotheker naar de huisarts een gunstig effect aangetoond. Het inbedden van de feedbackfunctie van de apotheker in een vergeleken met de huidige, minder vrijblijvende samenwerkingsstructuur met huisartsen, lijkt daarom kansrijk en zinvol.

In onze studie konden wij in de dagelijkse praktijk geen meetbare effecten waarnemen van de samenwerking tussen huisarts en apotheker op de kwaliteit van het voorschrijven door huisartsen.

Omdat deze effecten in eerder onderzoek onder gecontroleerde omstandigheden wel aanwezig bleken, is een mogelijke verklaring van onze bevindingen dat samenwerking alleen effectief is indien daarbinnen de advies- en interventiefunctie van de apotheker duidelijk is gestructureerd. Gezien de belangrijke plaats die geneesmiddelen innemen bij de behandeling van patiënten en de belangrijke rol die samenwerking tussen huisarts

en apotheker hierbij kan spelen is een duidelijke positionering van de apotheker gewenst. Verder onderzoek naar de optimalisering van de samenwerking tussen huisartsen en apothekers is noodzakelijk. Hierbij kan rekening gehouden worden met de op grond van ons onderzoek gegeven aanbevelingen met betrekking tot de samenwerkingsstructuur, de zorgfunctie van de apotheker en het gebruik van prescriptie-indicatoren.

In de **appendices** tenslotte staat een overzicht van de verstuurde enquêtes en een verwijzing naar de prescriptie-indicatoren.

## Appendices

A. Questionnaires sent to general practitioners and pharmacists

B. Prescribing indicators



## Questionnaire general practitioner HAPO project

- 1a. How many years have you been working as a general practitioner? ..... years
2. Which percentage of time do you work as a general practitioner in your practice (full-time = 100%)? .....%
3. How many general practitioners are working in the practice in which you are active (excluding general practitioners in training, but including general practitioners in engagement)? .....number of general practitioners
4. On average, how many assistants does your practice employ? .....number of assistants per day (average)
5. Which type of practice do you have?
- Solo practice
  - Solo practice with pharmacy
  - Duo practice
  - Duo practice with pharmacy
  - Group practice
  - Group practice under one roof
  - Health centre
  - Other
6. Are more than 50% of prescriptions in your practice hand-written?
- Yes
  - No
7. Are more than 50% of prescriptions in your practice made using an electronic information system
- Yes
  - No
8. Within your electronic information system, do you use a preferential database for drugs (such as an electronic formulary?)
- Yes
  - No
  - N/A
9. The maintenance of your preferential database for drugs is the task of
- Yourself / other members of your practice
  - The pharmacist with whom you co-operate
  - Other
  - N/A
10. Which percentage of all prescriptions do you send to the pharmacy electronically?
- 0 - 25%
  - 25 - 50%
  - 50 - 75%
  - 75% or more
11. Are there any general practitioner trainees in your practice ?
- Yes
  - No

12. How do you perceive your workload as a general practitioner in your practice?  Comfortable  
 Acceptable  
 Strenuous  
 Very Strenuous  
 Unacceptable
13. On average how often a month do you receive representatives of the pharmaceutical industry? On average, ----- times a month
14. Do you have the possibility to join PTAM? (PharmacoTherapeutic Audit Meeting)  Yes  
 No
- |  | never                    | sometimes                | often                    | very often               |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 15. How often do you prescribe alternative medicines (such as homeopathic remedies) to patients?   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 16. How often do you participate in a personal refresher course geared towards pharmacotherapy?  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 17. How often do you choose a drug because it is preferred by a specialist with whom you cooperate?  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 18. In case the medication which is preferred by the specialist does not match your own preferences, do you still prescribe the medication?  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 19. How often do you inform a pharmacist about medical data of a patient which could be relevant for the use of drugs by that patient (for example pregnancy, breast cancer, allergy)? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 20. How often do you refer your patients to the pharmacy for instruction (such as inhalation instructions, instruction on how to use an insulin pen or how to use a glucose meter)?    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 21. How often do you take a prescription decision, based on the advice of the pharmacist?  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 22. How often do you participate in the PTAM meetings in your working area?  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

***In case you answered "never" to question 22, please proceed to question 45***

23. How often a year does your PTAM group meet?  1 - 3 times a year  
 4 - 5 times a year  
 6 - 7 times a year  
 8 times a year or more

Appendix A. Questionnaires sent to general practitioners and pharmacists

	never	sometimes	often	very often
24. Are the PTAM meetings in which you participate usually well-organised and structured (pre-defined agenda, appointed chairman, minutes are taken, etc.)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. How often do pharmacists contribute a discussion of unusual prescription patterns they have witnessed in their pharmacy to the agenda of a PTAM meeting ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. At which frequency are agreements concerning drug prescription made in your PTAM group?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Is a PTAM meeting report usually prepared?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. How frequently are PTAM agreements confirmed by means of a formulary?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. How often is your PTAM group informed by the pharmacist(s) about the extent to which made agreements have been honoured?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. At which frequency does your PTAM group receive prescription statistics from the pharmacy?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. How often does your pharmacist inform you about the extent to which you have lived up to made agreements within your PTAM group?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. How often does your PTAM group receive prescription statistics provided by a health insurance company?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. How often do you use statistics provided by your GP computer program in your PTAM group prescription?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. How often does your PTAM group use the "Farmacotherapeutisch kompas" as a standard reference when making agreements concerning pharmacotherapy?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. How often does your PTAM group use the NHG standards as a reference when making agreements concerning pharmacotherapy?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. How frequently are representatives of the pharmaceutical industry admitted to PTAM meetings?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. How often are medical specialists admitted to the PTAM meetings?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. How often does your PTAM use the DGV teaching tools?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- 39 In the past three years, have any concrete agreements been made within your PTAM group?  
*(if so, please check in which category)*
- 40 In case concrete agreements were made, did you evaluate to which extent these agreements were honoured, using prescription statistics ?  
*(if so, please check in which category)*
- 41 Does your PTAM group document formularies on paper?
- 42 If so, are these formularies maintained by the pharmacist(s)?
- 43 Does your PTAM-group use its own electronic formulary, or a preferred file, for drugs?
- 44 Is the electronic preferred file of medicines of your PTAM group kept up to date by the pharmacist(s)?
- 45 As a general practitioner, which information source do you most frequently consult for your prescription policy?
- 46 In general, how would you describe your relationship with the pharmacists present in your area of care?
- 47 Are there any other activities related to pharmacotherapy which you share with pharmacists and/or general practitioners?  
If so, please provide a short explanation:

- Anti-migraine medication
  - Child asthma medication
  - Grown-up asthma medication
  - Anti-microbial medication
  - NSAID's
  - Cholesterol reducing medication
  - Substitution of a specialty by a generic or parallel imported drug
- Anti-migraine medication
  - Child asthma medication
  - Grown-up asthma medication
  - Anti-microbial medication
  - NSAID's
  - Cholesterol reducing medication
  - Substitution of a specialty by a generic or parallel imported drug
- Yes
  - No
- Yes
  - No
  - N/A
- Yes
  - No
- Yes
  - No
- The Repertorium
  - The Farmacotherapeutisch Kompas
  - The NHG-standards
  - The EVS (Electronic prescription advise)
  - Own PTAM agreements/formulary
  - Another formulary
  - Information from representatives of the pharmaceutical industry
- Bad
  - Could be better
  - Workable
  - Good
  - Very good
- Yes
  - No

.....

.....

- 48 Did you find the collaboration with general practitioners (whether within the PTAM group or not) to be substantially different in 2001, as compared to 2000?  Yes  
 No  
 If so, please provide a short explanation:

.....  
 .....

**Please state your opinion with regards to the positioning of the pharmacist in primary care**

	completely agree	agree in part	neutral	disagree in part	completely disagree
49 Pharmacists are the major medication experts in primary care.	<input type="checkbox"/>				
50 The pharmacist should play a very important role in the care for patients who are actively using drugs.	<input type="checkbox"/>				
51 Pharmacists greatly influence the use of medication	<input type="checkbox"/>				
52 The pharmacist should play a very important role in the drug prescription policy of the general practitioner	<input type="checkbox"/>				
53 The pharmacist has virtually no influence of the drug prescription policies of the general practitioners in his area of care.	<input type="checkbox"/>				
54 To a major extent, the pharmacist is co-responsible for the drug therapy of his pharmacy's patients	<input type="checkbox"/>				
55 If a general practitioner is not sure about which drug therapy is most suitable for a given patient, the general practitioner should contact the pharmacist for advice	<input type="checkbox"/>				
56 When trying to make agreements within the PTAM group, the input of the pharmacist is essential	<input type="checkbox"/>				
57 The pharmacist should contribute to the PTAM agenda by supplying information about the prescription patterns observed in his/her pharmacy.	<input type="checkbox"/>				
58 It is the task of the pharmacist to provide feedback to general practitioners with regards to their prescription figures.	<input type="checkbox"/>				

Appendix A. Questionnaires sent to general practitioners and pharmacists

	completely agree	agree in part	neutral	disagree in part	completely disagree
59 The only responsibility of the pharmacist is to distribute drugs (i.e. providing the drug plus a brief instruction to the patient on how to use it, as well as monitoring potentially harmful interactions with other drugs)	<input type="checkbox"/>				
60 The pharmacist should be aware of all the diagnosed conditions of a given patient which may affect medication response.	<input type="checkbox"/>				
61 The pharmacist should be allowed to provide a generic drug instead of a prescribed specialty drug.	<input type="checkbox"/>				
62 The pharmacist should be allowed to provide a pharmacotherapeutic substitute (i.e. an analogous drug, rather than the prescribed drug, is provided to the patient).	<input type="checkbox"/>				
63 The pharmacist should be authorised to provide repeat-medication independently of the general practitioner.	<input type="checkbox"/>				
64 It is the responsibility of the pharmacist to document undesirable prescription patterns of general practitioners.	<input type="checkbox"/>				
65 In her/his role as medication expert, the pharmacist is responsible for the consequences of providing irrational drug therapy.	<input type="checkbox"/>				
66 What should be the role of the pharmacist with regards to the use of medication for a given patient? <i>(please check one answer only)</i>	<input type="checkbox"/>				
	<input type="checkbox"/>		A deciding input		
	<input type="checkbox"/>		A co-determining input		
	<input type="checkbox"/>		An advising input		
	<input type="checkbox"/>		No input		

67 Do you have any further comments concerning the role of the pharmacist in health care?  
 .....  
 .....  
 Thank you very much for your co-operation. In case of doubt, may we briefly contact you by phone? If so, please indicate your phone number below.

Phone number: 0.....

## Questionnaire pharmacist HAPO project

- 1a. How long have you been working as a pharmacist? ..... years
- 1b. When were you born? 19.....
- 1c. What is your gender?  man  
 woman
2. What percentage of time do you work as a pharmacist (fulltime = 100%)? .....%
3. How many pharmacists (excluding any pharmacists in training) are working in the pharmacy you work? .....number of pharmacists
4. Is the current number of personnel sufficient to accomplish the tasks associated with your work as a pharmacist?  Yes  
 No
5. Are you  Pharmacist-owner  
 Pharmacist manager  
 Second pharmacist
6. Is your pharmacy a part of a chain of pharmacies working under required guidelines?  Yes  
 No
7. Which percentage of prescriptions from general practitioners do you receive electronically (incl. fax)?  0 - 25%  
 25 - 50%  
 50 - 75%  
 75% or more
8. Do you use your computer to warn you about clinically relevant interactions?  Yes  
 No
9. Do you use your computer to warn you about incorrectly prescribed dosage?  Yes  
 No
10. Do you use your computer to warn you about patients who return too early or too late with regards to their chronic medication?  Yes  
 No
11. Is your computer equipped to list daily unusual prescriptions?  Yes  
 No

Appendix A. Questionnaires sent to general practitioners and pharmacists

12. Do you document text concerning your care given to patients in your computer system?
- Yes
  - No
  - My computer system does not support this option
13. Do you educate pharmacists in training?
- Yes
  - No
14. Does your pharmacy have an active policy towards selling and buying generic drugs?
- Yes
  - No
15. Do you have the possibility to join PTAM? (PharmacoTherapeutic Audit Meeting)
- Yes
  - No
16. How many pharmacies (excluding yours) exist in your area of care?
- No other pharmacy
  - One other pharmacy
  - Several other pharmacies
17. Which percentage of your working time do you spend on personal patient contact?
- 0 - 20%
  - 20 - 40%
  - 40 - 60%
  - 60 - 80%
  - 80% or more
18. How do you perceive your workload as a pharmacist in your practice?
- Comfortable
  - Acceptable
  - Strenuous
  - Very Strenuous
  - Unacceptable
19. Do you provide your assistants the opportunity to follow post-graduate education focusing on patient care?
- Yes
  - No
20. Are your assistants responsible for a specialised area of care (for example, care for a group of patients suffering from a certain disease)
- Yes
  - No
21. How often a month do you, on average, receive representatives of the pharmaceutical industry?
- On average ----- times a month

Appendix A. Questionnaires sent to general practitioners and pharmacists

	never	sometimes	often	very often
22. How often do you advise patients to try a remedy based on alternative medicine (such as homeopathic remedies)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. How often do you participate in a personal refresher course geared towards pharmacotherapy?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Besides files of supplied medication, does your pharmacy keep medical records in a database such as incidence of pregnancy, allergies, breast cancer, advise given, appointments, etc?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. In case you provide remedies for self-care in your pharmacy, do you usually document the supply of such remedies?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. In case your pharmacy provides remedies for self-care, how frequently is a structured set of questions, such as the WHAM-questions, used?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. When an intervention of care-taking occurs in your pharmacy, do you usually register this?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. In addition to the label and other information provided by the manufacturer, how often does your pharmacy provide supplementary information with home-delivered medication?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. At which frequency does your pharmacy provide information about the use, possible side-effects and working mechanism of a drug which is prescribed to a given patient for the first time?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. How frequently do you enquire about a patient's experience with a given drug before providing the same drug to that patient for the second time?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. How frequently do you engage in personal consultation with a patient in a separate, secluded area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. Did the working environment in your pharmacy change significantly in 2001 as compared to 2000?	<input type="checkbox"/> no <input type="checkbox"/> yes			
If yes, please provide a short explanation:				
.....				

	never	sometimes	often	very often
33. How often do you discuss with the general practitioners in your area about the care provided by your pharmacy?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. How often do family doctors contact you to ask for your advice concerning use of medication by a given patient? a.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. How often do you contact a general practitioner about the use of medication by a given patient? b.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. How often do you participate in the PTAM meetings in your working area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

***In case you answered "never" to question 35, please proceed to question 57***

36. How often a year does your PTAM group meet?
- 1 - 3 times a year
  - 4 - 5 times a year
  - 6 - 7 times a year
  - 8 times a year or more

	never	sometimes	often	very often
37. Are the PTAM meetings in which you participate usually well-organised and structured (pre-defined agenda, appointed chairman, minutes are taken, etc.)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. How frequently do you contribute to the agenda of an PTAM meeting a discussion of unusual prescription patterns you have witnessed in your pharmacy?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. At which frequency are agreements concerning drug prescription made in your PTAM group?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. Is a PTAM meeting report usually prepared?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. At which frequency do you provide prescription statistics to your PTAM group members?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
42. How often do you use prescription statistics to evaluate whether agreements made within your PTAM group are honoured?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43. How often does your PTAM group use prescription statistics provided by a health insurance company?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



54. If so, are these formularies maintained by the pharmacist(s)?  Yes  
 No  
 N/A
55. Does your PTAM-group use its own electronic formulary, or a preferred file, for drugs?  Yes  
 No
56. Is the electronic preferred file of medicines of your PTAM group kept up to date by the pharmacist(s)?  Yes  
 No  
 N/A
57. In general, how would you describe your relationship with the general practitioners present in your pharmacy's area of care?  Bad  
 Could be better  
 Workable  
 Good  
 Very good
58. Did you find the collaboration with general practitioners (whether within the PTAM group or not) to be substantially different in 2001, as compared to 2000?  Yes  
 No  
 If so, please provide a short explanation:  
 .....  
 .....

**Please state your opinion with regards to the positioning of the pharmacist in primary care**

	completely agree	agree in part	neutral	disagree in part	completely disagree
59. Pharmacists are the major medication experts in primary care.	<input type="checkbox"/>				
60. The pharmacist should play a very important role in the care for patients who are actively using drugs.	<input type="checkbox"/>				
61. Pharmacists greatly influence the use of medication.	<input type="checkbox"/>				
62. The pharmacist should play a very important role in the drug prescription policy of the general practitioner.	<input type="checkbox"/>				

Appendix A. Questionnaires sent to general practitioners and pharmacists

	completely agree	agree in part	neutral	disagree in part	completely disagree
63. Being a pharmacist, I hardly have any influence of the drug prescription policies of the general practitioners in my area of care.	<input type="checkbox"/>				
64. To a major extent, the pharmacist is co-responsible for the drug therapy of his pharmacy's patients.	<input type="checkbox"/>				
65. If a general practitioner is not sure about which drug therapy is most suitable for a given patient, the general practitioner should contact the pharmacist for advice.	<input type="checkbox"/>				
66. When trying to make agreements within the PTAM group, the input of the pharmacist is essential.	<input type="checkbox"/>				
67. The pharmacist should contribute to the PTAM agenda by supplying information about the prescription patterns observed in his/her pharmacy.	<input type="checkbox"/>				
68. It is the task of the pharmacist to provide feedback to general practitioners with regards to their prescription figures.	<input type="checkbox"/>				
69. The only responsibility of the pharmacist is to distribute drugs (i.e. providing the drug plus a brief instruction to the patient on how to use it, as well as monitoring potentially harmful interactions with other drugs).	<input type="checkbox"/>				
70. The pharmacist should be aware of all the diagnosed conditions of a given patient which may affect medication response.	<input type="checkbox"/>				
71. The pharmacist should be allowed to provide a generic drug instead of a prescribed specialty drug.	<input type="checkbox"/>				
72. The pharmacist should be allowed to provide a pharmacotherapeutic substitute (i.e. an analogous drug, rather than the prescribed drug, is provided to the patient).	<input type="checkbox"/>				
73. The pharmacist should be authorised to provide repeat-medication independently of the general practitioner.	<input type="checkbox"/>				

Appendix A. Questionnaires sent to general practitioners and pharmacists

- |   | completely<br>agree      | agree<br>in part         | neutral                  | disagree in<br>part      | completely<br>disagree  |
|---|--------------------------|--------------------------|--------------------------|--------------------------|---|
| 74. It is the responsibility of the pharmacist to document undesirable prescription patterns of general practitioners.                      | <input type="checkbox"/>  |
| 75. In her/his role as medication expert, the pharmacist is responsible for the consequences of providing irrational drug therapy.          | <input type="checkbox"/>  |
| 76. What should be the role of the pharmacist according the use of medication for a given patient?<br><i>(please check one answer only)</i> |                          |                          |                          |                          | <input type="checkbox"/> A deciding input<br><input type="checkbox"/> A co-determining input<br><input type="checkbox"/> An advising input<br><input type="checkbox"/> No input |
| 77. Do you have any further comments concerning the role of the pharmacist in health care?  |                          |                          |                          |                          |   |

.....  
 .....

Thank you very much for your cooperation. In case of doubt, may we briefly contact you by phone? If so, please indicate your phone number below.

Phone number: 0.....

## **B. Prescribing indicators**

The development and the validation of the prescribing indicators are described in chapter 5. A complete overview of all indicators is accessible at:

**<http://www.hag.unimaas.nl/onderzoek/HaPo.htm> (accessed 1 March 2005)**

An update and a further validation of the indicators for which the delivery data are used as a proxy for diagnosis is planned, using a database that records both the drug prescribed and the diagnosis. This will be achieved in the form of a proposed project in which the Scientific Institute of Dutch Pharmacists (WINAp), the Centre for Quality of Care Research (WOK) of the university of Nijmegen and Maastricht and the LINH (National Information Network for General Practitioner Care) will work together. The LINH is a cooperative arrangement between the National Association of General Practitioners (LHV), the Dutch College of General Practitioners (NHG), the Dutch Institute for Healthcare Research (Nivel) and the WOK and comprises a representative national network of 100 general practitioner practices. In the registration system of this network, prescriptions are recorded with a specific diagnosis code.



