

Prescribing drugs in primary health care

– Thoughts, information strategy and outcome



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FOR REFLECTION

If One Is Truly to Succeed in Leading a Person to a Specific Place,

One must First and Foremost Take Care to Find Him

*Where **He** Is and Begin There*

This is the secret in the entire art of helping.

Anyone who cannot do this is himself under a delusion if he thinks he is able to help someone else. In order truly to help someone else, I must understand more than he – but certainly first and foremost understand what he understands. If I do not do that, then my greater understanding does not help him at all. If I nevertheless want to assert my greater understanding, then it is because I am vain or proud, then basically instead of benefiting him I really want to be admired by him. But all true helping begins with a humbling. The helper must first humble himself under the person he wants to help and thereby understand that to help is not to dominate but to serve, that to help is not to be the most dominating but the most patient, that to help is a willingness for the time being to put up with being in the wrong and not understanding what the other understands (1).

Søren Kierkegaard

Prescribing drugs in primary health care; thoughts, information strategy and outcome

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ABSTRACT

Aims: *General aim;* to investigate whether tailored evidence-based drug information provided to general practitioners can be implemented more effectively than evidence-based drug information provided as usual. *Specific aims;* to describe general practitioners' (GPs) thoughts on prescribing medication and evidence-based drug information: to explore GPs' attitudes on drug information: to investigate whether tailored evidence-based drug information can influence these attitudes differently or the prescribing behaviour more effectively than drug information provided as usual.

Methods: Focus-group interviews with a descriptive qualitative approach (I), a cross sectional survey using an attitude questionnaire analysed in a multilevel mode and by multiple logistic regression (II), and a randomised controlled study (RCTs, III and IV) were used. In the two latter medical information officers (MIOs) providing drug information to GPs were matched pair-wise and randomised into intervention or control groups. The GPs were cluster randomised by their MIOs. The intervention MIOs were trained to provide evidence-based drug information tailored with motivational interviewing and to focus on the benefit aspect. The control MIOs provided evidence-based drug information as usual. Data was collected by an attitude questionnaire (III), analysed by the Mann-Whitney test and intention-to-treat. Prescriptions for antihypertensive drugs were collected (IV). The change in proportion of ACE inhibitor prescriptions relative to the sum of ACE inhibitors and Angiotensin II receptor blockers, during 0–3 and 4–6 months after the intervention, was analysed with multiple linear regression, by intention-to-treat and per protocol.

Results: GPs thoughts on prescribing medication and on evidence-based medicine dealt much with benefit. The core category ‘prompt and pragmatic benefit’ was the utmost benefit (I). A majority of the GPs perceived the information from the industry as too excessive; that the main task of the industry was to promote sales. The quality of public information was regarded as high and useful. Female GPs valued public information to a much greater extent than did male GPs (II). The changes in attitudes to drug information did not differ between the two groups (III). Information was given to 29% of GPs in both groups (IV). The GPs’ average change in proportion of prescribed ACE inhibitors increased in both groups after the intervention.

General conclusions and implications: GPs’ thoughts on evidence-based drug information and prescribing medication relates predominantly to ‘prompt and pragmatic benefit’; delivered immediately, useful and handy. Female GPs valued public drug information much more than male GPs did, which might be useful to know in future implementation. GPs’ attitudes on drug information did not differ between the groups after the intervention. Neither did the change in proportion of prescribed ACE inhibitors differ. This indicates no benefit in using tailored evidence-based drug information compared to drug information provided as usual.

Keywords: Utilitarianism, prescribing medication, evidence-based medicine, general practitioner, pharmaceutical therapy, guide lines, drug information services, primary health care, multilevel models, pharmaceutical industry, attitudes, behaviour, public authority drug information, prompt and pragmatic benefit, drug and therapeutic committee, implementation.

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Sammanfattning på svenska

Syfte Övergripande syfte; att undersöka om evidensbaserad läkemedelsinformation (EBL) presenterad för allmänläkare kan få ett effektivare genomslag än EBL som den brukar ges. *Specifika syften*; att beskriva allmänläkares tankar om förskrivning av läkemedel och om EBL; att undersöka allmänläkares attityder till läkemedelsinformation; att undersöka om speciellt utformad EBL kan påverka dessa attityder annorlunda eller om läkarnas förskrivning av läkemedel förändras effektivare än efter den EBL som de brukar få.

Metod: Fokusgruppsintervjuer med deskriptiv kvalitativ metod (I), en tvärsnittsstudie med attitydformulär analyserad med flernivåmodell och multipel logistisk regressionsanalys (II) samt randomiserade kliniska prövningar (III och IV). I de två senare matchades läkemedelsinformatörer med ansvar att förmedla EBL till allmänläkare, parvis till interventions- och kontrollgrupper. Allmänläkarna randomiserades i kluster tillsammans med sina informatörer. Interventionsgruppens läkemedelsinformatörer tränades till att ge EBL med motiverande samtal och fokus på nyttoaspekter. Kontrollgruppens informatörer förmedlade EBL som vanligt. I studie III användes en attitydenkät, analyserad med Mann-Whitneys test och enligt intention-to-treat. I studie IV samlades uppgifter om utskrivna hypertoni-läkemedel in. Förändring i proportion av förskrivna ACE hämmare i relation till summan av ACE hämmare och Angiotension II receptorblockerare jämfördes för perioderna 0–3 och 4–6 månader efter interventionen. Analys gjordes med multipel linjär regression, både enligt intention-to-treat och per protocol.

Resultat Allmänläkarnas tankar om att skriva ut läkemedel och evidensbaserad medicin handlade mycket om nytta. Kärnkategorin 'näranyttä' innefattade andra nyttoaspekter. En majoritet av allmänläkarna ansåg att industrins läkemedelsinformation var alltför omfattande och att deras huvuduppgift var försäljning. Samhällets läkemedelsinformation ansågs användbar och av hög kvalitet. Kvinnliga allmänläkare uppskattade samhällets läkemedelsinformation betydligt mera än de manliga läkarna gjorde (II). Attitydförändringar till läkemedelsinformation skilde sig inte åt mellan grupperna (III). 29 % av läkarna i båda grupperna fick information (IV). Den genomsnittliga förändringen av allmänläkarnas proportion av utskrivna ACE hämmare ökade i båda grupperna efter informationen.

Sammanfattning och betydelse: Allmänläkarnas tankar om EBL och att skriva ut läkemedel handlade mycket om 'näranytta'; det som finns nära i tid och rum är lätt att använda. Kvinnliga allmänläkare uppskattade samhällets läkemedelsinformation mycket mer än vad männen gjorde. Detta kan vara värdefull kunskap i fortsatt implementering. Allmänläkarnas attityder till läkemedelsinformation skilde sig inte åt mellan grupperna efter intervention. Inte heller skilde sig förändringen i andel förskrivna ACE hämmare åt mellan grupperna. Det här talar för att det inte finns någon fördel med att använda speciellt utformad EBL jämfört med att ge EBL som man brukar göra.

Nyckelord Läkemedelsförskrivning, evidensbaserad medicin, allmänläkare, farmakologisk behandling, riktlinjer, läkemedelsinformation, läkemedelskommitté, primärvård, flernivåmodeller, läkemedelsindustri, attityder, beteenden, näranytta, myndigheter, utilitarism, implementering.

LIST OF PAPERS

This thesis is based on the following studies, referred to in the text by their Roman numerals.

- I Skoglund I, Segesten K, Björkelund C; GPs' thoughts on prescribing medication and evidence based knowledge: the benefit aspect is a strong motivator. A descriptive focus group study. Reprinted with permission from Scandinavian Journal of Primary Health Care, 2007, Vol.25, No.2, Pages 98-104
(doi:10.1080/02813430701192371)
- II Skoglund I, Björkelund C, Mehlig K, Gunnarsson R, Möller M; GPs' opinions of public and industrial information regarding drugs: a cross-sectional study. BMC Health Services Research, 14726963, 2011, Vol. 11, Issue 1, pages 204, open access.
- III Skoglund I, Björkelund C, Gunnarsson R, Möller M; Can motivational interviewing in drug information using benefit aspects influence general practitioners' attitudes to the information? A randomised controlled trial. Submitted.
- IV Skoglund I, Björkelund C, Petzold M, Gunnarsson R, Möller M; A comparison between two types of evidence-based drug information provided to GPs: a randomised controlled trial. Submitted.

CONTENT

FOR REFLECTION	3
ABSTRACT	4
Svensk sammanfattning	6
List of papers	9
Abbreviations	14
About the author	15
INTRODUCTION	17
General practitioners and primary health care in Sweden	17
Medical officers	17
Primary health care and the patient-centred approach	18
Prescribing medication	19
Prescribing medication	19
Swedish drug and therapeutic committees	20
The drug industry	21
Moderately elevated blood pressure	22
Evidence-based medicine	23
Health technology assessments	24
The Cochrane collaboration and randomised controlled trials	24
Challenges to evidence-based medicine	25
Implementation	26
Motivational interviewing technique	28
Education, information and learning styles	30
Attitudes and behaviour	34
AIMS OF THE THESIS	37
General aim	37
Specific aims	37

METHODS	38
Study I	40
Design and geography	40
Informants and inclusion criteria	41
Procedure and data analysis	41
Study II	43
Design and geography	43
Subjects and procedure	43
Data collection	43
Statistical analysis	46
Study III	47
Design and geography	47
Subjects and procedure	47
Data collection	49
Statistical analysis	50
Study IV	51
Design and geography	51
Subjects and procedure	51
Data collection	52
Statistical analysis	53
Ethical consideration	53
RESULTS	54
Study I	54
Curing	55
Limiting	55
Economising	55
Conducting	56
The available time set the limits	56

Knowledge on day-to- day basis	57
Information scrutiny and sorting out	57
Patients as the doctor’s source of knowledge	57
Part of the art of medicine	58
Retaining and preserving knowledge	58
“Law of medical inertia”	58
Theory versus practice	58
Custom made	59
Study II	61
Study III	65
Study IV	70
DISCUSSION	72
Summary on main findings	72
Methodological considerations – study designs	73
Methodological considerations – study I	73
Methodological considerations -studies II-IV	75
Recruitment, GPs and power	75
Study designs and validity	76
Questionnaire and non-responders	77
How information and education was provided	78
IT issues	79
Prompt and pragmatic benefit, utilitarianism and existentialism – study I	81
How is benefit maximised when medications are prescribed?	81
How is benefit measured?	82
Support in the decision-making process	83
What could be prompt and pragmatic benefit in the GP’s workday?	84

Prompt and pragmatic benefit and existentialism	85
GPs' attitudes to public and industrial information before and after intervention – studies II and III	87
GPs and the relations to the pharmaceutical industry	87
The framing of the information provider	89
Time constraint and continuous medical education	89
The gender aspects on attitudes to drug information	91
Leadership might influence attitudes	91
No attitude changes after intervention with tailored intervention compared with information as usual	91
The GPs' prescribing after intervention – study IV	93
The same change in proportion of prescribed ACE inhibitor prescriptions after the intervention	93
SUMMARY AND CONCLUSIONS	96
Epilogue	97
ACKNOWLEDGEMENTS	98
REFERENCES	101
APPENDIX	115
Original publikations	

Abbreviations

ACE	Angiotensin-Converting-Enzyme inhibitor
ARB	Angiotensin II Receptor Blockers
CME	Continuing Medical Education
DTC	Drug and Therapeutic Committee
EBM	Evidence-Based Medicine
GP	General Practitioner
ICC	Intra-Class Correlation
IT	Internet Technology
MI	Motivational Interviewing Technique
PPB	Prompt and Pragmatic Benefit
PHCC	Primary Health-Care Centre
RCT	Randomised Clinical Trial
SBU	The Swedish Council on Technology Assessment in HealthCare

ABOUT THE AUTHOR - PROLOGUE

With these lines I intend to give you some insights into the driving forces behind my endeavor to study the field of general practitioners (GPs) and prescribing.

I was born in Borås, the Swedish pedlars' city, and studied medicine in Gothenburg. After training I started to work as a GP and as head of the primary healthcare centre "Trandared" in 1989. One foundation of our work was the challenge "Health for all in 2000" proposed by the World Health Organization in Alma Ata 1978. Discussions on behaviour are natural when addressing public health which is why the questions of whether and how one can change behaviour consequently were put on *my* agenda. We initially investigated how the work at the health care unit was perceived by the patients (2). Some years later a small group from the healthcare centre took part in an interdepartmental project on women's health with gender perspective on female professionals and female patients. Participants were also recruited from the social insurance office, the employment agency, the social services and a shelter for abused women (3). During my student years at The Nordic School of Public Health in the mid nineties the currents of change were enhanced. Professor Edgar Borgenhammar encouraged us to think independently and Professor Bengt Starrin's explaining that the concept of the DNA-helix included many qualitative aspects was a huge eye-opener to qualitative research.

As chairwoman of the drug and therapeutic committee (DTC) in Södra Älvsborg(1998-2007) the previous experiences came in handy. The mission was to lead an interdepartmental working group working on rational prescribing. Close collaboration with skilled pharmacists was essential for a good result. The ultimate product was an annual list of recommended drugs to be used by prescribers in hospitals, primary health care and home health care and as well as by pharmacists. It was also a tool for activities directed to the public and to politicians. The DTC work was also influenced by Swedish agencies such as the Swedish Council on Technology Assessment in Health Care (SBU), the National Board of Health and Welfare, the Medical Products Agency and the Dental and Pharmaceutical Benefits Agency. As a member of the latter during 2004–2008 I got a close insight into how the agencies work in relation to the information ordinary GPs get from different guidelines.

Evidence-based medicine was an important element in our information but it became clear that many aspects of ‘the art of prescribing’ were not rational and at times the physicians had low potentials for trying to be more ‘rational’ in every-day job.

The question ‘*Why do the GPs not do as we have told them to?*’ at first made me angry but then I started to think; ‘*Why don’t they?*’ As a GP myself I started to ‘dig where I stood’ with initial help from Professor Cecilia Björkelund, who saw possibilities in the question. As we dealt with evidence-based drug information provided by skilled medical information officers, mainly pharmacists, the study questions of prescribing drugs in primary health care and information strategy were close at hand.

The journey of work and writing has possibly augmented the amount of patience and self awareness; some of the most difficult experiences to gain. Some deep roots to the study questions are described in “Reflection” by Søren Kirkegaard (1), in the beginning of the thesis.

Introduction

This thesis is about general practitioners' (GPs) prescriptions of drugs in primary health care; their thoughts on prescribing medication, evidence-based medicine and a new information strategy .

In Sweden, GPs comprise the largest group of prescribers, writing more than 50% of all prescriptions (4). Medication accounted for about 10% of resources used for Swedish health care in 2005 (5, 6). As costs for medication have risen, there has been an increasing need to find ways to receive better value for money (7, 8). Focus has increased on evidence-based medicine (EBM) which refers to the conscientious, distinct and sensible use of the most reliable and current knowledge when making decisions affecting individual patients (9). It also includes the cost-efficient use of available resources. Knowledge of EBM is therefore important for the prescribers and especially for GPs.

General practitioners and primary health care in Sweden

Medical officers

Medical officers preceded the GPs in Sweden and appeared in 1663 as the Collegicum medicum – a government agency – was set up. This agency was appointed by Queen Hedvig Eleonora to supervise the physicians in the capital and in time the organisation was spread throughout the country (10).

The agency was needed to promote quality since care used to be provided by charlatans who also sold doubtful drugs. The officer Nils Rosén (1706–1773), born near Borås, improved Swedish child care and published a widely used drug compendium. The medical officers were in the year 1700 in charge of 115 000 patients per office and in 1840 there were 26 000 patients per officer. In 1920 the total number of medical officers was 524.

At first the medical officers were numerically superior to hospital physicians but as a result of increased specialisation this was changed in the 1930s. In the 1940s the medical officers comprised 17% of all physicians in Sweden and in 1960 7%. Most medical officers worked alone and their workload was heavy. In 1963 the responsibility for them was transferred to the county councils and in 1972 the title was changed to general practitioner (10).

Primary health care and the patient-centred approach

In the 1970s the National Board of Health and Welfare developed guidelines on how to manage a planned expansion of primary health care (11). The key words were, and are;

A holistic view – man's needs are judged and provided in a context.

A primary responsibility – diseased people obtain care and treatment as close to home as possible.

Nearness/availability – familiarity with man's everyday environment, good opening hours and on-call duty in primary health care.

Continuity – people's personal and regular contact with health professionals.

Quality and safety – emphasis on the importance of education and knowledge.

Cooperation – with the municipality, county health and regional care.

There were hopes that primary health care would be a functioning base of all care but there was still a shortage of GPs. In the 1980s, 20% of all physicians in Sweden were GPs. Corresponding figures in Norway were 30% and in Great Britain 40%.

In the 1990s, health care was rationalised and subject to cutbacks. Primary health care became market adjusted and the recruitment of new GPs declined. In the mean time demand for health care increased and the proportion of all outpatient visits in primary health care rose from 45% to 55%. The population was aging and many patients suffered from comorbidity. Furthermore, there were reports of increasing rates of illness due to psychiatric and stress-related disorders and of a lack of confidence in the society (11).

In 2006, a 'care choice' was introduced in Sweden. This law has meant some new establishments of GPs and a further market adjustment in primary health care. Six core competencies essential for GP practice and defined by the world organisation of family doctors (WONCA) were examined in a thesis on the skillful GP (12). Swedish GPs fulfilled the requirements for a patient-centred approach, problem-solving skills, versatility and a holistic view. The GPs were, however, to a minor degree in control of organisational skills and resource management. This is of interest as the requirements from the healthcare organisations to collect and register patient data are increasing.

In time we will see if primary health care can provide nearness, availability and continuity that will suffice for new generations (10).

The patient-centred approach mentioned above has become widely used in general practice during recent decades. There are also six components in this method; exploring the disease and the illness experience, understanding the whole person, finding common ground, incorporating prevention and health promotion, enhancing the relationship and being realistic (13).

In an observational Canadian cohort study (14) it was seen that health-experiences were improved with the patient-centred approach and the number of diagnostic tests and referrals decreased. The interpretation was that the patient-centred approach was beneficial for the patient's health.

Stewart emphasises that the patient-centered approach and evidence-based medicine are synergistic in creating improved clinical practice.

Prescribing medication

Prescribing medication

The history of prescribing medication extends back at least to the Middle Ages (15). Traditionally a prescription consists of five parts; 1) 'Invocatio' invoking God through an old sign ℞ meaning 'in the name of God', later written as R/ which is shortening for the Latin 'Recipe' meaning 'Take', 2) 'Praescriptio sive Ordinatio', on the amounts or the preparation, 3) 'Subscriptio', on instructions on preparation and packaging, 4) 'Signatura', on instruction of usage, and 5) 'Inscriptio', dating and signature.

The art of prescribing drugs is also complex (16), which is why not just one but a combination of methods is proposed to modify prescribing patterns (17, 18). According to a health technology assessment report (19) dissemination of printed educational materials, audit with feed-back and multifaceted interventions with educational outreach improve physician performance by 6%–8% whereas reminders have twice the impact.

For some decades the use of information technology (IT) in prescribing medication has increased. In Sweden there are actions e.g. on behalf of the National Board of Health and Welfare, to promote an effective use of 'the cause of prescribing' as it is presented by the physician (20). This is expected to be a means to take further measures based on the prescribed medications. Such measures could be the use of a specified drug terminology, to develop better decision support for the drug decision making, and to create

the necessary links between different IT devices. In my experience it takes a long time to fulfill the development of useful functions of IT in health care. The recommendations in the report on ‘the cause of prescribing’ are waiting to be implemented.

There are several players who want to influence the prescribing pattern from different views. One of them is the society, in the text represented by the drug and therapeutic committees and another is the pharmaceutical industry.

Swedish drug and therapeutic committees

The development of drug and therapeutic committees (DTCs) has varied considerably in Europe and has been particularly extensive in the Nordic countries (21, 22). In Sweden they originated in hospital settings in the 1960s. They are funded by the county councils. Focus was broadened in the 1980s to increase the commitment of GPs.

Since 1996 a Swedish law states that each county council is required to have at least one DTC. The overall aim is to promote the rational use of drugs based on evidence-based principles of drug therapy at all levels of the healthcare system. This is achieved through the selection of recommended drugs and support in using them through education and information in academic drug detailing, often provided by pharmacists or physicians. As a rule the DTCs make one list each of recommended drugs. The DTCs have worked within multidisciplinary networks including GPs and other specialised physicians, district and other specialised nurses, and pharmacists.

In recent years the number of DTCs has been reduced and there is an ongoing debate on whether the DTCs should make national drug selections instead of producing one list each (23).

The need for non drug-industry information and education has been highlighted by many authors (24-26). Limiting the role of the pharmaceutical companies could be necessary to enable cost control (27). With that perspective, the Swedish DTCs have a competitive alternative with publicly provided information delivered by medical information officers (MIOs). There is also an ongoing debate since the introduction of the law of DTCs in 1996 about the responsibility for continuing medical education (CME) of physicians in drug-related knowledge. The law was partially seen as an education reform

since it enabled the county councils to take more responsibility for education, previously partially left to the drug industry. There are no national guidelines on education.

Although the information and education provided to Swedish physicians by the DTCs have a good reputation, their marketing is often considered as voluminous and skill inferior to the pharmaceutical industry (28).

The drug industry

Most drug information delivered to GPs emanates from private companies (29) and is deemed to be too voluminous (26). As a result, proposals have been put forward to limit the role of pharmaceutical companies in physician activity and to emphasise more objective sources of information (30-33). It should not be forgotten, however, that many county councils used to deem the information and education delivered by the drug industry as very good as it entailed low costs for CME. As the prices for drugs started rising considerably this position was reconsidered.

There has been much debate on how the pharmaceutical industry influences physicians and assessment agencies (34-36). Physicians' attitudes continue to be positive towards industry-related activities according to an American hospital study (37). Published studies with companies as sponsors are more likely to present results that favour the company (36) and it has been claimed that the financial arrangements with industry are well hidden (35). Medical journals and meetings are heavily dependent on industry money in the US (38) but also in other parts of the world.

The pharmaceutical industry's financial contribution to continuing education (CME) of Swedish physicians has been estimated at one billion Swedish crowns (€104.6 million) (39). Swedish employers, mainly in the public sector are said to contribute 67% of the total cost of CME (40). However, these figures are based on weak grounds due to trade secrecy, but the best available in literature.

In time it will be seen if the care in the Western societies will be more or less dependent on cooperation with the pharmaceutical drug companies.

Moderately elevated blood pressure

We have used the case of ‘moderately elevated blood pressure’ in our investigation. The reasons for choosing this were that the report from the SBU (7) was to be introduced to Swedish physicians and that treatment of hypertension is important in primary health care.

About 1.8 million (27%) Swedish adults have been estimated as hypertensive (7). Eighty per cent of those are unsatisfactorily treated, implicating increased risks (41). In the SBU report on moderate hypertension (>140/90) (7), the first recommendation was to apply lifestyle changes; the second to use low doses of one or several of the following drugs: thiazides, angiotensin-converting enzyme (ACE) inhibitors, calcium-blocking agents, and beta blockers. The latter drug was later considered as third-line treatment (42). The third recommendation was to increase or add low doses of the other drugs until acceptable blood pressure was attained. Angiotensin II receptor blockers should only be used as a last line drug. Prescription of the Angiotensin II receptor blockers increased in Sweden prior to good evidence of cost-effectiveness (43), which led to high costs without major advantages compared to the use of ACE inhibitors (7).

Evidence-based medicine

Keeping abreast of all the reported medical advances reported takes time. To do so, GPs' would need to read at least 19 articles per day, 365 days per year compared to time available of well under an hour a week in Britain at the end of the 20th century (9). Today, reading articles is being replaced by taking part of processed evidence-based knowledge in clinical electronic decision support systems provided by public sources or by private companies (44).

According to David Sackett (9) evidence-based medicine is; *"...the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research. By individual clinical expertise we mean the proficiency and judgment that individual clinicians acquire through clinical experience and clinical practice. Increased expertise is reflected in many ways, but especially in more effective and efficient diagnosis and in the more thoughtful identification and compassionate use of individual patients' predicaments, rights, and preferences in making clinical decisions about their care. By best available external clinical evidence we mean clinically relevant research, often from the basic sciences of medicine, but especially from patient centred clinical research into the accuracy and precision of diagnostic tests (including the clinical examination), the power of prognostic markers, and the efficacy and safety of therapeutic, rehabilitative, and preventive regimens. External clinical evidence both invalidates previously accepted diagnostic tests and treatments and replaces them with new ones that are more powerful, more accurate, more efficacious, and safer."*

EBM meant an important paradigm shift in clinical medicine as it was introduced. To try to understand the use of and meaning of EBM today we take some steps backward in the history (45).

In Canada in 1990, Dr. Gordon Guyatt at the McMasters University introduced a new concept that described a novel method of teaching medicine at the bedside. His mentor, Dr. David Sackett, had made the groundwork, using "critical appraisal" in clinical education. The concept was coined to "Evidence-Based Medicine" and was presented in an editorial in 1991(46). However, the colleagues were not content as the new concept implied that current clinical decisions were less scientific than the new one.

Evidence-based medicine integrates clinical epidemiology with biomedical informatics to evidence-based guidelines. Clinical practice was historically viewed as the “art of medicine” and the use of scientific methodology, as in biomedical research and statistical analysis, were rare in the world of medicine. Mistrust had made incorporation of these tools into medicine difficult.

However, some important preceding events had to be accomplished before putting EBM in use. In the 1960s, the American physicians Suzanne and Robert Fletcher perceived that biomedical science often lacked translational application to clinical medicine. In the same time Alvan Feinstein, a mathematician turned physician, recognised that the basis for diagnosis was purely clinical authority—not scientific criteria (45).

Health technology assessments

Before the concept “EBM” was officially coined in 1991 many public authorities around the world were working with similar methods to evaluate medical treatments. One of them were the Swedish Council on Health Technology Assessment (SBU), founded in 1987 and in 1992 commissioned as an independent public authority for the critical evaluation of methods used to prevent, diagnose, and treat health problems (47). Their overall goal is presented as; “*Scientific assessment in health care aims to identify interventions that offer the greatest benefits for patients while utilising resources in the most efficient way.*”

The SBU evaluates methods to improve the use of best available methods and highlight areas with gaps of knowledge.

The Cochrane collaboration and randomised controlled trials

Three men can be credited with the formation of the institution Cochrane Collaboration in 1993 (48): Tom Chalmers, Ian Chalmers, and Murray Enkin (45). The institution’s name is a tribute to the British physician Archie Cochrane who performed his first trial on fellow prisoners during World War II, comparing the effect of yeast extract on deficiency diseases. The motto of the Cochrane Collaboration is “*Working together to provide the best evidence for health care.*” The principle that randomised controlled trials (RCTs) must provide benefit to subjects is a hallmark of the Cochrane Collaboration. The collaboration is an independent, not-for-profit organisation, funded by a variety

of sources including governments, universities, hospital trusts, charities and personal donations.

Challenges to evidence-based medicine

EBM is now accepted and taught at well-renowned centres of higher education. However, there are also critical voices against some of its inherent weaknesses (45); some mean that it transforms the complex process of clinical decision making into a not individualised algorithmic exercise and therefore is subject to error in patient care. Others say that RCTs are simply a comparison of one treatment to another treatment and not some superior form of truth; that EBM does not incorporate the “soft” data that clinicians use to formulate diagnoses and treatments and that social and political patient context are equally insufficiently addressed in EBM. The label “best available evidence” might be misused by health care policy makers to marginalise practices that do not conform to these standards. Feinstein highlighted that both insulin for diabetic acidosis and penicillin for bacterial endocarditis would never have been included in the work of the Cochrane Collaboration had they been introduced through single study articles.

To meet these challenges the pioneers of EBM created a “reader’s” guide and more than 20 articles were presented on the topic from 1993 to 2000 (49).

The GPs have a complicated situation with regard to EBM as they practice in a wide medical field. As a natural consequence their ways of searching evidence (50) is different from those of other physicians.

However, through physicians’ critical appraisal and reflecting on the evidence for EBM the concept has made a clear and probably permanent mark in medicine. EBM has widely improved the use of randomised clinical trials and the introduction of clinical epidemiology has offered a systematised, scientific approach to the bedside-practice of medicine (45).

Implementation

In the 1990s, studies among GPs in England, Norway, Sweden and Iceland showed that consolidation of guidelines into clinical practice was difficult (51-53).

Academic detailing, based on physicians' knowledge and motives for prescription and designed as problem-based learning with feedback, has been described as a method for information and education in the US and Sweden (53, 54). Education, in small groups led by a pharmacist and a GP, led to changes in prescription habits (53). Information on recommendation on drug treatment of migraine provided to GPs by medical information officers shortly influenced the prescriptions (55). A phenomenological study among Icelandic GPs showed that continuity of medical care and a stable patient-doctor relationship may be seen as the most important tasks for the GPs to promote evidence-based prescribing (56). However, educational outreach visits, particularly when combined with social marketing appear to be a promising approach to modifying health professional behaviour, especially prescribing (18). To improve prescribing it seems to be preferable to use several methods (57). Thus, existing knowledge on how GPs' prescription habits can be temporarily influenced is relatively substantial. Key characteristics important to success are, however, lacking (18). There are also indications that it is difficult to improve prescription quality among elderly patients after a randomised intervention programme (58). Findings from this recent study were that physicians showed only limited interest in actions to improve prescription quality and that hierarchical structures remained in place so that most of the patients do not dare to discuss their drug treatment with their physician.

The last decade has seen a growing interest in implementation science, which was developed to meet a need to put EBM into work (59). Many concepts that are used were first described by Everett Rogers in 1962 (60). Some of them are; *Innovators* (persons quickly adopting an innovation, take risks, well-educated and follow the development), *early adopters* (often well-educated, social leaders), *early majority*, *late majority* and *laggards* (the last ones to change). Rogers claimed that five steps describe the process of spreading innovations in an organisation; *knowledge* (that there is an innovation and what problems it can solve), *persuasion* (the receiver is convinced of the value of the innovation), *decision* (the receiver decides to accept the innovation and use of it), *implementation* (the innovation is used and

the receiver tries to get use of the values) and *confirmation* (the receiver fully uses the innovation or decides not to).

In implementation science the objective and context-neutral evidence was seen as making the evidence-into-practice cycle fulfilled by means of mechanism described by Williams and Gibson as "*like water flowing through a pipe*" (p.65) (61). The basis of implementation science is natural sciences with RCTs as the gold standard. The knowledge is meant to be instantly applicable.

Research on implementation of innovations and adaptation comes from a mixed background although there are elements similar to EBM and implementation research. Research on implementation of policies adheres to a social science tradition.

Briefly, it could be claimed that the tradition of implementation science and the tradition of implementation of policies this far have almost never met. As the need for knowledge in both areas is increasing it seems that researchers are more open-minded to use new methods to gather new knowledge (59, 61).

Research with relevance for healthcare can be derived from sociological research on innovations from the beginning of the 2000th century.

Some factors that should be considered when dealing with implementation of drugs is the importance of the context, such as the organisation in which you work, the importance of what you are trying to implement, and properties of the receivers. To regard the receivers as co-workers provides other aspects of implementation than to just think of them as a vessel that should be filled with new, and utmost evidence-based knowledge (59).

Motivational interviewing technique

Motivational interviewing is a change-oriented and governing methodology mainly used in area of lifestyle change. It is described as a method for communication (62, 63) and has its roots in the work of professor William R. Miller's work on drug abuse from the 1970ties. It is linked to humanistic psychology (62). Interest in the use of motivational interviewing has previously increased in the Swedish healthcare sector (64).

The technique is intended to work through four main principles (65). The first is to express empathy which involves to see life through the client's eyes. The second is to support self-efficacy meaning that the client is held responsible for change. The third is rolling with resistance which implies that the counsellor does not challenge resistance but just "rolls" with it to explore different views of it. The fourth principle is to develop discrepancy implying that people perceive a discrepancy between their current behavior and future goals, which can lead to motivation for change. It is a brief intervention, typically lasting for 1-4 sessions.

Motivational interviewing counsellors work to develop this situation to make people become more motivated to make important life changes. According to a review from the National Institute of Health (66), the results of the technique are inconsistent. It seems that the role of the therapist is important. According to Swedish motivational interviewing counselors, the informed dialogue is important for success (41).

The technique is sometimes described as a variant of the so called trans-theoretic model (41), originating from Prochaska, DiClemente and Norcross (67), but this is rejected from the initiators (68). The descriptions of motivational interviewing has changed over time (68) and the difficulties in learning how to practice motivational interviewing and the importance of monitoring and feedback during education have been emphasised (68).

A meta-review of RCTs mainly in primary health care (69) showed that motivational interviewing produced significant results in about 75% of patient treatments regarding body mass index, systolic hypertension, total blood cholesterol and alcohol measurement. Only studies with motivational interviewing description and treatment as usual as control were included. However, the 'traditional advice' in the meta-analysis is an expression for a

GP-centred approach. The GP defines the patient's problem from a biomedical perspective and does not include the patient perspective on the matter. This is not regarded as 'gold standard' in contemporary patient consultation (14). Patient education on diabetes by nurses (64) rendered no improvements on HbA1c compared with education as usual.

At the time of the studies there were no Cochrane reports on the effects of motivational interviewing. A report on alcohol abuse was presented in 2011 (65) providing motivational interviewing is more effective than doing nothing. When it is compared with other interventions such as giving feedback on assessments or other types of psychotherapy, no superiority or inferiority has been shown.

This is probably explained by the fact that motivational interviewing shares a number of nonspecific therapeutic factors such as attention and therapeutic alliance with these other interventions. These factors may have a much greater influence on outcome than the contribution made by approach-specific theory and technique. In a review of empirical psychotherapy studies Lambert (70) found that common therapeutic factors accounted for 30% of the therapeutic effect, technique for 15%, expectancy (placebo effects) for 15% and spontaneous remission for 40%.

Education, information and learning styles

It is difficult to distinguish between “information” and “education” (71). Information is a didactic concept and research in the field describes *what* to be inform about, *how* it should be presented and *why* the topic should be informed about.

Knowledge has often been regarded as something positive and valuable (72). This is not always the case as it may also have negative implications.

Some centuries ago it was clear that knowledge could be useful during a lifetime (73). With time the timespan of social change including the usability of a person’s knowledge has become much shorter than the years of longevity (*Figure 1*).

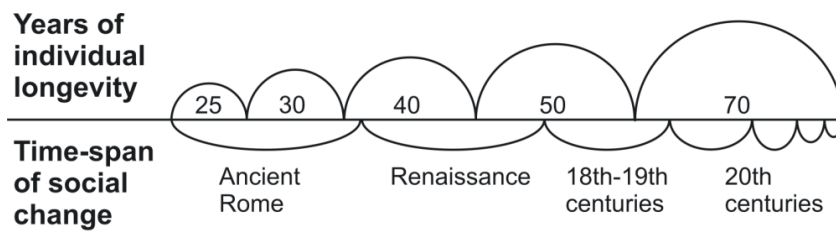


Figure 1. Timespan of social change including the usability of a person’s knowledge in comparison with the lifetime. Adapted from a figure by Alfred North Whitehead, presented in Malcolm Knowles’ ‘The modern practice of adult education’, page 41 (see reference 73).

The implication of this is that the ‘knowledge’ of the individual has to be renewed to be useful in surroundings that change distinctly. Of course this is not true for all knowledge e.g. aspects of life that you learn just like professionals learn to be skilled by experience (74).

The relation between the action, knowledge, and learning levels are described to as four levels spanning between reproductive learning to creative learning (72). It could be interpreted as a variant of Maslow's pyramid (Figure 2).

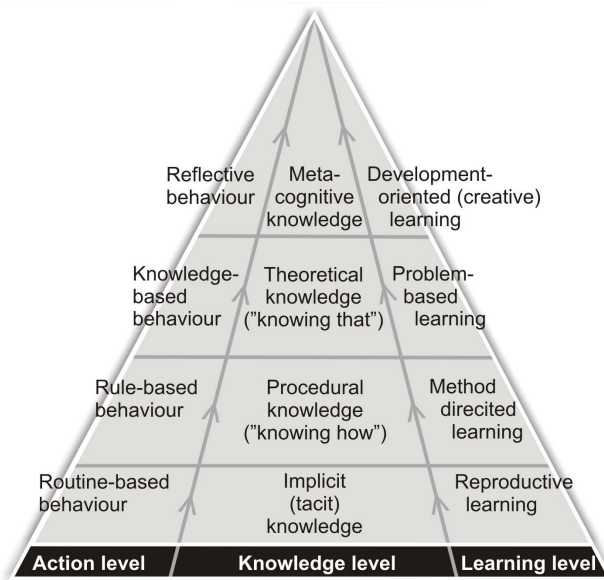


Figure 2. This interpretation of Maslow's pyramid is done with the help of description of four levels of learning, knowledge and action according to Ellström (see references 72 and 73). It is adapted after Malcolm Knowles' 'The modern practice of adult education', page 28. Originally Maslow's pyramid has 'Physiological or survival needs' in the bottom layer. This is followed by 'Safety needs', 'Love, affection and belongingness needs', 'Esteem needs' and at the top of the pyramid 'Need for self-actualization'.

Reflective learning requires not only a well-functioning working organisation but also the individual's knowledge and skills (72).

Concerning education, Marton (75) presents four requirements for learning; the knowledge must be relevant, the knowledge should be discernible, teaching needs to be varying to be learned and should engage all senses. Recent studies on animals support these requirements (76). Plurality, fast dynamics and dynamic grouping are optimal for a brain system thought to exploit large pools of stored information to guide behaviour on a second-by-second time frame in the animal's natural habitat.

In his book on modern practice on adult education, Knowles from the United States writes 'In the beginning was pedagogy' (73). This started in the monastic schools of Europe between the seventh and twelfth centuries. It came to dominate the secular schools including the universities. The word derives from the Greek words for 'child' and 'leading', meaning the art and science of learning for children, mostly reading and writing.

Not until the 1920s was adult education beginning to be organised systematically. We did not know much about learning in contrast to teaching until studies of adult learning began to appear after the second World War (73). Learning must now be defined as a lifelong process of continuing inquiry and learning how to learn. The term often used for adult education is 'andragogy', also derived from Greek for 'man, not boy' and learning. Adults learn at best when they perceive the information as relevant and provided promptly. Andragogy has dealt more clearly with independence of the person learning. Some names of important persons in the history of learning with relevance for our time are Montaigne, Pestalozzi, Kierkegaard, Montessori and Freinet (77). The Swede Ference Marton, mentioned above, also fits into the group.

According to a Cochrane report (78) educational meeting alone or combined with other interventions can improve professional practice and healthcare outcomes for the patients. The effect is most likely to be small and similar to other types of continuing medical education, such as audit and feedback, and educational outreach visits. Strategies to increase attendance at educational meetings, using mixed interactive and didactic formats, and focusing on outcomes that are likely to be perceived as serious, may increase the effectiveness of educational meetings. Educational meetings alone are not likely to be effective for changing complex behaviours.

According to a health technology assessment report (19) dissemination of printed educational materials, audit with feedback and multifaceted interventions with educational outreach improve physician performance by 6%–8% whereas reminders have twice the impact.

The knowledge profiles for physicians and nurses were described as a triangle including 'behaviour', 'biology' and 'population' by Hultberg and Thorpenberg in 2001 (71). 'Biology' dominates clearly the physicians' profile whereas 'behaviour' dominates the nurses' profile although not so evidently (*Figure 3*). The profiles may be useful in educational contexts in health care.

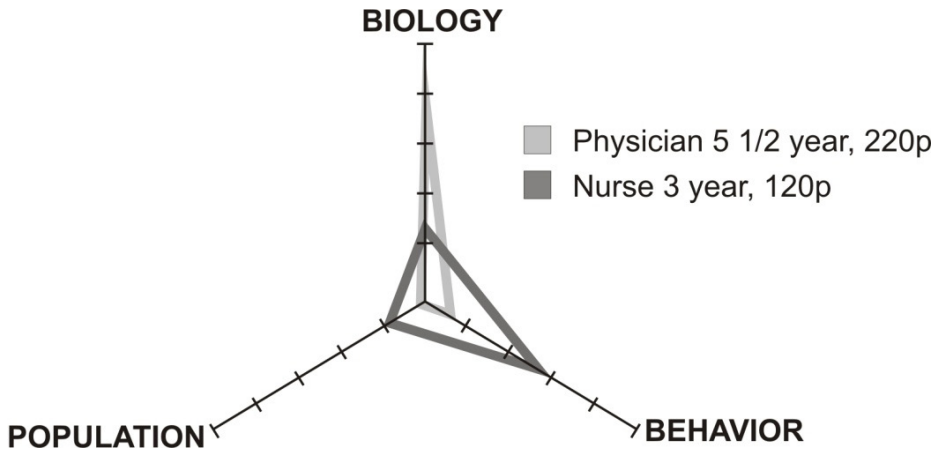


Figure 3. Knowledge profiles for physicians and nurses. Adapted after a figure by Hultberg and Thorpenberg (2001), from Isaksson; *Patient-education and the learning of patients*, page 64 (see reference 71).

In a qualitative report from the Sahlgrenska Academy (79) it was described that less experienced physicians concluded the diagnoses from an analytical point of view based on some critical features. The more experienced physicians sensed different nuances to be used when making a decision. Few physicians, regardless of age, put theoretical knowledge ahead of practical experience. The physician's work is thereby often lead by 'rules of thumb' (80) rather than scientifically proven principles. Of course a scientific approach cannot be excluded in the work with 'rules of thumb'! A management such as 'rules of thumb' is known from other professions which use concrete locally designed rules and guidelines (74). In this report from Gothenburg (79) it almost seemed as if the younger and the more experienced physicians were two different professions regarding their reflections of action in the profession.

In Sweden, the problem-based learning and the Harvard case methods, both originating in problems to be solved, began to spread in health care at the end of the 20th century (81).

Attitudes and behavior

”Attitude” was described already by Gordon Allport in the 1930s as the social psychology’s most indispensable concept (82). The concepts ‘attitude’ and ‘opinion’ cannot be distinguished from each other and the definition of ‘attitude’ varies between authors (83). Allport’s observation in 1935 that ‘attitudes are measured more successfully than they are defined’ is still valid as many definitions still exist (84).

One definition of attitude is ‘a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour’ (85). The psychological tendency refers to a state that is internal to the person and evaluating refers to all classes of evaluate responding, whether overt or covert, cognitive, affective, or behavioural.

Those in favour of the cognitive development, claim that beliefs or schemas are meant to be the building blocks of an attitude. According to this approach, attitudes toward a given object are constructed and formed in response to information that is collected, stored and then evaluated, both directly and indirectly.

From the affective perspective, attitude is a product of the pairing of an attitude object with a stimulus that elicits response. For example, stimuli repeatedly associated with the onset of electric shock would result in negative evaluation via this affective process. The affective responses are quite immediate and might not be mediated by thinking about the attitude objects.

The behavioural approach to attitude creation means that attitudes are a result of direct experience through repeated exposure to an object that results in greater attraction to that object. This could be a variant of classical or instrumental conditioning where behaviour that gives positive consequences is reinforced whereas behaviour followed by negative consequences is not. A form of observational learning, as a form of modelling, is also described.

There are theories that if behaviour and attitude do not correspond this might lead to a cognitive dissonance, which could cause increased stress levels. These aspects are frequently highlighted by the pioneers of the motivational interviewing technique.

A longitudinal study over one month showed that newly acquired attitudes were more strongly associated with actual behaviour when the source information was lengthy and providing the recipients had high involvement in the issue (86). In a study on environmental concerns (87) latent motivation had to be supported by favourable circumstances in the

choice-making situation to affect behaviour. When people were put under time pressure they disregarded the new attitudes and relied on habits.

There is no simple explanation saying that there should be a cause-effect relationship between attitude and behaviour (88). It could be so, or it could be the other way around.

1 AIMS OF THE THESIS

General aim

The general aim was to investigate whether evidence-based drug information provided to GPs can be implemented more effectively than evidence-based drug information provided as usual.

Specific aims

To describe GPs' thoughts on evidence-based drug information and prescribing medication (*Study I*).

To explore GPs' attitudes on drug information from public authorities and from the pharmaceutical industry (*Study II*).

To investigate whether tailored evidence-based drug information, provided using motivational interviewing technique and focused on benefit aspects, can influence GPs' attitudes on drug information differently, than evidence-based drug information provided as usual (*Study III*).

To investigate whether tailored evidence-based drug information, provided using motivational interviewing technique and focused on benefit aspects, can change GPs' prescribing pattern of ACE inhibitors more effectively than evidence-based drug information provided as usual (*Study IV*).

Methods

The dissertation comprises one qualitative and three quantitative studies. An overview of the studies is shown in *Table 1*.

Table 1. Methods used in the studies of the thesis.

Study	I	II	III	IV
Design	Descriptive qualitative	Cross-sectional	RCT	RCT
Study groups	Strategically selected GPs (n=16)	GPs (n=368) at 97 PHCCs	GPs (n=180) at 66 PHCCs	GPs (n=991) at 66 PHCCs
Data collection method	Focus-group interviews, taped and transcribed	Attitude questionnaire	Attitude questionnaire	Prescription data on anti-hypertensive drugs from computerised medical records
Data analysis	Qualitative content analysis	Multilevel logistic model	Mann-Whitney's test	Multilevel modelling and multiple linear analyses

The selection process is shown in *Figure 4*.

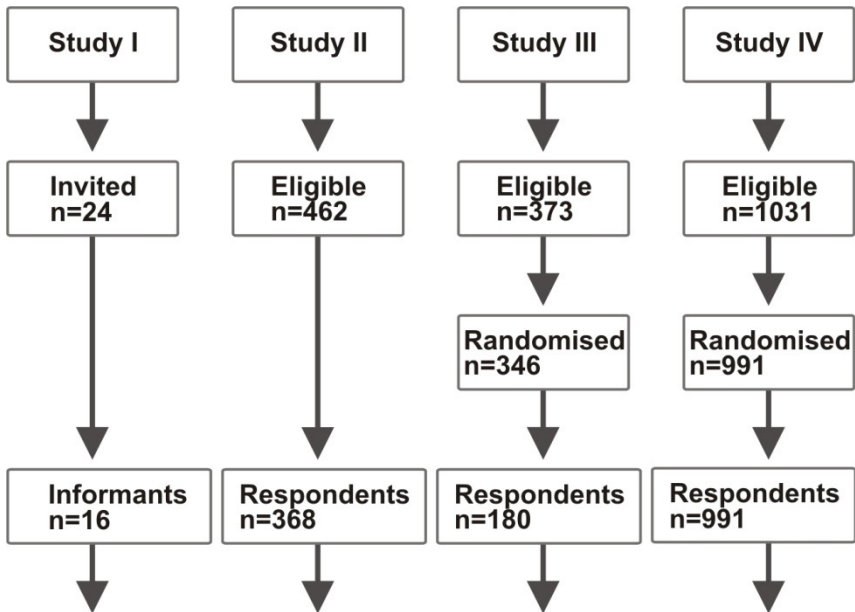


Figure 4. The selection process in the studies of the thesis.

Study I

Design and geography

This study was qualitative and a merge of the results from four focus-group interviews, conducted in the year 2000 in the Södra Älvsborg county council (Figure 5).

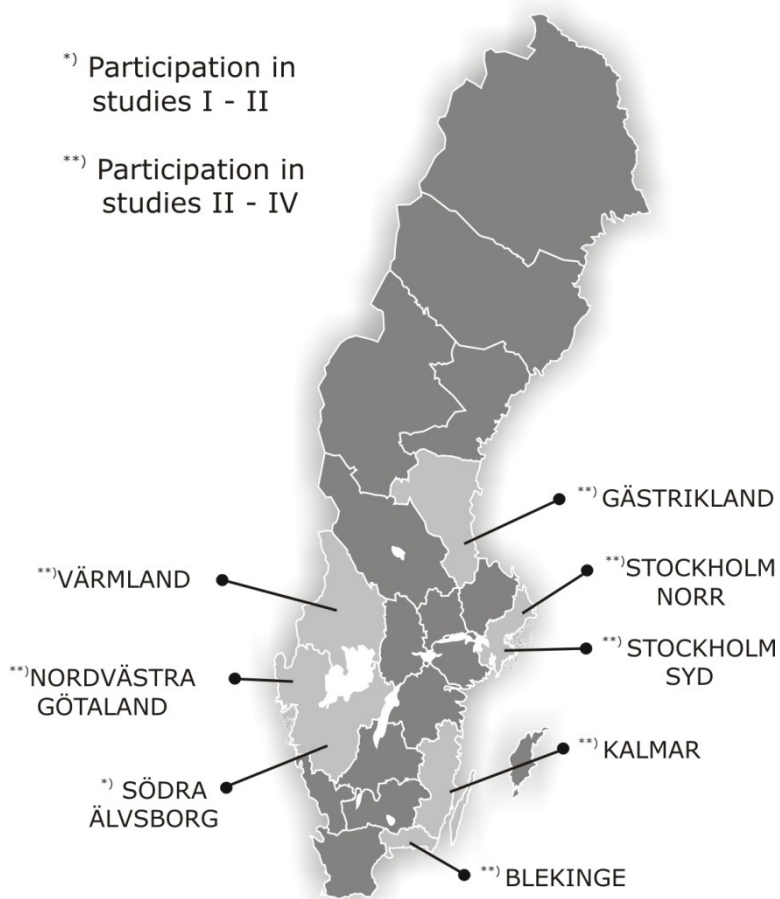


Figure 5. GPs from different parts of Sweden participating in studies I-IV.

Informants and inclusion criteria

Focus-group interviews, a method particularly useful for exploring people's knowledge, experiences, and thoughts (89), were used in order to access the thoughts of the GPs. In this study, thoughts mean the meanings the GPs expressed in the focus groups.

Out of a total of 178 GPs in the south-eastern part of the Region Västra Götaland, (including future specialists currently in training), 24 were strategically selected and personally invited by mail. The selection aimed at including those with long and short professional experience, men and women, doctors in private practice and in the public health sector. Of the 24 invited GPs, 16 accepted to participate; ten men and six women, ten in the ages 39–49 and six 50–69 years, mean age 48 years. Rural areas as well as cities with 30 000–100 000 inhabitants were represented. Number of years of work experience ranged from 2–22 years.

Procedure and data analysis

Four focus-group interviews with four participants in each were held during two hours' time in the year 2000. A question guide, dealing with experiences of prescribing, how knowledge is acquired/obtained, reviews on EBM and thoughts about knowledge and information in the future was used. The moderator had an assistant with prior experience of the method during two interviews. Notes were taken during the interviews. In addition, the interviews were taped and subsequently transcribed verbatim. A comprehensive assessment was written by the moderator after the interviews. This was used to recall the first impression during the analysis. Each tape was listened to during the first 24 hours by the moderator.

The transcribed interviews were analysed by the three authors (two GPs, one of them MD/PhD, and one nurse-sociologist/PhD). After several readings, during which notes were made, the text was divided into meaning units. Units with similar content were compiled under different themes. The themes were then assembled into categories. One category was more pertinent than the others, included the others, and was therefore labeled as a core category. The method, systematic text condensation, is a qualitative descriptive method (90). It means that datasets are concentrated and systematised into a description.

The results were validated by 12 of the 16 informants being asked to assess whether they approved of our designation of the core category in the analysis. The quotes in the results emerge from different persons in the four groups.

Study II

Design and geography

The study was quantitative and cross-sectional and we used an attitude questionnaire for data collection. The participating GPs were from the south of Sweden including Stockholm (*see Figure 5*).

Subjects and procedure

The study was carried out in 2004. All Swedish DTCs were invited to participate in the study by their chairmen and chairwomen since the DTCs were in charge of giving public evidence-based drug information to GPs.

Out of 29 DTCs eight took part in the second study. Non-participating DTCs were occupied with other projects or lacked information officers or time to participate. The DTC of Södra Älvsborg only took part in the second study as the study emanated from there. The participating DTCs invited the primary health care centre (PHCCs) in the geographical area of which they were in charge. The GPs were invited by their managers. The DTCs did not otherwise take part in the process.

The number of GPs targeted to receive information was based on the number of permanently employed GPs at the PHCCs which at that time were 462.

Data collection

A questionnaire (*Table 2*) was developed in cooperation with six experienced colleagues in a network dealing with medication in the Swedish Association of General Practice. The first edition was tested on about 10 GP colleagues who were asked whether they found the items comprehensible and if not, to provide suggestions for change. The revised questionnaire was then used.

The seven questions dealt with origin of drug information, the amount, quality, usefulness and if so, how soon the information proved to be useful. One open-ended question asked for useful examples. Finally, GPs were asked to agree or disagree with statements whether the work of industry and public authorities, respectively, was to i; improve GPs' knowledge of drugs, ii; influence cost of medication (public authorities) or iii; sales of drugs (industry). All questions except one were Likert scales anchored from 1 to 7. The open-ended answers were categorised and the responses in each category were counted. The final version of the questionnaire was sent to each PHCC director for distribution. Non-responders were reminded twice reminded with a two-week interval via the director of the PHCC.

Table 2. Topics in questionnaire on attitudes to drug information.

Item*	
1	From where do you mostly get information about drugs? (pharmaceutical industry --- public authorities)
2a	What is your opinion on the amount of drug information you get from public authorities? (too scarce --- too extensive)
2b	What is your opinion on the amount of information from the pharmaceutical industry? (too scarce --- too extensive)
3a	What is your opinion on the quality of drug information from public authorities? (very poor --- excellent)
3b	What is your opinion on the quality of drug information from the pharmaceutical industry? (very poor --- excellent)
4a	Do you usually find drug information from public authorities useful? (not at all --- a great deal)
4b	Do you usually find drug information from the pharmaceutical industry useful? (not at all --- a great deal)
5a	If you usually find drug information from public authorities useful – how soon does it prove to be useful? (later on --- immediately)
5b	If you usually find drug information from the pharmaceutical industry useful – how soon does it prove to be useful? (later on --- immediately)
6a	If you usually find drug information from public authorities useful – please give some examples.

Item*

- 6b If you usually find drug information from the pharmaceutical industry useful – please give some examples.

To what extent do you agree with the following four statements?
(do not agree at all --- agree totally)

- 7a The main purpose of the drug information from public authorities is to increase my knowledge of drugs.
- 7b The main purpose of the drug information from the pharmaceutical industry is to increase my knowledge of drugs.
- 7c The main purpose of the drug information from public authorities is to influence the cost of medication for providers.
- 7d The main purpose of the drug information from the pharmaceutical industry is to influence the company's sales.

*All questions except 6a and 6b were Likert scales anchored from 1 to 7 with 1 representing the alternative seen left in brackets below the item and 7 as the alternative seen right in brackets below the item. Society=Societal information about drugs from e.g. drug and therapeutic committees, The Medical Products Agency, The National Board of Health and Welfare, The Swedish Council on Technology Assessment in Health Care, The Swedish Drug Compendium, postal advertisement, information during lunch, educational events.

Statistical analysis

For each question we calculated a dichotomised outcome variable, which was 1 if the category of the answer was larger or equal to the median, and 0 if otherwise (91). Independent variables were the physician's sex, work experience, age and whether the physician worked in the public sector or in private enterprise. These independent variables were treated as fixed effects in a multiple logistic regression model. As the GP's age and GP's experience were strongly correlated they could not be included in the same model. Thus, each question was analysed twice, first by GP's age and all other independent variables except experience and then by GP's experience and all independent variables except age.

A multilevel model was used to analyse the correlation in the opinions of GPs working at the same PHCC or in an area connected with the same DTC. We included GPs' workplace, located within areas belonging to a particular DTC as random effects in the multilevel logistic model. For each random effect, the variance between groups (PHCC or regions) was transformed into an intra-class correlation coefficient which could be interpreted as the proportion of variation of the dependent variable that could be explained by variation in the random effect variable. Two-sided p-values were presented both for fixed and random effects. The significance level was set to 5%.

Study III

Design and geography

The study was a randomised clinical trial and we used an attitude questionnaire for data collection. The participating GPs were from the south of Sweden including Stockholm (*see Figure 5*).

Subjects and procedure

The study was carried out in 2004–2005. Inquiry of participation was put to all 29 Swedish DTCs; seven chose participation. The participating DTCs invited the PHCCs in the geographical area of which they were in charge. The GPs were invited by their managers. The DTCs did not otherwise take part in the process.

The medical information officers of the seven DTCs; seven men and seven women (three GPs, eleven pharmacists), were previously assigned to provide information to GPs at specified PHCCs in the participating DTCs. The officers were as far as possible matched pairwise based on profession, number of GPs in their district and sex; male and female pharmacist officers with equal amount of GPs in their domain, a female pharmacist officer was matched to a female GP officer, and a male GP officer to a female GP officer. They were then randomised by an independent person. The GPs, the study objects, were as a result ‘cluster randomised’ with their officer.

The number of GPs estimated to receive information was based on the number of permanently employed GPs at the participating PHCCs in the seven drug and therapeutic committees, 373. Some were missing why there were 204 GPs in the intervention group and 142 GPs in the control group. GPs not attending the information sessions were assumed to receive the information through their colleagues.

Four male and three female officers provided tailored evidence-based drug information by using MI (one GP, six pharmacists) whereas three male and four female officers (two GPs and five pharmacists) provided evidence-based drug information as usual.

The officers gathered in October 2004. Both groups were lectured on the EBM report on hypertension in a common session for approximately two hours. After the education session, the control officers left. The intervention officers were further educated for eight hours during two days. The aim was to teach them how to provide evidence-based drug information with motivational interviewing technique and focused

on the benefit aspect. The training started from the individual GP's own thoughts and beliefs and the benefit aspects were emphasised. The setting reminds of patient-centred communication (146). The training in motivational interviewing technique included role playing which was videotaped (62) and the officers were given feedback. All officers were aware that a difference between the groups existed but did not know what constituted the difference.

The intervention took place in November 2004. All GPs present at the 66 participating PHCCs; 28 in the intervention group and 38 in the control group, were presented with the new guidelines during two hours. The information for the GPs took place at the PHCC. The intervention group received evidence-based drug information using motivational interviewing technique and focused on GPs' thoughts on prompt and pragmatic benefit, while the control group received evidence-based drug information as usual (*Figure 6*).

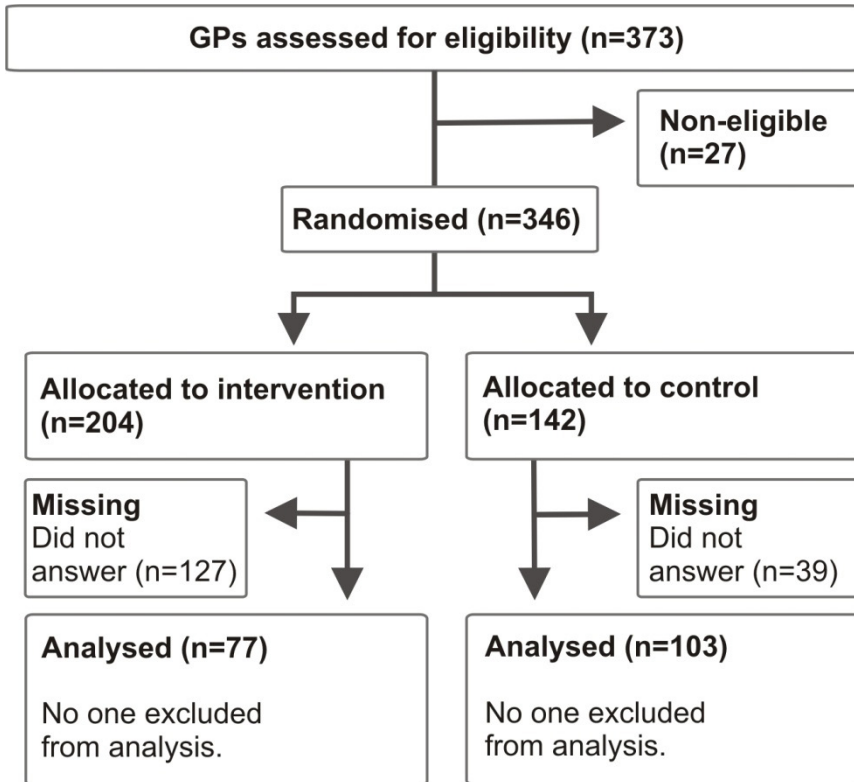


Figure 6. Flow of participating GPs through the study.

Data collection

The same attitude questionnaire as in study II was used (Table 2). It was answered a month before and two months after the intervention; non-responders were reminded twice with two-week intervals. The open-ended questions were not analysed and presented in this study.

Statistical analysis

The groups were compared at baseline. Change in response concerning attitudes was coded shift to the left, no change, or shift to the right compared to baseline. Changes between groups in this three-step ordinal scale were analysed with the Mann-Whitney test. Analysis was by intention-to-treat. Statistical significance was set to $p < 0.05$. The statistical programme Epi-info version 3.4.3 (CDC, Atlanta, U.S.A.) was used.

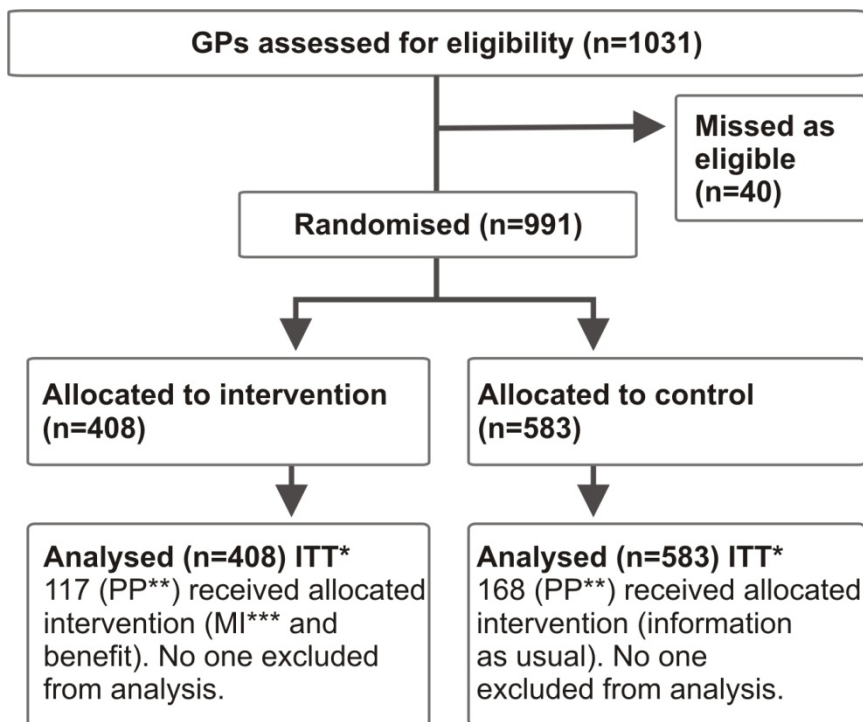
Study IV

Design and geography

The study was a randomised clinical trial and we used GPs' prescriptions of antihypertensive drugs from computerised medical records for analyses. The participating GPs were from the south of Sweden including Stockholm (*see Figure 5*).

Subjects and procedure

The study was carried out in 2004–2005. As the intervention of the study is the same as in study III, I refer mainly to the description of methods for study III above. The number of GPs estimated to receive information was based on the number of permanently employed GPs at the participating PHCCs in the seven drug and therapeutic committees; 373 GPs. However, in data compilation we found 1031 physicians, working at the PHCCs during the study period. The majority were temporary doctors and substitutes. Permanently employed GPs not attending the information sessions were assumed to receive the information through their colleagues and the same assumption was made with the other physicians as they were included. All physicians are referred to as 'GPs'. The randomisation procedure of the medical information officers and, as a consequence, a 'cluster randomisation' of the GPs' is already described in study III. The intervention was the same. The GPs in the intervention group received evidence-based drug information using motivational interviewing technique and focused on GPs' thoughts on prompt and pragmatic benefit, while the control group received evidence-based drug information provided as usual (*Figure 7*).



*Intention-to-treat. **Per Protocol. ***Motivational interviewing technique.

Figure 7. Flow of participating GPs through the study.

Data collection

Prescription data from participating PHCCs for all antihypertensive drugs were collected from their computerised medical records according to the Anatomical Therapeutic Chemical Classification. The software systems for computerised medical records were Profdoc®, Medidoc® and Swedestar®. Change in prescription from base line (0–3 months before intervention) to the time periods 0–3 months and 4–6 months after intervention were analysed. A separate file enabled linkage between data on prescription data and the prescriber. The primary outcome was change in the proportion of ACE inhibitor prescriptions relative to the sum of ACE inhibitors and Angiotensin II receptor blockers, comparing intervention and control groups 0–3 and 4–6 months after the intervention.

Statistical analysis

A sample size calculation indicated that we needed an estimated total of 460 GPs ($p < 0.05$, power 90%); 991 were analysed. Statistics were calculated on the level of GPs. Data existed at several levels; 1) GPs' prescriptions of antihypertensive drugs 2) GPs 3) PHCCs and 4) geographical area including several PHCCs. Prescriptions were aggregated to produce one change in proportion for each GP. A multilevel model was used to examine the effect of the levels *PHCC* and *geographical area* on the change in proportion of GPs' ACE-inhibitor prescriptions. As these levels explained <1% of the variation in the dependent variable /change in proportion of ACE inhibitor prescriptions, we decided to use the simpler multiple linear regression to compare the groups. The dependent variable was the change in GPs' prescription proportion while independent variables were group allocation and those variables where groups differed at baseline; patients' sex and type of clinic. The analysis was performed by intention-to-treat and per protocol.

Ethical consideration

The studies were carried out in accordance with the Helsinki Declaration and approved by the Regional Ethical Review Board in Gothenburg (Dnr: 129-04). Studies II–IV were also approved by the head of the Personal Data Act (PUL) in primary health care in the region Västra Götaland. The participants were informed either personally or via their manager about the aim of the study and that all information would be treated confidentially and that no information would be traceable to a single individual.

3 Results

Study I

Benefit, in various aspects, was the category emerging most clearly from the interviews. In every decision-making situation, positive elements collaborated and enhanced the possibility that a given treatment would be chosen over another. The benefit was a merge of positive elements, all aspects of the GPs’ tasks: curing, limiting, economizing and conducting. The benefit contained all aspects including benefit for the patient, benefit for the doctor, benefit for the care, benefit for the work situation and benefit for the unit. The benefit should be prompt and pragmatic, which was the utmost benefit: delivered immediately, useful and handy. A very long-term perspective does not belong to prompt and pragmatic benefit (Table 3). The categories, including some citations, are presented below.

Table 3. The themes and categories forming the core category “Prompt and pragmatic benefit”.

Themes:	Categories:	Core category:
Curing Limiting Economising Conducting The available time sets the limits	Benefit Time and space	Prompt and pragmatic benefit (utilitarian)
Knowledge on a day-today basis Information scrutiny and sorting out The patients as the doctor’s source of knowledge Part of the art of medicine Retaining and preserving knowledge “Law of medical inertia” Theory versus practice Custom made	Expert knowledge	

The benefit category;

Curing

The participating GPs emphasised the striving to be useful and to help, which they regarded as a part of the profession. Medications were considered a potent concrete tool and thus a means for the GPs to fulfil this striving. To prescribe medication with a prompt result was a more rewarding experience for the GP compared to medication with a result sometimes in future.

“He sank into a depression. Then he got help and bounced back after a month, in great shape. ‘Now that’s a fellow we’ve never seen before!’ said the staff.”

Limiting

Setting limits on medication against patient’s wishes but for the benefit of health, as with addictive drugs, was described as a mentally stressful experience. It is beneficial for the physician to reduce the feeling of discomfort and to act professionally. There are benefits also for the patient if this takes place although it is not always understood or accepted by him/her. Limiting is closest to a long-term aspect in the results.

“A person who has to run around his whole life addicted to drugs, showing up on the doctor’s doorstep the minute the pill bottle is empty, must be a very unhappy person. You simply don’t want to make them that unhappy.”

Economising

When it came to economy the doctor’s focus was on the patient’s economy, not on the economy of the healthcare sector. The need to follow up prescribed drugs with many blood tests and checkups was also significant for the doctor’s assessment of the benefit to the patient and also to economise. Using thiazides, a diuretic hypertension-drug, might be linked to extra blood tests several times.

“Actually, I rather like thiazides but all my patients’ potassium levels go down, so I use furosemid instead.”

Conducting

Prescription of medications was a symbolic tool or ritual, performing a rounding-off which did, correctly applied, carried the work forward.

“The prescription helps us bring the parts of a consultation together; it is a conclusion and something concrete for the patient to take with him or her.”

The time and space category;

The available time set the limits

According to the doctors, relating to time was about making it suffice. Taking benefit into consideration was also part of the picture and most often entailed giving priority to working directly with one's patients, a choice considered to be obvious. It was thus hard to find the time to meet other demands in addition to seeing patients. The available time set the limits, especially when it came to time devoted to continuing education. Circumstances facilitating and improving the utilisation of time contributed, to a high extent, to prompt and pragmatic benefit. Listening to a verbal presentation of a book or report, obtaining information quickly from a book or by phone, or attending a well-prepared lecture are examples of such circumstances. The Internet was, on the other hand, regarded as less helpful; it required too much time and was complicated.

“The only obstacle is that it'll be hell to come back, you have to pay back to take the time.”

Factors crucial to the doctor's handling of knowledge and prescription were physically close at hand. The relationship to the patient and the information given to him/her, a district nurse to collaborate with, instructions for taking clinical tests, and simple routines for adhering to a treatment were very important. Being close at hand often implied a low consumption of time.

The expert knowledge category;

When the doctors spoke of knowledge, the emphasis was on how knowledge is used, where it is obtained, how it is maintained and how it relates to the EBM concept.

Knowledge on day-to-day basis

The practice-based knowledge of different drugs, obtained by the medication prescribers during the workdays was also an important source of knowledge. Thoughts of that this knowledge was extensive and difficult to collect were highlighted.

“There is much knowledge in the primary health care that just needs to be assembled by someone.”

Information scrutiny and sorting out

Information from the pharmaceutical industry required scrutiny and sorting out in order to be beneficial, but practical advice regarding drugs with which one was already familiar was appreciated.

“I think information that’s not tied to the manufacturer is an important alternative. There are lots of good things about the pharmaceutical industry but we need to learn the economically important bits from an organisation not associated to the manufacturer.”

Patients as the doctor’s source of knowledge

The patient’s opinion was important when evaluating reported and experienced side effects and became an important factor when considering treatment. The perceived side effects, rather than scientific studies, were the focal point, which was obvious from the interviews.

“There are many barriers if you really listen to the patient’s story. There are side-effects and they get tired from beta-blockers, cough from ACE-inhibitors and pee from diuretics.”

Part of the art of medicine

Writing prescriptions was seen as a task of the GPs' work that was almost automatic.

"It just goes without saying; you're practicing medicine when you write prescriptions."

Retaining and preserving knowledge

It took time to compile knowledge. This meant that a new drug would not be chosen instead of an old one without further ado. Inertia in changing medications was thus reinforced. The arduously created confidence in the patient–doctor relationship could easily be demolished by a treatment failure.

"It is good to have in mind what will happen in some years concerning side effects. It's good to know how the drug can be used in practice. I learn from my colleagues' practice at the hospital."

"Law of medical inertia"

Postponing therapeutic changes could be wise to keep the trust of the patients. Some participants stated, however, that doctors should introduce innovations at an early stage if they seemed to be beneficial to the patient.

"This law of medical inertia has often saved us from throwing ourselves into therapeutic measures that didn't turn out so well. It's about maintaining trust, perhaps for many decades."

Theory versus practice

The issue of theory versus practice was especially apparent when evidence-based advice was to be followed.

"You get the impression that it was written by old professors that scrutinised something and then crankily said, 'There's no evidence for that.' but 'basically I think (evidence-based summaries) are a good principle. The field that has emerged throughout the years is gigantic."

Custom made

The advice had to be custom-made for general practice. This was also the case when specialists lectured in their fields; the advices given did not relate to the GPs' reality with a resulting low degree of benefit being derived from the information.

...“In a previous edition of Läkemedelsboken (physicians' reference guide for pharmaceutical treatment), we found the specialist's opinions, based on patients who were so ill that they were seeing the specialist, and all of a sudden half of humanity has these symptoms. We can't follow advice like that; we have to skim off the cream quickly and efficiently, otherwise the healthcare system would collapse.”

Study II

The questionnaire (*Table 2*) was answered by 80% of the GPs (368/462) at 97 PHCCs. The answers are seen in *Table 4*. Most of them, about 85 %, thought that the amount of information from the drug industry was too extensive (item 2b), that the drug information from public authorities was of high quality and useful (item 3a+4a), that public authorities' main task was to increase the physician's knowledge of drugs (item 7a), and that the main purpose of the industry providing drug information was to promote sales (item 7d).

A consistent finding was that male GPs were more orientated towards industry-provided drug information, compared with female GPs (item 1, 4a, 4b and 7a). In item 2b, 4b and 7d it was found that older GPs and those with longer experience were more positively orientated towards industry-provided drug information compared with younger GPs and those with less work experience. Older GPs and those with longer work experience did to a greater extent consider that increasing their knowledge of drugs was a major task for public authorities (item 7a). Furthermore, GPs with greater work experience considered to a lesser extent that the aim of public authority information was to influence the cost of medication to society (item 7c). In item 7d GPs in the public sector to a larger extent considered the main task of the industry to increase their sales compared with GPs in the private sector (*Table 4*).

For most items, the random effects describing correlations within PHCCs or regions belonging to the same DTC were of little importance compared with fixed effects such as sex, age, work experience and sector. For all questions, we found that the variation in opinions between different PHCCs was larger than between regions connected to different DTCs, or, in other words, we observed a relatively high correlation of GPs opinions within the same PHCC, regardless of where they worked. Most prominent was how the doctors regarded the usefulness of the information received from the pharmaceutical industry (item 4b).

Table 4. Questionnaire responses related to sex, age, work experience, sector and geographical area.

Fixed effects				
Item ^a	N ^b	Sex (female/male) ^c	Age ^{cf}	Work experience ^{cf}
1	292	1.92 (1.17-3.14)**	1,01 (0.98-1.04)	----
	291	1.97 (1.19-3.26)**	----	1.02 (0.99-1.06)
2a	292	1.64 (0.97-2.79)	1.00 (0.96-1.03)	----
	291	1.66 (0.97-2.83)	----	1.00 (0.97-1.03)
2b	292	1.35 (0.80-2.26)	0.96 (0.92-0.99)**	----
	291	1.37 (0.81-2.29)	----	0.98 (0.95-1.00)*
3a	291	1.46 (0.88-2.43)	0.99 (0.97-1.00)	----
	290	1.49 (0.90-2.48)	----	0.99 (0.96-1.02)
3b	291	1.29 (0.78-2.13)	1.03 (1.00-1.07)	----
	290	1.31 (0.79-2.17)	----	1.02 (0.99-1.05)
4a	292	2.06 (1.24-3.40)**	0.99 (0.97-1.02)	----
	291	2.07 (1.24-3.44)**	----	1.00 (0.97-1.03)
4b	291	0.55 (0.32-0.94)*	1.04 (1.01-1.08)*	----
	290	0.57 (0.33-0.98)*	----	1.04 (1.00-1.07)**
5a	286	0.82 (0.51-1.33)	1.02 (0.99-1.05)	----
	285	0.55 (0.26-1.14)	----	1.00 (0.95-1.04)
5b	283	1.04 (0.61-1.80)	1.01 (0.98-1.05)	----
	282	1.00 (0.58-1.74)	----	1.00 (0.97-1.03)
7a	292	1.76 (1.02-3.03)*	1.04 (1.00-1.08)*	----
	291	1.78 (1.03-3.07)*	----	1.04 (1.01-1.07)**
7b	291	1.17 (0.70-1.94)	1.01 (0.98-1.05)	----
	290	1.20 (0.72-2.01)	----	1.01 (0.98-1.04)
7c	291	1.17 (0.68-2.03)	0.97 (0.93-1.01)	----
	290	1.12 (0.64-1.97)	----	0.97 (0.94-1.00)*
7d	291	1.10 (0.68-1.78)	0.96 (0.93-0.99)**	----
	290	1.04 (0.64-1.69)	----	0.97 (0.94-1.00)*

*p<0.05,**p<0.01

^a Question according to Table 2.

^b Number of responders with response for all items included in the regression model.

^c Odds ratio (95% confidence interval) --- two sided p-value.
First line when age is included as independent variable and second line when working time is included as independent variable.

Random effects		
Sector (Public/Private) ^c	PHCC ^d	Area ^e
1.38 (0.57-3.38)	0.039	0
1.27 (0.51-3.20)	0.052	0
1.06(0.39-2.89)	0.075	0.022
1.07 (0.40-2.87)	0.065	0.026
1.45 (0.54-3.89)	0.082	0.01
1.50 (0.56-4.00)	0.087	0.001
1.67 (0.63-4.43)	0.054	0.031
1.55 (0.58-4.18)	0.060	0.033
0.37 (0.13-1.05)	0.092	0
0.36 (0.12-1.04)	0.094	0
1.19 (0.50-2.82)	0.022	0
1.15 (0.48-2.77)	0.029	0
0.20 (0.05-0.76)*	0.163*	0.036
0.19 (0.05-0.74)*	0.169*	0.034
0.95 (0.42-2.16)	0	0
1.00 (0.40-2.49)	0	0
0.78 (0.30-2.04)	0	0
0.79 (0.30-2.08)	0	0
1.27 (0.49-3.24)	0.057	0
1.15 (0.46-2.91)	0.047	0
0.59 (0.22-1.61)	0.062	0
0.58 (0.21-1.59)	0.065	0
0.97 (0.33-2.89)	0.101	0.016
1.02 (0.33-3.11)	0.112	0.020
2.70 (1.12-6.49)*	0	0
2.80 (1.16-6.75)*	0	0

^d Variation among primary health care centres is transformed to intra-class correlation. ICC --- One sided p-value for variation.

^e Variation among regions is transformed to intra-class correlation. ICC --- One side p-value for variation.

^f Odds ratio for an increase of one year in age or working time.

When GPs in open-ended questions described aspects of drug information from public authorities and from the pharmaceutical industry, the former was regarded as useful for the GPs in making scientific judgments on drugs, concerning economic aspects of drug therapy and in providing objective information. The latter was regarded as useful in providing information on new drugs, and in making scientific judgments on drugs and providing useful information on how the patient can use the drugs.

Study III

Of the estimated 373 GPs 27 were not present at the study time. Thus 204 were allocated to the intervention group and 142 to the control group (*Figure 6*).

The response rates were 52 % for the GPs (180/346); 103 males, 76 females (one missing value for sex), and 86% from the primary healthcare centres (59/66). No significant difference was found between the proportion of GPs receiving allocated intervention in the intervention group (73/77) and the control group 92/103 $p=0.30$ (Chi-square with Yates correction). At baseline there were no differences between the intervention and the control group in respondent characteristics (*Table 5*).

Table 5. Characteristics at baseline of GPs in the intervention and control groups.

	Intervention group	Control group	Difference between groups (p-value)
GPs' age ^{a,c}	51 (7.2)	51 (7.2)	0.96
GPs' sex; Male /Female ^b	46/31	57/45	0.72
GPs working at private / public clinic ^b	14/63	10/91	0.17

^aMean (standard deviation). Difference between groups analysed with Students t-test.

^bDifference between groups analysed with Chi-square with Yates correction.

^cBased on available information for 180 GPs.

GPs in the control group considered information from the pharmaceutical industry more useful than those in the intervention group (item 4b, *Table 6*).

Table 6. Comparison of attitudes towards drug information at baseline.

	Item* **	Intervention group***	Control group***	Difference between groups****
1	From where do you mostly get information about drugs? (pharmaceutical industry --- public authorities)	4.1 (1.5) 4.0 (3.0-5.5)	3.6 (1.6) 4.0 (2.0-5.0)	0.056
2a	What is your opinion on the amount of drug information you get from public authorities? (too scarce --- too extensive)	2.9(1.2) 3.0(2.0-4.0)	3.0(1.2) 3.0(2.0-4.0)	0.44
2b	What is your opinion on the amount of information from the pharmaceutical industry? (too scarce --- too extensive)	5.5(1.4) 6.0(5.0-7.0)	5.6(1.2) 6.0(5.0-7.0)	0.94
3a	What is your opinion on the quality of drug information from public authorities? (very poor -- excellent)	5.3(1.2) 6.0(5.0-6.0)	5.0(1.6) 5.0(4.5-6.0)	0.34
3b	What is your opinion on the quality of drug information from the pharmaceutical industry? (very poor --- excellent)	3.5(1.3) 4.0(3.0-4.0)	3.8(1.3) 4.0(3.0-5.0)	0.16
4a	Do you usually find drug information from public authorities useful? (not at all --- a great deal)	5.5(1.2) 6.0(5.0-6.0)	5.4(1.3) 6.0(5.0-6.0)	0.92
4b	Do you usually find drug information from the pharmaceutical industry useful? (not at all --- a great deal)	3.5 (1.2) 3.0 (3.0-4.0)	4.0 (1.4) 4.0 (3.0-5.0)	0.0084
5a	If you usually find drug information from public authorities useful – how soon does it prove to be useful? (later on --- immediately)	4.5(1.3) 5.0(4.0-5.0)	4.3(1.4) 4.5(3.0-5.0)	0.60
5b	If you usually find drug information from the pharmaceutical industry useful -how soon does it prove to be useful? (later on --- immediately)	4.2(1.3) 4.0(3.0-5.0)	4.4(1.4) 4.0(3.0-5.0)	0.45

Item* **	Intervention group***	Control group***	Difference between groups****
6a and 6b	Omitted, open-ended questions	-----	-----
To what extent do you agree with the following four statements? (do not agree at all --- agree completely)			
7a	The main purpose of the drug information from public authorities is to increase my knowledge of drugs. 5.8(1.3) 6.0(5.0-7.0)	5.7(1.4) 6.0(5.0-7.0)	0.79
7b	The main purpose of the drug information from the pharmaceutical industry is to increase my knowledge of drugs. 3.3(1.5) 3.0(2.0-4.0)	3.8(1.8) 4.0(2.0-5.0)	0.13
7c	The main purpose of the drug information from public authorities is to influence the cost of medication for providers. 5.0(1.4) 5.0(4.0-6.0)	4.8(1.5) 5.0(4.0-6.0)	0.57
7d	The main purpose of the drug information from the pharmaceutical industry is to influence the company's sales. 6.2(1.1) 6.0(6.0-7.0)	6.3(1.0) 6.5(6.0-7.0)	0.83

*All questions except 6a and 6b were Likert scales anchored from 1 to 7 with 1 representing the alternative seen left in brackets below the item and 7 as the alternative seen right in brackets below the item. Public authorities= Societal information about drugs from e.g. drug and therapeutic committees, The Medical Products Agency, The National Board of Health and Welfare, The Swedish Council on Technology Assessment in Health Care, The Swedish Drug Compendium, societal educational events.

**The questions were at most answered by 180 GPs, frequency varying for different questions.

***First line mean with standard deviation within parenthesis, second line median with inter quartile range within parenthesis

****P-value, The Mann-Whitney's test

There were no other differences between the groups at baseline. The changes in attitudes occurring after the intervention did not differ significantly between the groups (*Table 7*).

Table 7. Comparison between groups of changes in attitudes towards drug information after the intervention.

	Item* ^{***}	Intervention group ^{***}			Control group ^{***}			Difference between groups ^{****}
		Shift to left	Un-changed	Shift to right	Shift to left	Un-changed	Shift to right	p-value
1	From where do you mostly get information about drugs? (pharmaceutical industry --- public authorities)	22	23	31	26	35	39	0.95
2a	What is your opinion on the amount of drug information you get from public authorities? (too scarce --- too extensive)	20	26	31	33	32	36	0.37
2b	What is your opinion on the amount of information from the pharmaceutical industry? (too scarce --- too extensive)	30	30	16	35	48	18	0.82
3a	What is your opinion on the quality of drug information from public authorities? (very poor --- excellent)	23	37	17	30	34	36	0.24
3b	What is your opinion on the quality of drug information from the pharmaceutical industry? (very poor --- excellent)	20	38	19	30	42	29	0.98
4a	Do you usually find drug information from public authorities useful? (not at all --- a great deal)	27	22	26	31	48	22	0.56
4b	Do you usually find drug information from the pharmaceutical industry useful? (not at all --- a great deal)	19	27	29	26	42	32	0.52
5a	If you usually find drug information from public authorities useful – how soon does it prove to be useful? (later on --- immediately)	26	21	26	35	25	38	0.81

	Item**	Intervention group***			Control group***			Difference between groups****
		Shift to left	Un-changed	Shift to right	Shift to left	Un-changed	Shift to right	p-value
5b	If you usually find drug information from the pharmaceutical industry useful -how soon does it prove to be useful? (later on --- immediately)	27	19	25	39	27	32	0.75
6a and 6b	Omitted, open-ended questions	----	----	----	----	----	----	----
	To what extent do you agree with the following four statements? (do not agree at all --- agree completely)	----	----	----	----	----	----	----
7a	The main purpose of the drug information from public authorities is to increase my knowledge of drugs.	16	41	19	33	49	19	0.091
7b	The main purpose of the drug information from the pharmaceutical industry is to increase my knowledge of drugs.	15	33	28	33	29	38	0.37
7c	The main purpose of the drug information from public authorities is to influence the cost of medication for providers.	26	20	30	27	31	42	0.47
7d	The main purpose of the drug information from the pharmaceutical industry is to influence the company's sales.	20	44	12	29	54	16	0.78

*All questions except 6a and 6b were Likert scales anchored from 1 to 7 with 1 representing the alternative seen left in brackets below the item and 7 as the alternative seen right in brackets below the item. Public= Societal information about drugs from e.g. drug and therapeutic committees, The Medical Products Agency, The National Board of Health and Welfare, The Swedish Council on Technology Assessment in Health Care, The Swedish Drug Compendium, societal educational events.

**The questions were at most answered by 180 GPs, frequency varying for different questions.

***Number of GPs whose attitudes either shifted towards left, were unchanged or shifted towards right with Likert scale anchored questions.

**** P-value, The Mann-Whitney's test

Study IV

Of the estimated 1031 GPs 40 were not present at time of the study. Thus 408 were allocated to the intervention group and 583 to the control group (*Figure 7*). At baseline there were more GPs working at private clinics in the intervention group and the average proportion of female patients was higher in the control group (*Table 8*).

Table 8. Baseline characteristics of 991 GPs in the intervention and control groups at baseline

	Intervention group n=408	Control group n=583	Difference between groups (p-value)
Medical information officers ^a	6 pharmacists, 1 GP 4 males, 3 females	5 pharmacists, 2 GPs 3 males, 4 females	---
Primary healthcare centres	28	38	---
GPs' age; years ^b	46 (11)	47 (11)	0.19
GPs' sex; Male /Female ^c	248/153	328/250	0.13
Number of GPs working at private / public clinic ^c	31/377	0/583	< 10⁻⁶
Proportion of GPs receiving allocated treatment ^c	29%	29%	0.96
Average proportion of female patients among GPs' patients ^b	0.54 (0.19)	0.57 (0.20)	0.016
Average age of GPs' patients; years ^a	69 (6.5)	68 (6.4)	0.13

^aDescription of medical information officers profession (first line) and sex (second line).

^bMean (standard deviation). Difference between groups analysed with Students t-test.

^cDifference between groups analysed with Chi-square with Yates correction. Significant differences in **bold**.

The proportion of ACE inhibitor prescriptions (average proportion for GPs) was increased in both groups at the three and six month follow-up. There were no significant differences in the change in prescription proportion between groups neither with intention-to-treat nor per protocol analysis (*Tables 9 and 10*).

Table 9. Proportion of ACE inhibitors prescribed by all GPs and change in this proportion over time (intention-to-treat).

	Intervention group n=408	Control group n=583
Proportion of ACE inhibitors at 3 months before intervention, baseline ^{a, b}	0.64 (0.26) 0.67 (0.50-0.83)	0.63 (0.28) 0.65 (0.45-0.85)
Relative change in proportion of ACE inhibitors 0-3 months after intervention ^{b, c}	+0.12 (0.43) +0.029 (-0.11 – 0.32)	+0.12 (0.59) ±0.00 (-0.17 – 0.27)
Relative change in proportion of ACE inhibitors 4-6 months after intervention ^{b, c}	+0.12 (0.47) +0.051 (-0.13 – 0.25)	+0.13 (0.56) +0.0040 (-0.14 – 0.26)

^a Proportion = Number of ACE-inhibitors prescribed divided by the sum of ACE-inhibitors and ARBs.

^b Upper line mean (standard deviation). Lower line median (interquartile range).

^c Relative change in proportion = Change in proportion of ACE inhibitors at follow up divided by baseline proportion.

Table 10. Change in proportion of ACE inhibitors prescribed by GPs actually receiving assigned intervention over time (per protocol).

	Intervention group n=117	Control group n=168
Relative change in proportion of ACE inhibitors 0-3 months after intervention ^{a, b, c}	+0.14 (0.41) +0.024 (-0.11 – 0.30)	+0.11 (0.49) 0.053 (-0.17 – 0.25)
Relative change in proportion of ACE inhibitors 4-6 months after intervention ^{a, b, c}	+0.11 (0.47) +0.049 (-0.13 – 0.24)	+0.14 (0.48) +0.031 (-0.12 – 0.32)

^a Proportion = Number of ACE-inhibitors prescribed divided by the sum of ACE-inhibitors and ARB.

^b Upper line mean (standard deviation). Lower line median (interquartile range).

^c Relative change in proportion = Change in proportion of ACE inhibitors at follow up divided by baseline proportion.

4 Discussion

Summary of main findings

Study I; GPs' thoughts on EBM and prescribing medication were highly related to reflecting on benefit and results. Prompt and pragmatic benefit, that is utilitarian in nature, is important for comprehending their thoughts relating to prescribing medication and evidence-based drug information. It is delivered immediately, useful and handy. Thinking in terms of benefit is widespread in current society although not on a clear conscious level. It can occur almost as an unconscious process. The prompt and pragmatic benefit concept is not previously described in the literature.

Study II; GPs considered that drug promotion from the industry was too extensive and that drug information from public authorities was useful and of good quality. They also stated that the main task of public authorities was to promote the GPs' knowledge of drugs and that the industry's main task was to promote sales. Female GPs valued information from public authorities to a much greater extent than male GPs did. To facilitate the implementation of evidence-based drug information, the existence of differences among GPs' attitudes should be taken into account when designing the information.

Study III; In this RCT we investigated whether GPs' attitudes on drug information could be influenced by evidence-based drug information tailored with motivational interviewing technique and focused on the benefit aspect compared with evidence-based drug information provided as usual. No differences in attitude changes were seen between the two groups after the intervention.

Study IV; This RCT investigated whether guidelines on antihypertensive prescription were more effectively implemented to GPs with a new drug information strategy. Evidence-based drug information tailored with motivational interviewing technique and focused on the benefit aspect was compared with evidence-based drug information provided as usual. No statistically significant differences in the change of proportions of prescribed ACE inhibitors were found between the two groups during the two periods 0–3 and 4–6 months after the intervention.

Methodological considerations – study designs

Several methods have been used. In the first study a descriptive qualitative method was used. In the following studies quantitative methods were applied; one was a cross- sectional study and two were RCTs.

Methodological considerations – study I

Many factors influence qualitative studies and most of them can be referred to the researchers choices along the process. They can have impact on the validity of the results (90).

According to Malterud (90), the standards for qualitative inquiry are relevance, validity and reflexivity. The method is discussed from these aspects.

A qualitative method contributes to the understanding of particular areas of human life, in this case the part of GPs' practice that means concerns prescribing medication. The doctors were selected strategically, based on the criteria age, gender and duration of professional experience. The variety in sample, its description and recognition of the context enhances the possibilities to transfer and use the findings beyond the context of the study setting (90). There was general concordance in the focus groups' opinions, confirming the notion that doctors perceive reality with a great degree of accord. The four groups of informants shared their thoughts freely with the moderators. The 12 GPs who were asked for their opinions about the results accepted prompt and pragmatic benefit as a reasonable way to express the core of the findings. This supports the internal validity and possibility of using the label as a way of thinking when planning for various interventions in order to enhance evidence-based practice.

The recommended numbers of participants in a focus-group varies somewhat in text books (89,90). Morgan recommends a range between six and ten participants. We had planned for a similar number of participants. Due to scheduling difficulties, only four participants were available in each group. With participants highly involved, lower numbers than four might work well (89). Smaller groups give each participant a better opportunity to talk and a climate for airing controversies is more easily facilitated (90). In addition,

richness of data required is more important, as to provide sufficiently detailed descriptions of the study area enhances external validity.

As moderator, I beforehand knew all but two participants as colleagues. This could be both an advantage and an obstacle. No specific reactions on this matter were noticed. The investigator always affects the study process, so reflexivity was used, and these aspects were discussed with the study team trying to avoid bias (90). There were neither links of economical nor employment nature.

The study was carried out in the year 2000 and the article was published in 2007. Some of the results might therefore be outdated. Presumably, the GPs would express other thoughts on economic issues than they did in the year 2000, see later in the discussion. According to reactions that I have received when I have described the concept 'prompt and pragmatic benefit'(PPB) to colleagues, it remains understandable and makes sense in order to understand the GPs' thoughts on evidence-based medicine and prescribing of medication. After discussions and presentation of the concept PPB to other groups of healthcare professionals it seems to be understandable for them, too. The criteria of validity and transferability are thus fulfilled (90).

Methodological considerations – studies II –IV

Recruitment, GPs and power

The participants in these studies were recruited through their DTCs. The chairmen and chair-women were asked whether their DTCs would be interested in participation in a study of drug information. In study II eight DTCs accepted participation and in the studies III–IV seven of the original eight DTCs took part. The DTC in Södra Älvsborg only took part in study II as the author of the thesis was chairwoman of this DTC at the time of the study. The other non-participating DTCs stated that they were occupied with other projects, lacked informers or lacked the time to participate.

This way of recruiting does not render a random sample of participants. However, the proportions of female GPs in the studies were similar to the proportion of Swedish female physicians during the study period, 38 %. The female study proportions were; study II= 37%, study III= 43%, and study IV=41%. In addition, 4.2 out of 9.1 million inhabitants in Sweden lived in the geographical regions surrounding the participating DTCs and large and medium-sized cities as well as rural areas were represented. These facts strengthen the assumption that the participating GPs could be representative for Swedish GPs at the time of the study.

Despite of the consistency of figures between the groups we cannot ignore the possibility of reduced internal validity due to selection bias. Further, bias due to interest and possibilities to take part in education concerning EBM may also have influenced the results.

We started to invite the DTCs to participation. Through them we got in contact with the managers at the PHCC and got an approximate number estimate of the number of GPs that could be expected. The number in study II was 462 and in the studies III–IV 373. During data compilation on prescribed antihypertensive drugs we found 1031 physicians, working at the PHCCs during the study period. This number was higher than the expected number of GPs. The majority of the additional numbers of physicians were temporary doctors and substitutes.

We believe that the GPs would transfer the information they were provided to their colleagues, also those not present. This is in analogy with clinical trials where you analyse intention-to-treat analysis assuming that every patient has taken the drug. Since it was assumed that all physicians received the information from their colleagues, they were included in the analysis. All physicians are called GPs in the studies.

The estimation for sample size has been made from two main variables; change in assessment forms and change in prescription amount. There are no data from former studies that could be used. Reasonable estimations of outcomes have been made in Excel to get changes in the averages and their standard deviation. With assumption 5% significance level and 90% power we would assume assessment forms need answers from 202 GPs in each group (totally 404) to reach significance. With the same assumption concerning the prescription we would need 27 GPs in each group (in total 54). We therefore started from the need calculated for the assessment forms. As we had to calculate on some missing 460 GPs were asked. 180 GPs were analysed in study II and 991 GPs in study IV.

Study designs and validity

Study II, on GPs' attitudes to drug information of public and industrial origin, is a cross-sectional explorative study. The studies III–IV were RCTs, which is a methodological strength, and they were analysed as intention-to-treat and in study IV also by per protocol. In study III a high percentage, 89%, of the PHCCs was represented in answering the questionnaires. In study IV, a strength is that a very high percentage, 94 %, of the PHCCs completed the study by submitting data.

The medical information officers in the studies III–IV, while aware that there was a difference between the groups, were not aware of what constituted the difference. They did not know beforehand what was expected from them during their training. The method of motivational interviewing technique might be more susceptible to the engagement of practitioners, which may have had some effect on the results. They were invited to cooperate within their own medical information officer group and were told about the difference between the groups six months after the intervention.

Other methods to approach the area of interest are difficult to find. If you were to consider starting with a random sample of GPs and then trying to find corresponding medical information officers who could provide information and education, this alternative would require too many resources requirements. Other aspects that would have complicated such a method are risks for spill-over between groups of GPs at the same PHCC and as well as the difficulties for medical information officers who might have to inform in both ways in the same geographical area.

The studies resemble the everyday work in drug information services. According to Canadian researchers, clinical trials conducted in community practices present investigators with difficult methodological choices related to maintaining a balance between internal validity (reliability of the results) and external validity (generalisability) (92). The attempt to achieve methodological purity can result in clinically meaningless results, while attempting to achieve full generalisability can result in invalid and unreliable results. We have tried to achieve a creative tension between the two. The internal validity in measuring prescriptions from computerised medical records is good and the internal validity in measuring attitudes is rather good. During planning the study we found no questionnaires on comparing GPs' attitudes on drug information from the public authorities and from the pharmaceutical industry. We tried to make the questionnaire as reliable as we could with respect to resources at hand. Of course it would have been better if we had been able to validate the questionnaire, too. The external validity refers to measuring areas of interest, to be able to communicate on them and to get useful knowledge from the investigations. This is thus fulfilled.

Questionnaire and non-responders

The way of managing questionnaires as we did in the studies II and III is frequently used (93, 94).

In the third study the non-response rate, 52%, can introduce bias (95). Measures such as sending the questionnaire with first class post with stamped-return envelope, keeping the questions rather brief, monetary incentives and to contact the respondents personally are known to increase response rates in postal questionnaires (96). We took these measures with the exception that GPs were not personally contacted but the managers at the PHCCs were asked to distribute the questionnaires and there were no monetary incentives. Other studies have shown smaller-than-anticipated differences between responding and non-responding physicians (97), which strengthens our results despite the 52 % response rate. The physicians remain a relatively homogenous population compared to a general population (98) (97, 99).

It is well known that it is more challenging to get high response rates from questionnaires sent to GPs than to a general population (99). The span can extend from 3.2% to 68%, the latter being a very high figure when it comes to GPs (93, 99, 100).

In study III, the scale was used as an ordinal scale and was analysed by the

nonparametric Mann-Whitney's test (101). Even though it has limitations, this method provides a relatively reliable and cost-effective way of measuring attitudes.

How information and education was provided

All medical information officers (MIOs) participating in the study gathered in October 2004 and were lectured in a common session on the guideline on hypertension. The seven officers randomised to provide benefit-tailored information (102) by using motivational interviewing technique (62), were further trained for an additional eight hours during two days. The point of departure for the training of the medical officers was to focus on the individual GP's own thoughts and beliefs and the benefit aspects were emphasised. The method resembles that of patient-centred communication (103) which is well known in primary health care. The motivational interviewing technique training included role playing which was videotaped (62) to provide feedback to the medical information officers.

The time for the tailored education might, however, have been insufficient. The combination of training in using motivational interviewing technique and learning about GPs' thoughts on benefit might have been too large an area to accommodate in one training session. With a limited time period it might be difficult to deepen education equal in all areas.

In 2006 all MIOs were interviewed by me concerning educational background data on the telephone. Some of them said that the training time could have been longer. Clinical experience has shown that learning motivational interviewing technique is more difficult than was earlier expected (68).

It was not possible for us to control how the information was provided to the GPs. This requirement was set in the Cochrane review of motivational interviewing technique (65).

Some data on educational background of the MIOs are seen in *Table 11*.

Table 11. Age and educational background of the medical information officers (MIOs) in the intervention and control groups. Data referring to the situation in 2004, collected in 2006.

	MIOs in the intervention group	MIOs in the control group
Range of age (mean age in years)	29-57 (43.9)	32-60 (50.4)
Range of number of years of experience as MIO (mean of years)	2-19 (5.4)	0,5-4 (1.7)
Number of MIOs with experience from motivational interviewing technique	0	0

MIO= medical information officer

As time proportions devoted for MIO tasks could differ, it is difficult to compare the number of years at work.

Most officers had been trained in relation to their tasks from some to seven days, including pedagogic elements. They knew the GPs to whom they provided drug information. In the interview many of the MIOs experienced that they were more heartily welcomed to provide drug information this time than what was usually the case.

One aspect that the officers mentioned was the changed status of the beta-blockers (42) during the intervention period. As this was something new in the information the discussions were vivid in both groups. This could have had an effect on the outcome if the time spent on ACE inhibitor discussions were too short to give impact on the GPs.

IT issues

We quickly became aware of that collecting data on prescribed drugs was complicated and would take much longer than we had expected. Our presumption was that it would be rather easy for the PHCCs to report the data, but that was not the case. The explanation is partially on our account but partially it might also be related to deficiencies in practical computer support in the organisations.

In some cases data arrived promptly but in other cases the IT manager unsuccessfully tried to provide the data several times. The cause could be lack of education but another frequent explanation was that they were not authorised to perform the measures of data transfers even if they thought so. When the next level of IT managers was engaged it could take quite a long time before delivery was made. Our impression was that many IT managers

lacked the time or education to solve their tasks in a streamlined organisation. Even though our studies entailed in extra tasks beyond everyday health care it can give a view of what might occur in clinical research since one of the prerequisites often is to obtain data from the healthcare system.

Our findings could be reflections of a bigger problem. There are arguments from Swedish organisation researchers towards the implementation of IT and lacking efficiency in health care (104). There are also failures in IT support of drug prescribing (105) and there are huge deficiencies in monitoring the adoption of IT by healthcare professionals (106, 107). As Gagnon expressed in a Cochrane report; *”There is very limited evidence on effective interventions promoting the adoption of information and communication technologies by healthcare professionals”*. Group training, one-on-one training sessions, or providing training materials, may improve the use of information and communication technologies. But over all, it is still uncertain whether some strategies are effective.

Another aspect that might need highlighting is which teaching methods that are appropriate to implement good use of information and communication technologies (77). Outdated methods such as just teaching by rules do not work in new environments. Learning-through-instructions might somewhat have been replaced by learning-by-searching but presumably not yet widely.

Prompt and pragmatic benefit, utilitarianism and existentialism – study I

Prompt and pragmatic benefit (PPB) is used to describe the essential part of GPs' thoughts relating to prescribing medication and EBM. Prompt and pragmatic benefit is utilitarian in nature and this philosophy was created as a theory by John Stuart Mill in the mid-nineteenth century (108). It is currently the dominant approach to ethical issues (109). The theory is constructed on two basic tenets: the moral rightness of an act can be measured according to its probable consequences and the degrees of happiness/unhappiness and pleasure/pain for those affected by the act are assessed. The Swedish philosopher Torbjörn Tännsjö (110) is a contemporary interpreter of utilitarianism. He summaries the philosophy as: "An act is right if, and only if, there is no better alternative that might lead to better consequences". Maximising benefit and what should be maximised are the objects of discussion in modern versions of utilitarianism. There are also contemporary contestants such as the author Göran Rosenberg concerning the interpretation (111). We cannot know beforehand which consequences a decision may lead to but we may, by taking that which is known as our point of departure, aim at the act that maximises the expected benefit; we have then done our best. Thinking in terms of benefit is widespread in current society although not on a clear philosophical level. It can occur almost as an unconscious process.

How is benefit maximised when medications are prescribed?

The benefit to the patient and the perceived effect of the treatment were the most important considerations when selecting the treatment. Hypertension and depression are two examples. The doctor treating hypertension today rarely sees the short-term benefit and does not know if the individual patient will derive any long-term benefit from the treatment. The depressed patient is more often obviously helped by treatment, which may partially explain why hypertension is often not treated according to existing guidelines (112). High blood pressure is shown to be neglected by the doctor (113). If the doctor is hesitant, this is transmitted to the patient who may feel supported in a decision not to take the prescribed treatment (114).

For GPs, a good relationship with the patient is a prerequisite for maximising benefit. Patient participation and mutual trust can help in

managing crises and difficult decisions. This relationship is not risked lightly. “*The law of medical inertia*”, entailing waiting for others to gain experience of a new treatment before trying it oneself, can thus lead to maximisation of benefit, unless the inertia is excessive. This could be another aspect of the ‘late majority’ or perhaps ‘laggards’ (see the Introduction, Implementation) (60). An interesting reflection on this topic is a Danish study in which the authors question whether there are any ‘early adopters’ in primary care (115). From the doctors’ point of view, maximising benefit primarily consists in creating something beneficial; the doctor becomes the “components of happiness”, according to John Stuart Mills’ philosophy. When time is allowed, pleasure and happiness emerge to various extents (109). Lack of time is a very explicit limiter of one’s work and becomes a negative factor, both for the doctors’ own benefit, as well as for the treatment of the patient (56). Work with patients must not always replace time for continuing medical education (CME). That time for one’s own CME must yield precedence to work with patients is a type of PPB. The question is: what happens to benefit maximisation in the long run if CME is reduced too much?

How is benefit measured?

Benefit, as defined in our study, is not a deductive tool that can be handled and measured.

It is more a question of “gut feeling” and that concept resembles PPB to some extent (116). The GPs don’t mention measuring benefit but they do calculate expected results relative to required resources. Their assessment of benefit and maximised benefit is of considerable significance to the choice of treatment.

In the article; ‘Therapeutic decision making of physicians’ there is a description of an attempt to mathematically explain what is called ‘a maximisation strategy’ (117). The utility of a certain treatment is expressed as the sum of the value for specific criterions multiplied by the expected outcome of a certain treatment with regard to the specific criterions. The sum of this is, however, not represented as a result. The results from our study do not imply possibilities to operationalise the PPB concept in mathematical terms.

Support in the decision-making process

Applied as a decision-making process, utilitarianism entails making the best possible judgment based on the knowledge available at the moment. Evidence-based pharmaceutical information often consists of messages of a cognitive nature which may be perceived as ‘dry facts’. The effect may therefore be fragmentary and imperative and that the complexity of decision making may be perceived to increase. The result can be lack of effectiveness (118). This is, however, not always the case.

Emotions and ‘gut feelings’ of benefit are not so frequently discussed in the presentation of evidence-based drug information. As the GPs in our study expressed that thoughts of benefit are very important, taking this into account as a ‘tool’ when designing and providing information could be of useful. Matching the information they are provided with their thoughts of benefit it could facilitate the implementation of guidelines. There might be components of benefit in the rules of thumb for GPs – bridging the gap between theoretical knowledge and practical experience (80). The use of rules of thumb might be interpreted as an expression of PPB. A method with verbal protocols may be fruitful to understand why doctors reach different decisions and why guidelines are not adhered to (119). There are several descriptions of ‘barriers’ to treatment (120), such as questioning the guidelines, the GPs’ clinical experience, and preserving the patient–doctor relationship. By experience these barriers may vary between GPs and to identifying if and which they are is a first step in supporting the decision-making. With knowledge of these they can be a support in decision-making.

The pharmaceutical industry is knowledgeable about its own drugs and works consciously with emotional messages, which may affect the decisions doctors make (121). This is called emotional selling proposition. Drug choices endorsed by pharmaceutical industry representatives and hospital doctors are probably very important for the GPs’ prescription pattern (122). If the drug choices are considered reasonable and ‘useful, handy and delivered immediately’ they might be of benefit- character. The time to find the basis for a good clinical decision is reduced which facilitates the work. Aspects such as benefit, time, and branding of their products are very well-known by the pharmaceutical industry as their instruments of implementation and control of marketing communications (121). Themes like ‘custom-made’ and ‘the available time sets the limits’ are valid also in this context and might influence the GPs. Doctors gain experience from their patients, who in turn receive

impressions from their surroundings. One of them is the pharmaceutical industry and there has been animated discussions regarding direct contacts with the patients or not (123). The various components influencing the decision-making process towards maximisation of benefit are complex but can be improved with knowledge about what is considered important.

What could be prompt and pragmatic benefit in the GP's workday?

In the literature there are findings in line with our description of prompt and pragmatic benefit (PPB). An Australian telephone survey (124) showed that EBM sources remained the least likely to be used for informing decisions about patient care. Opinion-based sources were most commonly used; with industry-sponsored sources second. The most common perceived barriers were 'lack of time', 'lack of evidence or conflicting evidence', 'not knowing where to look' and 'not being able to tailor evidence to individual patients'. The most common suggestions for improving decision making were 'simply formatted evidence summaries' and 'mechanisms for tailoring evidence to individual patients'. Potential strategies to overcome this should focus on providing more user-friendly evidence summaries, involving patients in evidence-based decision making, and finding mechanisms to tailor evidence to individual patients. The rules of thumb (80) are described earlier and might be interpreted as thoughts of benefit in the workday. Many professions develop similar local guidelines and rules to make the job run more smoothly (74).

The thoughts on prompt and pragmatic benefit being at hand do not mean that they are 'carved in stone'. Changing time, with new knowledge and technology may give different answers on what constitutes the PPB for the individual doctor. The Australian study mentioned shows that the use of facilities that are 'at hand' are most appreciated. If guidelines were featured with such facilities, depending on the surroundings, it might well result in that they are considered to provide PPB.

Two aspects mentioned by the GPs in the interviews might have changed since the year 2000. The first is the attitude to and knowledge of information technology (IT). During the past ten years, IT-related skills in general including those of GPs, have increased and searching on the web is more frequent also in health care. On the other hand, the computerised medical systems as mentioned in the method discussion still leave wishes to be fulfilled.

The other aspect is that financial responsibility has changed significantly since the law on ‘care choice’ was introduced. A conservative assumption is that this fact would be highlighted in other aspects in a new focus group. The economic aspect presented in our study was from the patient’s perspective.

The quality of PPB can presumably be increased. Two proposals are that both computerised medical systems and guidelines for financial responsibility (including e.g. drugs, blood samples and other measures) should be designed so that they likely will fall within ‘PPB’.

If computerised medical systems could be developed to gather and present results from the clinic work to the practitioners in a simple way that would be an important piece of ‘PPB’. Time consumption activities clearly reduce the PPB.

Prompt and pragmatic benefit and existentialism

Existentialism emerged as a movement in the literature and the philosophy in the 20th century (125). It was heralded among others by the 19th century philosopher Søren Kierkegaard (126). The philosophers share some views; the human subject can think, act and feel. The starting point for the individual is called ‘the existential setting’, – a feeling of disorientation in an apparently meaningless and absurd world. To be existentialist causes a natural anxiety due to the free will. That comes at no extra but implies that you can choose and have opportunities (125).

I knew the lines “For Reflection” by Søren Kierkegaard (page 1) before the start of these studies. They are frequently cited and well-known among healthcare professionals. The lines are also frequently cited on the Internet; on 28th of April 2012 there were 1620 hits in Swedish and 99.000 hits in other languages.

The framing is to help someone. A dialogue is what is needed to get an idea of a person’s or a group of persons’ ‘PPB’ but also to promote a person’s own strengths. Similar expressions as in ‘For Reflection’ are encountered in the patient-centred approach (14) and in aspects of what characterises good education with learning and teaching (127). Such thoughts are also highlighted in the history of EBM as the pioneers realised the need of a ‘user’s’ guide to EBM, not just a ‘reader’s’ guide (45). There are also elements similar to this in the descriptions of motivational interviewing technique (41).

“The Reflection”, thoughts of existentialist origin, could be a useful tool to understand and make use of the prompt and pragmatic benefit, utilitarian in nature.

*‘If One Is Truly to Succeed in Leading a Person to a Specific Place, One must First and Foremost Take Care to Find Him Where **He** Is and Begin There.’*

GPs' attitudes to public and industrial information before and after the intervention – studies II and III

Literature on the opinions of GPs' relationships with the pharmaceutical industry has been published (37, 128), but scientific knowledge comparing drug information from, respectively, public authorities and with that from the industry has been sparse.

Studies on GPs' drug attitudes are scarce. Most studies on attitudes are cross-sectional and not all of them discuss the reliability of the measurement instruments used to assessment of attitudes and opinions. These could be ordinal scales (99), closed questions (93) or multiple choice and open-ended questions (94). Some discuss attitudes originating from qualitative studies (129, 130). Scientific studies on GPs' drug attitudes and changes in attitudes measured by attitude scales as in this study seem to be lacking.

Attitudes are not generally considered to precede behaviour but as presented in the introduction there are researchers of the opposite opinion.

GPs and the relationship with the pharmaceutical industry

The results in study II showed that the greatest part of the GPs' drug information emanates from the industry which is concordant with other findings (29). The response that promotion from the industry was considered too extensive is also consistent with the literature (26, 31). There are reasons to believe that many financial ties between industry and medicine are hidden (30). British GPs twenty years ago perceived 'other doctors' and 'pharmaceutical detailers' as the most important influences on prescribing newly adopted drugs (131). This might have changed but in my own experience it could still be valid.

Maybe the conclusion in the second study that "Some kind of incentives could be considered for PHCCs which actively reduce drug promotion from the industry" should have been expressed a bit smoother. The awareness of physicians on the effects of the relationships with the pharmaceutical industry has been low (37, 128). The relationship may have effects on the prescribing, costs and quality (132). Medical students in Norway seemed to be critical and curious of the industry and were influenced by their teachers (133). Researchers from the United States proposed that since trainees' attitudes towards the pharmaceutical industry were positive, education focused on this

would better align them with physicians' attitudes and with current policy trends in the future (37). In the United Kingdom, GPs have been influenced by government policies through incentives but the risk of unintended consequences due to the cost reduction cannot be ignored (27). An American survey showed that significant attitude shifts were seen among physicians towards being more critical to the pharmaceutical industry after information on their working methods (134).

The finding in the second study that older GPs and those with more years of experience were more positive towards industry-provided promotion might be explained by their experience from a closer relationship, before the 1990s, at which time the climate between the public health care and GPs on one side and the industry on the other side became chillier in Sweden. This led to a new agreement regulating the relationships (135). This agreement differs from many other countries where closer contacts between physicians and the pharmaceutical industry are still frequent and allowed (37). The attitudes of the younger GPs in Sweden might be similar to the attitudes of GPs in Britain as they have come to accept a higher need for external scrutiny and national standards (27).

It is reasonable to assume that the pharmaceutical industry has a big impact also on Swedish physicians. An assumption and as well as personal experience, is that the pharmaceutical industry carefully follows the changes in their markets. It is reasonable to think that they take measures to provide efficient news on their products in media of different types to receivers such as county councils, physicians and patients in media of different types. We attempted to obtain information on how many times during the study period there were drug information provided by the pharmaceutical industry at the different PHCCs. However, we did not manage to do this. Although these contacts may well have been influential on the GPs' prescriptions, the influence might to some degree have been taken care of by the randomisation. Another aspect is that even if we had access to data on these contacts, there are further ways of providing information from the pharmaceutical industry such as by papers printed media, the Internet, and by the patients.

The framing of the information provider

Concerning the opinions on both public authority and industry-supplied drug information services, the role of the information provider, as an important link between the client and the GP(s), must be put forward even if the literature is sparse (136). Public-authority providers in Sweden are often GPs or pharmacists and usually well known and accepted by the GPs, traditionally not putting focus on GPs as customers. As known from marketing, the opposite is the case when the companies work on their marketing communication (121). This was seen in a study on hypertension advertisements, implying that the industry lacked elements important for cost-effective care consistent with evidence-based guidelines (137).

Changing medical culture and physician education is an important field to be improved as many physicians still hold positive attitudes toward marketing-oriented activities (37). The positive attitudes in this study could perhaps partly be explained by some GPs' appreciation of the usefulness of the information provided by the industry on how the patient could use drugs. This is in line with the customer-centric marketing model that is known from marketing communications (121).

One interesting result is that the GPs regarded the information from the public authorities as useful and of high quality. This supports the notion that the DTCs have a deservedly good reputation and provide good quality (28).

A future problem might be a lack of information due to a lack of both medical information officers from the public authorities and of orally provided information from the pharmaceutical industry, due to new regulations.

Time constraint and continuous medical education

We have not quantitatively measured aspects on the time constraint in our studies but as the qualitative discussions on lack of time have occurred frequently during the research period the issue needs to be highlighted.

The GPs have a wide domain of practice in combination with lack of time, and to keep abreast with current best evidence in health is challenging (9). This might lead to increased vulnerability to pharmaceutical advertisements especially if the GPs' lack good reliable information sources at hand (124). Aspects of the GP workday are often related to lack of time and priority settings (98).

That lack of time and stress might reduce the possibilities to preserve newly acquired attitudes and behaviour is supported by social psychologists' research (87). Assessment reports, such as the report on moderately elevated blood pressure (7) from the Swedish Council on Technology Assessment in Health Care (SBU), can if well designed to some extent compensate for the lack of time.

The time constraint might also lead to GPs being more prone to preserve attitudes – and behaviour – as it takes more efforts to change them. One aspect of this could be that they are 'unwilling' to change, another that they want to show consideration for their patients not to start with new therapies too quickly.

Continuous medical education (CME) seems to have been reduced in recent years. In study I the GPs said that at times it was better to postpone their CME due to the work load.

As described in the introduction (*see 'Education, information and learning styles'*) time to think and reflect is by experience and knowledge preconditions to be able to remove 'old knowledge' to make way for new skills (72). There are differences in types of knowledge and what is needed to learn (*see Figure 2*), both in terms of requirements of the individual and from the organisation (72). These facts are very well applicable to the professional work as a GP. The knowledge must be relevant, the knowledge should be discernible, teaching needs to be varied and it should engage all senses (75). If the requirements are fulfilled this might improve the quality of health care. If not, it might result in worse use of the resources allocated.

To be able to maintain a critical appraisal of new medical concepts, e.g. as pre-hypertension was recognised as diagnose (138), it is important to allow time for continuing education, reading, and reflection based on reliable sources (29, 134). Non-profit evidence-based drug information could perhaps be one appropriate means for this.

A last but not least aspect on the time constraint is the patient. To get a good quality in drug treatments the GPs' knowledge is important but not the only decisive. The GPs have to have time enough to work as intended with patient-centred approach (13) to get good interaction with the person who will receive the medical treatment. Things Take Time (145).

The gender aspects on attitudes to drug information

A consistent and new finding in the second study was that male GPs were more oriented towards industry-provided drug information compared with female GPs. Earlier findings concerning physician gender differences have shown that female physicians were more engaged with their patients and have longer visits (139). They were also shown to have differences in prescription patterns (140) which indicate the existence of gender differences. A question about whether similar differences in attitudes exist in resembling questions in the rest of the society has been put to researchers at the SOM-institute in Gothenburg. This institute is part of the University and responsible for impartial investigations on opinions trying to understand the Swedish community development. No investigations comparable with our issue have been published.

The finding could be considered as an indication of that different attitudes among GPs exist and ought to be taken into account when designing evidence-based drug information. The finding needs further investigations.

Leadership might influence attitudes

There were greater differences in use of industry-provided information between PHCCs, than between geographical areas. Since the new agreement between regions and the pharmaceutical industry was settled (135), the tradition of seeing pharmaceutical representatives at lunchtime has been reduced at most but not at all PHCCs. This might explain the high correlation that was seen for PHCCs in this item, 4b (*Table 4*). Leadership forming policies at the centres could also have impact on attitudes (141), as could working conditions and culture among GPs and other staff.

No attitude changes after intervention with tailored drug information compared with drug information provided as usual

No differences in attitude change to drug information were seen between the GPs who were provided evidence-based drug information tailored with motivational interviewing technique and focused on the benefit aspect compared with the GPs provided with evidence-based drug information provided as usual.

Possible interpretations of the study results beyond those mentioned earlier

(see the methods discussions) could either be equal impact from information in both groups, no impact from information in either group, or a combination of both.

At the time of the study (2004) there were no systematic overviews on motivational interviewing technique compared with treatment provided as usual, in any field. This has changed with some Cochrane reports in the area of life-style (65). One major difference between the present study and the Cochrane study and other similar studies is that GPs were informed in a group instead of on an individual level. Another difference is that GPs are not similar to patients, having another pre-understanding of the context than patients. However, an interesting similarity is that as in the review on motivational interviewing technique and alcohol abuse (65) no differences were seen between motivational interviewing technique and treatment as usual.

A liable explanation for the results in our study, as in the review mentioned above, is that motivational interviewing technique and other interventions share a number of nonspecific therapeutic factors. Factors such as attention and therapeutic alliance might contribute to as much as 30% of the effect (70).

The focus on the benefit aspect, that was also included in the tailored drug information, probably did not affect the outcome in the same proportion as the motivational interviewing. This last aspect took most of the time in the training. It is doubtful whether the medical information officers in the intervention group got the message on the benefit aspect highlighted clear enough to become aware of its importance.

The use of motivational interviewing technique was increasing in the Swedish health sector in the beginning of the 21st century. The lack of effect in the present study adds to the knowledge of the application of motivational interviewing.

The lack of investigations of links between the pharmaceutical industry and the PHHCs has already been mentioned in this section (*GPs and the relations to the pharmaceutical industry*).

Another aspect which needs to be more investigated in depth is which effects the surrounding organisations might have on the outcome. This condition has attracted increasing attention in recent years (59).

The GPs' prescribing after intervention with tailored drug information compared with drug information provided as usual – study IV

As mentioned in the introduction there is no simple explanation saying that there should be a cause–effect relationship between attitude and behaviour (88).

The same change in proportion of prescribed ACE inhibitor prescriptions after the intervention

In this RCT, we have investigated whether evidence-based drug information tailored with motivational interviewing technique and focused on the benefit aspect implements guidelines better than drug information provided as usual to GPs. The same relative increase in ACE inhibitor prescriptions was seen in both groups during the periods 0–3 and 4–6 months after the intervention.

Some possible interpretations have been described in the section '*No attitude changes after intervention with tailored drug information compared with drug information provided as usual*', see just above. There could be either equal impact from information in both groups, no impact from information in either group, or a combination of both.

Another aspect is the possibility of non-specific factors in interventions like motivational interviewing technique which might contribute up to 30 % of the effect (70). This was presented in the Cochrane report alcohol abuse and motivational interviewing technique in 2011 (65).

The influences from the pharmaceutical industry are already mentioned and should be supplemented with other impacts such as discussion in medical and daily papers, influences from television, radio and the Internet, including social media and net groups. The GPs live in an open society and there are many factors that might affect both attitudes and behaviour.

It was not possible for us to have control of how the information was provided to the GPs and the time for the tailored education might have been insufficient. We believe that the GPs would transfer the information they were provided to

their colleagues, also those not present. This is in analogy with clinical trials where you analyse intention-to-treat assuming that every patient has taken the drug. An aspect of this and also according to experience is that some GPs may have arrived late and left the intervention information early. The result of the intervention might then be the same as had they not attended at all. The corresponding patient analogy is to take the 'pill' and spit it out before swallowing. The number of GPs in the intention- to-treat analyses of prescription changes was more than three times higher than the number in the per protocol analyses. The results from these two approaches did not differ. If the effect of the intervention had been powerful it is very reasonable to believe that we would have registered a clear difference between the GPs in the intervention and the control groups.

All prescriptions, both ongoing drug treatment prescribed by telephone and at a GP visit and those just initiated, were analysed. This might dilute the effect of change as was described in a North American mini-review (142). Physicians are not keen on changing a treatment that works but might be more prone to change when to prescribing to someone for the first time. There was an increase in the proportion prescribed ACE inhibitors in both groups. However, this change might have been higher if we only analysed the just initiated prescriptions.

Both groups of GPs have changed the prescription into the desired direction. This implies that both methods work to implement guidelines although we cannot be certain that the effects are just due to the information given. Both ACE inhibitors and Angiotensin receptor II blockers have increased in prescription approximately to the same extent since 2004 (43). Doctors do change prescription behaviour although we do not always know the reason for this. Another, not least important question, is whether the patient takes the prescribed drug but that is a matter of another investigation.

One pharmaceutical influence which is previously described in the method part (*'How information and education was trained and provided'*) is the subject of beta-blockers. The change in status for the drug attracted attention and took time during the interventions. If the time is limited and some aspects draw much attention this might have effects on the result.

Another aspect to reflect upon is whether the message to highlight the prescriptions of ACE inhibitors was clear enough for the GPs to become aware of its importance.

The issue of reducing the Angiotensin receptor II blockers (ARB) was well known by GPs also from the medical debate. The main messages from the SBU were less than ten and the message about ARB a distinctive one. Although we cannot measure the exact impact of this message, we would say it was one of the clearest in the presentation, also supported by other debate. However, it cannot be ruled out that another outcome could have shown differences, but we had to decide in advance which one to choose.

Melander and Nilsson have presented an equation on physicians' wished behaviour concerning drugs (28). They suggest that 'wished behaviour' is the product of 'information' and 'motivation' divided by 'hindrances'. A more complicated issue is to put the correct values in the equation.

We examined the following independent variables; the physician's age, work experience, sex, whether they worked in a public or private setting, the geographical area, PHCC, the medical information officers' sex and the patients' age. During the last years also financial responsibility for prescriptions has become an important factor imposing prescription pattern. This has been shown to have effect in a study from the Region of Västra Götaland (143). If investigated now, it would presumably have been influential. At the time of the study the financial responsibility was not thoroughly implemented in Sweden, why this factor was not taken into consideration in our study.

5 SUMMARY AND CONCLUSION

GPs' thoughts on evidence-based drug information and prescribing medication related much to 'prompt and pragmatic benefit'; delivered immediately, useful and handy. Time consuming activities reduce the benefit. The concept remains understandable and makes sense in order to understand the GPs' thoughts on evidence-based medicine and prescribing of medication. It could possibly be a useful tool to identify important aspects when you want to give information and education in a structured way to GPs. It could perhaps also be a tool among other groups of healthcare professionals.

Female general practitioners valued information from public authorities to a much greater extent than male general practitioners did. This aspect should be taken into account as an indication that different attitudes among GPs might exist. Different persons may have varying preferences and also different learning styles. This knowledge might improve the results of the educational efforts.

GPs' attitudes on drug information did not change after intervention with tailored evidence-based drug information compared with evidence-based drug information provided as usual. The change in proportion of prescribed ACE inhibitors increased in both groups after the intervention. This indicates no benefit in using tailored evidence-based drug information compared to evidence-based drug information provided as usual.

Further research on spreading of evidence-based drug information in primary health care is needed. It would be preferable to combine several methods and tentatively setting focus also on other aspects, such as the organisation, the economy and the leadership.

An observation is that the use of educational methods used in health care are not systematised and evaluated concerning outcome. To set goals in education, to implement them and evaluate the efforts would be in good imitation of the evidence-based medicine. Method development needs to continue.

Epilogue

The journey of writing is now over. My research colleague Göran Jutengren has said; ‘A scientific article is an opinion piece in a highly structured debate.’ If so, I hope the debate will go on.

We have been fortunate to follow an idea from concept to results, using both qualitative and quantitative methods. I have learned some ‘pros’ and ‘cons’ of the methods and we have been able to show some things and have not been able to prove others.

As a general practitioner I recognise the thoughts on EBM expressed by the colleague Astrid Seeberger (144). She describes the clichés in the printing industry, consisting of a fixed set of letters. She considers them similar to guidelines in evidence-based medicine. The use of the ‘clichés’ may be wise but cannot incorporate all aspects of the individual. This was also put forward by ‘the father of EBM’, David Sackett (9). Much work has been done in the field of EBM and qualitative methods now give a rich contribution to knowledge. Hopefully we will be able to understand more aspects of the individual in the future.

I summarise the journey with the grook ‘When you feel how depressingly slowly you climb, it’s well to remember that Things Take Time’ (145). I hope the debate will go on!

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Appendix

