

**Register-based studies on continuity,
collaboration and equity in general practice**

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Dissertation for the degree philosophiae doctor (PhD)
at the University of Bergen

2013

Dissertation date: 11.04.2013

Scientific environment

I conducted this project in the period 2007–2012 while affiliated with the Department of Public Health and Primary Health Care, University of Bergen, in different positions. I worked from 2008 as a PhD candidate, first in the Section for Social Medicine and in later years as a member of the research group for Social Epidemiology.

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The scientific environment also includes the “laboratory” at Bønes GP practice, where important hypotheses and impulses have been generated through work with the patients.

The project is funded by Fund for Research in General Practice, Norwegian Medical Association.

Acknowledgements

I came into this project somewhat like “slipping on a banana peel” when I was “promoted” from a censor for medical students to lecturer in 2006. In the Section for Social Medicine, I joined a nice bunch of experienced scientists, and I would like to thank Kjell Haug, John Gunnar Mæland, Siren Haugland, Aina Schiøtz and Sturla Gjesdal for welcoming me to the “world of science”.

At that time, Sturla was establishing a research data base in co-operation with health economists. We found a common interest in looking at our own special field, the general practice, through the prism of register data. I started rather reluctantly, but thanks to the encouraging and pleasant co-operation with Sturla, I gradually became more familiar with the role of researcher and after a while I found myself in a position as a PhD candidate with Sturla as my main supervisor. I would like to thank Sturla for constructive and efficient supervision as well as for interesting discussions throughout this project, also during periods of which other important tasks demanded his main focus.

I would also like to thank my co-supervisor, Kjell, for co-operation and advice on the papers and for very useful help with the thesis, and also John Gunnar for constructive help with the papers and for his contribution in the Social epidemiology research group in which Lee Winde and Inger Haukanes have also been congenial research fellows.

Tor Helge Holmås from the Institute of Economics was very helpful in facilitating the data and advising on statistics in the start of the project; my thanks go to him and also to the other economists who co-operated in establishing the research database. I am equally thankful to Rolf Terje Lie and his colleagues at ISF for introducing me through courses and conversations to some of the secrets in the field of statistics.

I would like also to express my gratitude to the board of the Fund for Research in General Practice in the Norwegian Medical Association , whose members believed in

the project and provided me with a generously amount of money. And also to the Health Protection Agency in the municipality of Bergen for study leaves, which helped me start the project period.

In retrospect, I am thankful for ten years of employment in Odda, a great place to learn about the many aspects of primary health care, and where I was also given a possibility to do some research close to “real municipality life”. This experience is an important foundation for my current research work. Special thanks go to my boss, Terje Espe, for giving me “elbow room” in my position in public health and also to my kind and patient colleague, Øystein Pløen, still going strong as a GP in Odda.

My colleagues at Bønes Medical Clinic have been most helpful when I needed to spend time on research, and I would like to thank them for covering for me, ensuring continuity of care for the patients on my list.

In the private sphere, many thanks for thought-provoking conversations and support along the way go to my friends and family. I might specially mention the regular “multidisciplinary meetings” with a handful of old friends discussing health service, society, meaning of life and stuff like that. In this respect, it has also been inspiring to have some “fellow sufferers” heading for a PhD at a “mature age”.

I have spent a number of afternoons in my loft-office at home, tapping the keyboard and watching the sunset. Thanks to my understanding Margunn; life has gone on well as she ensured the relational and the management continuity in the household. And with a wife working in municipal health service, and not as a GP, I have been given useful input concerning GPs as collaborators as seen from an outside perspective. Kristine and Ingvild, students themselves, have shown interest and have encouraged their aging father as he resumed a career as a student. Synne and Mari, still living at home, have been patient with this researcher even though they have not found his favourite theme of conversation, “the regular GP scheme“, particularly fascinating. Thanks to the five girls in my life!

Øystein Hetlevik (Bergen /Os October2012)

Abstract

Background: Continuity of care, collaboration regarding patients and equity in service delivery are core values and quality elements in general practice.

Aim: To assess how these core values are reflected in the practice of Norwegian general practitioners (GPs) and to explore the impact of GP-, list- and population characteristics on the variation in practice concerning these core values.

Method: Cross-sectional nationwide register based studies of GPs, GPs' lists and GPs' practice activities from different years in the period 2002–2009

Results: 78% of consultations in the list patients system were with the regular GP when this GP were in regular practice during a year. Personal continuity was highest for patient > 60 years, patients using GP most frequently and by GPs with larger list size. However, in a one fourth of lists > 32% of all consultations were with another GP. On average, GPs participated in 30 patient centred multidisciplinary meetings in one year and 54% of meetings concerned mental problems. Rates of participation varied considerably among GPs. GP age < 45 years, shorter list size, higher proportion of disadvantaged patients and smaller municipality were factors associated with higher rates of meetings. When grouping GP lists in quintiles according to socioeconomic status of list populations, a 13% increase in consultation rates and 26% increase in total fee-for-service per patients were observed comparing highest to lowest level, adjusted for other GP- and list factors. Frequency of consultations > 20 minutes and use of medical procedures in consultations did not differ. The higher workload for GPs with more disadvantaged list populations was associated with shorter lists. Young people had low consultation rates. Markers of high workload by GPs were associated with lower rates of consultations with young people.

Conclusion: Overall, the core values continuity, collaboration and equity are clearly reflected in Norwegian general practice, but with considerable variations between GPs. Improvements and more uniform practice are needed, especially regarding collaboration in teams and in GP services for young people.

Abbreviations and terms

GP	General Practitioner. In this thesis, GP is used for all physicians working within the list patient system, including temporarily
Regular GP	GP with a personal contract within the regular GP Scheme
Regular GP Scheme	The official term used for the list patient system in Norway
HELFO	The Norwegian Health Economics Administration, a subordinate institution directly linked to the Norwegian Directorate of Health
KUHR	Control and Payment of Reimbursements to Health Service Providers ("Kontroll og Utbetaling av Helse Refusjon"). A database administered by HELFO for reimbursements of health care providers contracted in the public health care system
ICPC-2	International Classification of Primary Care, Second edition
UPC	Usual Provider Continuity Index, in this thesis defined as: $\text{Number of consultations with regular GP} / \text{Total number of consultations with all GPs}$
WONCA	World Organization of National Colleges, Academies and Academic Associations of General Practitioners/Family Physicians, - or for short: World Organization of Family Doctors
OR	Odds Ratio
RR	Relative Risk

List of publications

1. Hetlevik O, Gjesdal, S. Personal continuity of care in Norwegian general practice: A national cross-sectional study. *Scandinavian Journal of Primary Health Care*. 2012. (posted online 31th Oct 2012).
2. Hetlevik O, Gjesdal S. Norwegian GPs' participation in multidisciplinary meetings: A register-based study from 2007. *BMC Health Service Research* 2010;10:309.
3. Hetlevik O, Gjesdal S. Does socioeconomic status of list populations affect GP practice? A register-based study of 2201 Norwegian GPs. *The European Journal of General Practice*. 2012 (posted online 19th July 2012)
4. Hetlevik Ø, Haug K, Gjesdal S. Young people and their GP: a register-based study of 1717 Norwegian GPs. *Family Practice*. 2010;27:3-8.

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1. Introduction

General practice entails aspects such as personal doctoring, continuity of care, easy access to services for all groups in the population and taking care of all kinds of health problems. Also coordinating care and working within the local community with knowledge of the patient's home setting are seen as central elements in the professional field of the general practitioner (GP).

There is support in research literature in favour of regarding these characteristics as core values of general practice and useful and necessary elements in high quality general practitioner services.

The aims of the list patient reform in Norway in 2001 were to improve continuity and coordination of care and to ensure equal access to general practice by giving all residents a right to a defined regular GP.

The regular GP scheme changed the framework of general practice, and the GPs were given more clearly defined responsibilities for a defined patient group. Regulations and financial arrangements influence both the patient's behaviour and the GPs' work styles and thereby also the possibilities to attend to the core values of the profession.

Following this reform, new opportunities emerged to study the GPs' practice in relation to a defined list population. This possibility motivated us to study how core values and characteristics of general practice were reflected in the practice of Norwegian GPs within a list patient system using available register data.

Continuity, collaboration and equity were chosen for further studies because they are important elements of general practice, reflected in the regulation of the Norwegian regular GP scheme and available for studies based on registers.

The current project cannot assess effects of list patient reform since there are no comparable data from before 2001.

1.1 The importance of general practice

A well developed primary health care with GPs as central professionals is a documented model for effective health services. This model is advocated by WHO in the World Health Report in 2008: "Primary health care - Now more than ever" [1]. There are both ecological studies and studies on the individual level showing an association between high quality primary health care and better self-reported health, improved health status in populations, reduced hospital utilisation and lowered expenditures on health service. [2-7].

1.2 Core values of general practice

It is a paradox that health outcome at the patient level seems to be better when the patient treatment is GP-based, even when the GPs lack the expert competencies of specialists in secondary care [8]. The result of the GPs' work seems to amount to more than the sum of their competencies in the different special medical fields.

How primary care contributes to health system performance and population health was assessed in a review by Kringos et al. [9]. They identified ten core dimensions describing the structure, process and outcome of the primary care system. The structural dimensions were governance, economic conditions and workforce development. The primary care process was determined by four dimensions: access, continuity of care, coordination of care and comprehensiveness of care. The outcome of a primary care system included three dimensions: quality of care, efficiency care and equity in health.

In the definition of general practice laid down by the World Organization of Family Doctors (WONCA), the professional field is described by reference to 12 distinctive characteristics that overlap with the findings of Kringos et al. [10].

Equity in health care delivery in general practice is one of ten core dimensions in primary care and can clearly be deduced as a characteristic on the basis of the

WONCA definition, which states that general practice “*is normally the point of first medical contact within the health care system, providing open and unlimited access to its users, dealing with all health problems regardless of the age, sex, or any other characteristic of the person concerned*” [10].

Collaboration is not a core dimension, but is a part of co-ordination and is also deduced from the characteristics in the WONCA definition, which describes the GP as one who “*makes efficient use of health care resources through co-ordinating care, working with other professionals in the primary care setting, and by managing the interface with other specialities taking an advocacy role for the patient when needed.*”

Some of the dimensions and characteristics of general practice are referred to as core values of general practice and are acknowledged as fundamental beliefs or guiding principles in the professional field.

The personal relationship with a patient-centred perspective and continuity in the GP-patient relation is a core value, according to Howie et al. [11]. McWhinney also emphasises these central elements and deduces that team work is a consequence of this core value [12].

In the recent policy document for Dutch general practice, the core values “generalist“, “patient-oriented” and “continuous” are used as a basis for describing the whole professional field. The value of equity is clearly part of both the generalist and the patient-centred approach, and collaboration in teams is part of continuous provision of services [13].

In this thesis, three characteristics or dimensions of general practice are chosen for further studies: continuity, collaboration and equity. As will be shown, these elements are of great importance in general practice and represent basic values of the professional discipline. Therefore, the term “core value” is used in further discussion to denote these important elements of the GPs’ work.

1.2.1 Continuity

Personal continuity of care has long been considered a core value of general practice and is still regarded as important among GPs [12,14].

Different concepts are used to describe the relationship between a patient and a GP: longitudinal continuity, personal continuity and relationship continuity. The concepts are used differently in the literature, and definitions have changed over time [15].

There are several measurements of continuity focusing on the patterns of contact [16,17]. One of the most used is the Usual Provider Continuity Index (UPC), defined as the number of consultations with the usual service provider divided by the total number of consultations in a defined period of time [18].

There is evidence that continuity of care in general practice reduces hospitalisation rates and emergency department visits, improves the care provided for chronic conditions and improves preventive services [19-23]. Continuity can also improve coordination of care [24].

There is support for personal continuity as a predictor of patient satisfaction, particularly among elderly patients and patients with psychosocial problems and chronic conditions [23,25-31]. Other studies indicate that many patients in these groups are not provided continuity in services, resulting in reduced patient satisfaction [32,33]. Chronically ill or vulnerable patients may value longitudinal continuity with a GP, even when the personal relationship is poor [34,35].

Studies from Norway have shown that a longitudinal relationship between a GP and the patient gradually increases the GP's sense of responsibility for the patient [36]. Accumulated knowledge of the patients was also found to influence practice by reducing time spent in consultations, reducing the frequency of laboratory testing and increasing the use of expectant management [37].

Longitudinal continuity is a basis for establishing trust in the GP-patient relationship [38-40]. However, quantitative measures such as those revealed by the UPC have

shown ambiguous associations with patient satisfaction [17]. Without obtaining the patient's trust, the positive effect of longitudinal continuity on patient satisfaction is not achieved [29]. Knowing the GP well is more important for trust and patient enablement than the length of registration with a practice or merely seeing the same doctor repeatedly [41,42].

Other studies have questioned the importance of continuity in a GP-patient relationship. Previous knowledge of the patients was found to have no influence on outcome of consultations with a GP trained in communication skills [43]. Continuity may also contribute to delayed diagnoses because the patients may be reluctant to bother a well known GP with symptoms that may be judged as trivial matters [44].

Arguments for personal continuity are challenged by recent trends in health policies focusing on quick access to health services. British GPs are given standards for acceptable waiting time for a GP consultation of 48 hours [45]. Such standards are part of the revised regulations for the Norwegian regular GP scheme [46]. Studies indicate that standards for quick access may reduce personal continuity [47].

On the other hand, some patients may value quick access more than personal continuity [31,48]. When the patient regard the actual health problem as urgent or as minor, seeing the regular GP is less important. Quick access and continuity are not necessary mutually exclusive, but are not easy to achieve simultaneously [49]. GP services should ensure patient treatment even when the regular GP is not available. This challenge is part of the motivation for increased use of group practices. For many patients, it may be sufficient see a known GP in the same practice rather than the designated, regular one [28,42]. Thus, the concept of continuity has been extended to involve more than one clinician [15], as shown in the definition of relational continuity set forward in a policy paper by the Royal College of GPs in 2011: *“Relationship continuity is longitudinal, personal, continuing and caring: it implies knowledge of each other within the context of the therapeutic relationship, with commitment and trust. Both doctor and patient contribute to its creation and*

maintenance. It can involve more than one clinician and it should be flexible over time, responding to the patient's changing needs and social context" [50] .

The organisational structures of the health services influence the possibilities for achieving continuity of care [51]. A list patient system may encourage, but cannot ensure, relational continuity in general practice, and the effects should be evaluated. Rigid systems that make it difficult to see other GPs may be unwise. Patients should have the opportunity to see other GPs if the regular GP is not available, if the personal relationship with the regular GP is difficult or in situations where views on treatment may differ.

The aim of improved continuity was included in the regulation of the list patient system in Norway [52]. The continuity of care is assessed by exploring the utilisation of GP services in the population and the distribution of consultations between the patients' regular GPs and other GPs in **Paper I**.

1.2.2 Collaboration

The complexity of primary health care has increased during the last decades due to more professional groups entering the services. There are also shifts in responsibilities from secondary to primary care as a result of health reforms. One example in Norway is the reforms in psychiatric services, which transfer responsibilities to the GPs and the municipalities. As a consequence, 6000 more employees now work with mental health in primary care, as compared to the late 1990s [53]. The ongoing "Coordination Reform" gives the municipalities additional responsibilities to provide patient treatment and also to partly finance specialised care [54]. These changes are also occurring internationally and require more collaborative work between professional groups in the health and social services, including GPs [55-58].

In line with these structural changes in health services, the concept of continuity has been broadened to focus on factors contributing to a "seamless" health service delivery [15]. Exchange of medical information (*informational continuity*) is needed

between health care providers. Coordination of care and collaboration between professionals (*management continuity*) is also necessary to ensure the best possible treatment [59,60]. Continuity of care within health care teams is proposed as a necessary extension of the continuity aspect [61].

It has been estimated that chronic conditions represent nearly 80% of the disease burden in Europe [62]. Care of patients with longstanding illness is therefore a main responsibility of GPs. These patients are often in need of other services and collaboration in providing patient care is required. Well-functioning, multidisciplinary teamwork is shown to yield positive health outcomes for geriatric patients, patients with mental disorders and patients with other chronic conditions [57,58,63-67]. GPs are often in demand as “key workers” in palliative home care, according to a Danish study [68].

To cope with the demand for coordinating care for the patients, personnel from different disciplines form a diversity of teams organised in different ways. Well defined team structure, with clearly defined roles and knowledge and respect of each other’s responsibilities, are important for the outcome of teamwork. [69-72]. Also, clear goals and effective communication are crucial for a team to function effectively. A GP’s participation in a multidisciplinary team meeting concerning one of the GPs’ patients is regarded as important in providing an appropriate, coordinated service [73].

Incorporating physicians in multidisciplinary work seems to be a special challenge. GPs need to change the traditional way of working and sharing responsibilities for their patients. Several barriers related to these aspects of collaboration have been identified [72,74,75]. In a Swedish study involving GPs experienced with teamwork, four major themes revealing ambivalence among GPs were identified: “*time-consuming versus time-saving; shared responsibility versus main responsibility; medical expert versus generalist; shared knowledge versus all knowing*” [74]. The authors concluded that “*the GPs’ self-perception has to be taken into consideration*

as has the prestige and status associated with their traditional role and the benefits of teamwork to the profession of medicine”

In 2001, Norwegian patients in need of coordinated and longstanding health services were given the legal right to an individual care plan in order to improve coordination of the health and social service delivery [76,77]. In this model for multidisciplinary collaboration, one person, most often from the municipal health service, coordinates the patient’s care plan, and personnel from the other services involved in the care are expected to participate [78]. In most cases a multidisciplinary team is established and the coordinator arranges regular meetings to coordinate the services, typically two to four times a year. The GPs are expected to take part according to their coordinating role in patient treatment [79]. However, surveys among municipal health care workers indicate that the GPs are seldom involved in this work, a view also acknowledged by the authorities in planning the Coordination Reform [80-83]. In 2005, 25 000 patients (0.5% of the Norwegian population) had an individual care plan [81].

At the start of the list patient reform, representatives of the GPs’ organisation held the positive expectation that GPs would take a larger share of responsibility for multidisciplinary work with a more uniform practice among GPs [84]. Assessing the GPs’ participation in multidisciplinary meetings may yield clear answers regarding how this challenge has been met, and this item is explored in **Paper II**.

1.2.3 Equity

The challenge for the health services to reach the goal of fair distribution has been longstanding because of the tendency to deliver services with a pro-rich profile, described as “The Inverse Care Law” forty years ago, resulting in inequity [85]. Health inequity can be defined as *“inequalities in health that are deemed to be unfair or stemming from some form of injustice”* [86]. The judgement of such inequalities as unfair is based on a set of moral values reflected in the Universal Declaration of Human Rights, the fundamental set of values in most health care systems [87].

Health inequity most often regards differences in health and health service utilisation based on socioeconomic status, with a focus on the least well off. However, barriers for other population groups may also reduce their access to health care if health service delivery is inappropriate due, for instance, to geographical and intergenerational inequity [87].

Principles for equity in health services have been proposed by WHO and are adopted and published by the Norwegian Directorate of Health [87]. This includes a non-profit driven public health service, providing care according to need and unrelated to the recipient's ability to pay. The same high standard of health care should be given to everyone regardless of gender, age or social or ethnic background. Lastly, values of health care should be identified and health service performance related to the values should be monitored.

The ideal of equity challenge the GPs especially as the first point of access in health services expected to deal with all kind of health problems regardless of patient characteristics [10].

Access is broad concept encompassing availability, accessibility, accommodation, affordability and acceptability [88]. Easy access to the GP service is important in systems where the GP is the first service point and should ensure personal continuity [31]. Variation in utilisation of GP services is one marker of access. An overview of access in Norwegian general practice is given in a current report of the Norwegian Medical Association [89].

The Norwegian College of General Practitioners has included the aim of giving highest priority to the patients most in need of services as one of their seven theses for general practice [90]. To achieve the aim of equity, the GPs should adapt to varying needs of the different population groups they serve, taking the different elements of access into account. The variation of the utilisation of GP services between population strata based on socioeconomic status or age may indicate the extent to which access to GP services is deemed fair.

Socioeconomic status and use of GP services

In Norway, as in other western countries, health inequality across socioeconomic strata is increasing, despite increased spending on health services [91-94]. GP services seem to be adaptive to the rising needs for health care among those of a lower socioeconomic status, while secondary care, according to several studies, have a pro-rich profile [95-99]. A more equitable distribution of the service delivery in primary care may be one of the explanations for why a well developed GP service has a positive impact on health status in the populations they serve [5,100,101].

Increasing the density of GPs in deprived areas and ensuring good financial accessibility to GPs for disadvantaged groups are among the recommendations in the Dutch strategy to reduce inequity in health [102].

Organising GP services with the GPs in a gatekeeping function and a low out-of-pocket payment for the patients seems to give a more pro-poor pattern in utilisation of these services [101].

Although most studies indicate a fair distribution of primary care services, there are studies showing a pro-rich trend in GP utilisation as well [103,104]. And even with a pro-poor profile in utilisation, there may still be a lower utilisation of GP services in lower socioeconomic groups if the differences in disease burdens are taken into account [105,106].

Some studies indicate that the quality of content in general practice may vary across social strata in a pro-rich manner, as measured by time expenditures, achievement of treatment goals or with respect to referral rates [107-109]. Some other studies find marginal differences or none at all [110,111]. Quality improvement in general was found to reduce the differences in achieved treatment goals between the least and most deprived population groups [112].

In a population survey, Norwegian patients from lower socioeconomic groups scored lower on indicators concerning their relationship to the GP [105]. These patient

groups also tend to evaluate GPs skills lower [113]. In a Danish study, however, educational level had no influence on patients' assessment of GP services [114].

A “cultural distance” between GPs and patients from lower socioeconomic groups is seen as a barrier for utilisation of health services, and these patients may challenge the GPs' relational and communication competencies and knowledge [115]. The GPs' ability to show relational continuity, empathy and to spend sufficient time in consultation is important to avoid the GP being perceived as “socially distant” by a patient with lower socioeconomic status [116].

GPs' knowledge of their patients' socioeconomic status seems to vary substantially [117]. Knowledge about social problems was most often related to working conditions and was found to influence the management in 17% of GP consultations [118]. A more active recording of information pertaining to the patient's socioeconomic position has long been advocated [119].

The variation in disease burden and thereby the need for health services in population groups is difficult to assess. Because of the known differences in health across socioeconomic strata, indicators such as income, educational level or use of social security benefits can serve as proxies for the need for health services. Investigating how the practice of GPs varies with socioeconomic and -demographic composition of the list may indicate how the GPs respond to differences in health care needs. In **Paper III** the objective was to assess such variations.

Young peoples' use of GP services

Broadening the concept of equity somewhat beyond social class and assessing the variation in accessibility for other patient groups are also important in judging whether the delivery of health services is fair. One group with a rather low utilisation of GP services is young people [120]. Patients in this age group are learning to use the health services on their own and they challenge the way the GPs normally work [121].

GPs are also the first line service for young patients, although in Norway there are alternative services for teenagers. However, the school health services and health centres for young people focus mainly on preventive health care. A Norwegian survey showed that two-thirds of the 15-year-olds interviewed had at least one GP contact during one year and that GPs were the health service most often used [122]. A somewhat higher proportion of young people reported that they had consulted a GP during one year in the Netherlands (76%) and Great Britain (70-91%) with some variation in the age groups studied [123-125].

Despite the rather frequent contact with GPs in this age group, there is a higher proportion reporting unmet health needs when compared to other age groups [126,127]. A strong association between self rated health among teenagers and their later work integration has been shown [128]. This negative consequence of early health problems is possibly preventable with accessible and competent help during the youth period.

Barriers to young people seeking help have been identified as related to organisation of GP services and how the health personnel are able to communicate with the young patient [120,129]. Convenient location and opening hours are probably more important as predictors of young people's contacting GPs, compared to other patient groups, as well as short waiting times. The way the staff and GPs meet patients seems especially important for young patients, and negative experiences become barriers to seeking further help [121]. Concern about confidentiality and embarrassment may also hinder young people from contacting the GP [127,130]. Some of these barriers may be reduced if young patients become better acquainted with the service routines and the type of health problems the GP can deal with [130-132]. Prior knowledge of the GP facilitates help-seeking pertaining more serious problems [133]. The GPs should use contacts with the younger patients to educate them and establish a good relationship.

Young people most often consult GPs for dermatological or respiratory symptoms, although mental health problems are the major disease burden in this age group [120].

Young people seem reluctant to seek help for mental health problems and believe that GPs do not deal with psychological problems [121,131]. One Norwegian study found that less than 13% of teenagers with depressive symptoms had sought the help of a GP [134]. On the other hand, GPs often do not explore psychosocial issues in their encounters with young people [135]. This might be a sign of insufficient competence among GPs [133].

Based on the knowledge of these accessibility related problems, youth-friendly health services have been proposed [120,121,129,136]. These concepts of youth friendliness are seldom high on the agenda among Norwegian GPs.

Utilisation of GP services can be regarded as an indicator of access. The rates of consultation with young people may be seen as a proxy for the GP's ability to reach this patient group. This theme was explored in **Paper IV**.

1.3 Organisation of GP services

Health care models vary between countries, but there are also similarities that make GP services largely comparable.

List patient systems

List patient systems are used to regulate GPs' work by giving the GP responsibility for providing services for a defined population [137]. List based systems may improve the possibility of achieving the goals of continuity and coordination, but they are also seen as a tool for controlling the GPs and their practices. The list can be personal, as in most lists in Norway and Denmark, or as a common responsibility for GPs within a group practice, such as is most usually the case in England and the Netherlands [138-140].

Gatekeeping

In list patient systems, GPs are expected to assume the role of gatekeeper, where the patients' path to specialists is through the GP. This role is associated with a stronger position as first contact [141]. Gatekeeping may be important to facilitate continuity and coordination of care. It has been argued that "coordinator" is a more appropriate term for this function [142].

In a recent review, the gatekeeping role of GPs was found to reduce the utilisation and expenditures on specialist care, but findings were ambiguous [143]. Little scientific evidence was found on the effect of gatekeeping on health outcomes.

In a study of Norwegian GPs shortly after the introduction of the list patient systems, the GPs were found to place more emphasis on delivering better services and keeping patients satisfied than on restricting access to other services [144].

Financing of GP services

Many countries have self-employed GPs but different reimbursement models are used to achieve cost-effective services of good quality. However, assessing the effects of models is difficult [145]. Financial incentives are widely used in health services to influence the direction or priorities of services given, including those beyond provision of GP services.

Capitation models feature a fixed annual fee for each person in the list and can be adjusted to compensate for a presumed increased workload in underprivileged areas [146,147]. This model does not ensure that the extra resources are actually used to improve services to the patients needing them most.

In fee-for-service models, GPs are paid for actual patient contacts and medical procedures carried out. A fee-for-service model may stimulate GPs to be more responsive to the need for services in the list population. Critics fear that GPs in this system prioritise their own economic interests irrespective of medical criteria or total costs in this system. The literature is ambiguous concerning this question [145].

Norwegian studies diverge on the matter of whether GPs use the fee-for-service model to induce demand when GPs have free capacity in their lists [148,149].

Mixed financing models combining capitation and fee-for-service are used in the list patient systems in Denmark, the Netherlands and Canada [138-140]. The balance between these elements varies.

In a fund holding system, the GPs partly finance services when they refer patients. In pay-for-performance systems, the GP's income is related to how defined treatment goals are achieved [139]. There is still insufficient evidence on the various effects of this remuneration arrangement [150].

In a Cochrane analysis, fee-for-services was found to increase continuity and give higher compliance with the recommended number of visits, but less patient satisfaction with access [150,151]. The findings were ambiguous and were based on few studies.

In the lists patient systems most comparable to the Norwegian one, there is less patient co-payment [138-140]. This may affect the utilisation of services, especially in deprived patient groups.

1.4 General practice in Norway

1.4.1 A brief historical view

There is a long tradition of primary care based health services in Norway, with GPs as central professionals. This service was previously organised by the central government with a history dating back to the 16th century. Physicians working as combined GPs and public health officers were the basis of primary health care, with a gradual increase in the number of general practitioners during the previous century.

In 1984, the municipalities were given the responsibility for primary health care including GP services through a new municipality health service act. GPs were either employed by the municipalities or paid via a mixed model with a fixed payment from the municipalities according to weekly opening hours in practice combined with fee-for-services partly paid by patients and partly by The National Insurance Scheme.

The first university institutes for general practice were established in Oslo in 1968 and in Bergen in 1972.

In the early 1980s, the Norwegian GPs were “lifted out of the shadows” by a comprehensive study by Olav Rutle of the work done in Norwegian general practice [152]. The studies also focused on the problems the patients brought to the GPs. Marked variations in practice among GPs were revealed.

A speciality in general practice was introduced in 1985 based on a five-year educational program, with recertification every fifth year [153].

Norwegian GPs have a long tradition of focusing on core values as important elements in general practice. In a policy document from 1977, the two organisations of Norwegian primary care physicians used the acronym “KOPF” to formulate the ideals for future general practice using the terms: continuous, comprehensive, personal and committed. In the first Norwegian textbook for general practice, published in 1991, these values were defined as the foundation the GP’s work [153]. The GPs were described as personal doctors coordinating services for their patients and having a comprehensive knowledge of the patient’s social context. Also, an important task for the GPs included taking responsibility for resource allocation and serving a gatekeeping function. Later there was considerable debate about these ideals, which were considered to be too comprehensive [154].

However, basic values of the discipline have continuously been the object of focus, as shown in Per Fugelli’s paper reflecting on the central value of trust [155].

The chosen core values – continuity, collaboration and equity – are clearly reflected in the seven theses for general practice and markedly influence the policy document for the revitalisation of Norwegian general practice published by the Norwegian Medical Association in 2009 [90,156].

1.4.2 The Regular GP Scheme

The regular GP scheme introduced in 2001 represents a continuation of the Norwegian tradition of general practice [79]. A main purpose of the reform, according to Section 1 in the regulation, was:

“to improve the quality of the general medical services by ensuring that residents of Norway are granted the right to register with their own RGP. The RGP Scheme shall provide the population more security through better access to the general medical services” [157].

The residents’ legal right to belong to a certain GP list was new, together with the GPs’ new responsibility to prioritise their list population.

In the proposition to the Norwegian parliament, the government also emphasised the importance of a continuous and personal GP-patient relationship:

“The reform will aim for continuity in doctor-patient relationships. This is particularly important in the case of people suffering from chronic diseases and mental illnesses, as well as the disabled and patients undergoing rehabilitation...” [52].

According to this, the GPs were expected to assume the role of care coordinators. The GPs were to keep contact with specialised care and keep an updated medical record including lists of medication. There was an underlying expectation that the reform would improve coordination of patient care [52]. GP involvement in the team work aimed at individual care planning seemed to be anticipated, although GPs were not expected to be the coordinators.

The core values identified in this thesis as continuity, collaboration and equity seem to have had a formative influence during the preparation of the regulation for the regular GP scheme.

Administrative and legal regulations

The administrative framework of the current GP services in Norway are defined by legal regulation and agreements between the Norwegian Medical Association, The Norwegian Association of Local and Regional Authorities (KS) and the Government [79,158].

The GPs set a limit to their list size in a contract with the municipalities, within the range of 500–2500 patients. The patients have a free choice of GPs among GPs with free capacity and are allowed to change twice a year.

The GPs have a personal responsibility for medical services for the patients in the list within normal working hours on agreed practice days. When absent, the GPs are obliged to have an agreement with other GPs to take care of the patients, normally a GP in the same practice, and alternatively, a colleague in the neighbourhood.

The typical GP works in the practice four days per week and one day in other primary care services administered by the municipality, according to regulations [79,158]. GPs with short lists normally work fewer days in their practices, often with larger part-time positions within public health facilities or universities. There is no available information on the number of practice days for each GP.

The Norwegian list patient system is based on a mixed financing model.

Approximately 30 % of GP incomes come from a capitation with no correction for composition of list population of performance indicators. A 70% is fee-for-services payment equally divided between the National Health Insurance and patient co-payment. The age limit for free service for children varied in the study period with an increase from 7 to 12 years of age in 2006 and was further increased to 16 years of

age in 2010. There are no co-payments for pregnancy, serious infectious diseases, diseases and injury related to occupation and no co-payment for some other patient groups. All patients get a healthcare exemption card when they have paid user fees up to a maximum cutoff; in 2009 this cutoff was NOK 1780 during one calendar year.

The municipalities arrange off- hour emergency services; GPs normally take part according to their contract in the regular GP scheme [46,159].

Some facts and figures

From 1990 to 2009, the number of man-labour years of physicians in primary health care increased from 3218 to 4637 [160]. In 2009, 3817 of these were in general practices, the remainder in public health services, nursing homes or in preventive services for children in the municipalities. The difference between this number and figures in table 1 is explained by part-time, regular GPs.

Studies and reports evaluating the first four years of the Regular GP Scheme are summarised in a report from The Research Council of Norway [161]. The activity in general practice has also been described in register based reports [162,163]. The following table and figure are based on data in the current studies, but similar data are presented in the referenced reports.

Table 1**GP and list characteristics in the list patient system,
2001 compared to 2009**

	2001	2009
Number GPs	3662	4078
Age GP, mean (SD)	46,3	48,5
Proportion male GPs, %	71,0	65,3
List size, mean (SD)	1183	1180
Proportion of closed lists, %	39,0	58,1
Proportion of GP in single handed practices,%	19,3	14,9
Proportion of GPs with fixed salary, %	10,6	6,1

Data source: The regular GP database

Among the GPs working in group practices in 2002, 19% of practices had two GPs, 42% of practices had three to four GPs, and 24% had five or more GPs [164].

In 2009, 59.4 % of GPs were approved specialists in general practice. This speciality is not mandatory to get a contract as a regular GP.

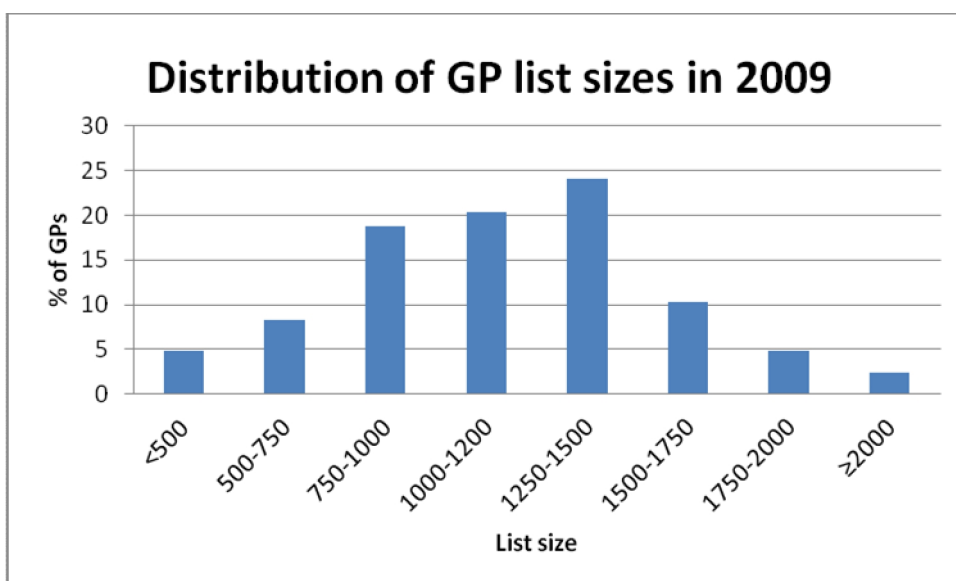


Figure 1 (Source: The regular GP database)

Distribution of list sizes in 2009 is shown in figure 1. The average list size is shorter than in Denmark and United Kingdom, with average sizes at 1500-1600 and 2250-2500 in the Netherlands [138-140]

In 2009, 99,6% of the Norwegian population participated in the regular GP scheme [165].

1.5 Literature

The most extensive literature search was carried out in the preparation of the respective papers. However, the references were supplemented during the process of writing the thesis until October 2012, with an ambition to compare the findings from Norwegian general practice to the latest studies and knowledge in the field.

2. Aims

The aims of the study have been to explore:

- How the core values continuity, collaboration and equity are reflected in Norwegian general practice by using markers available in register data.
- The variation in the GPs' practices according continuity, collaboration and equity.
- The associations between these variations and characteristics of the GPs, the GPs' practice, the lists and the list populations.

To achieve these aims, the following aspects of general practice were studied:

- Continuity of care by exploring the utilisation of GP services in the population and the distribution of consultations between the patient's regular GP and other GPs.
- Collaboration regarding the GPs' patients by assessing the GPs' participation in multidisciplinary meetings.
- Equity by assessing service utilisation in different patient groups:
 - The use of GP services in list populations with different socioeconomic levels.
 - The use of GP services among young people

3. Methods

3.1 Design

Cross-sectional studies based on national register data describing Norwegian general practice within the regular GP scheme.

The study period varies between the four papers. **Paper I** uses data from 2009, **Paper II** from 2007, **Paper III** from 2008 and **Paper IV** is based on data from 2002-4.

3.2 Data sources and data

3.2.1 The regular GP database

The regular GP database (*Fastlegedatabasen*) was established in 2001 for research purposes as well as to monitor and evaluate the reform. This database is organised by Norwegian Social Science Data Services (NSD) [166].

The regular GP database includes information of all GPs having a contract with a municipality within the regular GP scheme. The database also contains information about the GP affiliation of all residents in Norway, including age and gender of the patients and information pertaining to their list switches. The regular GP database is updated yearly at the end of each calendar year.

For the period 2001–2005, the regular GP database also has a sample of the GPs' invoices sent to The Norwegian Health Economics Administration (HELFO) (see section 3.1.3) covering one to three months per GP per year. The regular GP database was the source of information on GP activity in **Paper IV**.

3.2.2 FD-Trygd

FD-Trygd is a national research database administered by Statistics Norway. It is a historical event database including information on socio-demographic data on the individual level for the Norwegian population [167,168]. Information in this database is collected from different official registers. Demographic data and information on income come from the Norwegian Tax Administration. The Norwegian Labour and Welfare Service is the source of information on various types of retirement and sick leave covered by the National Insurance Scheme. There is also a link to the National Educational Database (NUDB).

3.2.3 The KUHR database

The Control and Payment of Reimbursements to Health Service Providers database (KUHR) was established in 2005 to administer the payment arrangements for health personnel with fee-for-service agreements with the authorities. HELFO, a section of the Norwegian Directorate of Health, is at present responsible for KUHR.

All GPs in the regular GP scheme send invoices for each patient contact to claim the fee-for-service according to a GP-tariff (Normaltariffen), a detailed tariff scale used in the fee-for-service system to pay the GPs [169]. The KUHR database includes all electronic invoices from the GP, constituting 99% of all claims in 2009 according to information from HELFO.

Invoices from out-of-hours services in the municipalities are also included in KUHR. They are marked separately and are not used in the current studies.

Variables in the data received from KUHR have changed during the study period. Data available in the analyses in **Paper II and III** included all invoices without a patient identifier and were used to characterise the GP's practice activity.

In **Paper I** the invoices also included a person identifier allowing the use of GP services to be aggregated on the personal level and identifying the age and gender of

the patient. In this sample, one could also differentiate between invoices from the patient's regular GP and other GPs.

3.3 Linking of data sources

The dataset was made available in a research database called “The GPs, welfare and inequality” (“Fastlegene, trygd og ulikhet”) established in a collaboration between Health Economic Bergen and the departments of Economics and of Public Health and Primary Health Care at the University of Bergen in 2006 [170].

The data from the three sources were linked by Statistics Norway by personal number in the original dataset and then made anonymous for researchers, using a constructed identity for the individuals, including the GPs.

On the basis of the permission granted for the project, the linkage on the personal level was made between the patient files in the regular GP database and the FD Trygd and was then used to describe the list populations.

When the data from KUHR was delivered to Statistics Norway with a personal identity (**Paper I**), this was changed to an anonymous code but not linked to the individual data from FD-Trygd or regular GP database, in compliance with limitations in the permissions given.

The data from KUHR was linked to the GPs in the regular GP database by a GP identity code and changed to an anonymous internal GP identity by Statistics Norway. Invoices from GPs not registered in the regular GP database were coded as missing with respect to GP identity.

Information on the number of residents in the municipalities is publicly accessible in Statistics Norway and was linked to the information on GP practice by municipality in the regular GP database.

3.4 Participants

3.4.1 Inclusion criteria

The participants were all regular GPs with a personal contract with a municipality, identified in the regular GP database.

3.4.2 Exclusion criterias

Exclusions were made for GPs having lists in several municipalities: in 2009, 15 GPs were excluded because the practice activity could not be related to a given list population.

Some regular GPs were excluded, seen as not being in “regular practice”, if data indicated a long-term interruption in their practice during the study period, such as few invoices in total, lack of invoices for periods of the year or not having a contract as a regular GP during the whole study period. The exclusion criteria were slightly different in the four sub-studies and are accounted for in the respective papers.

Only GPs who were approved specialists in general practice were included in **Paper III and Paper IV** because of under-reporting of consultations from non-specialists. For GPs not approved specialist, some consultations do not warrant any fees from HELFO. Some electronic patient record systems did not report these contacts to HELFO and the size of this under-reporting could not be assessed.

However, non-specialist GPs were included in **Paper I**. Available data at that time allowed for aggregating GP consultations at patient level. The consultation rate of list populations in non-specialist GPs’ lists was estimated to be about 5 % lower compared to specialists’ lists. Based on an assumption that the specialist status of regular GP should have little impact on the population’s use of GP services, the completeness of reporting was judged to be satisfactory and sufficient to allow an assessment of the total GP utilisation in Norway.

In Paper II the main measure is the fee for multidisciplinary meetings that are independent of GP specialist status.

3.5 Independent variables

The basic variables retrieved from the three data sources are listed below. The variables were used as explanatory variables in different combination in the four sub-studies, accounted for in each paper.

Table 2: Variables from the regular GP Database

	<i>Used in Paper no</i>			
	<i>I</i>	<i>II</i>	<i>III</i>	<i>IV</i>
<i>Variables on GPs:</i>				
GP age	X	X	X	X
GP gender	X	X	X	X
GP group practice or solo practice	X			
GP self-employed or fixed salary			X	
List size	X	X	X	X
List changes and free list capacity		X		X
Practice municipality	X	X	X	
<i>Variables on population:</i>				
Age	X	X	X	X
Gender	X	X	X	X
Regular GP	X	X	X	X

The population files from the Regular GP database were linked to information on each person from the FD-Trygd, using the variables shown in Table 3:

Table 3: Variables from the FD-Trygd database

<i>Variable:</i>	<i>Used in Paper no</i>			
	<i>I</i>	<i>II</i>	<i>III</i>	<i>IV</i>
Educational level, in years	X	X	X	X
Annual income		X	X	
Information of disability pension		X	X	
Information of social assistance recipients		X	X	
Information of unemployment benefit			X	

Table 4: Variables from the KUHR database

	<i>In paper no.:</i>			
	<i>I</i>	<i>II</i>	<i>III</i>	<i>IV</i>
<i>GP and patient variables:</i>				
GP identity code ¹	X	X	X	X
Patient identity code (only available in Paper I)	X			
Patient age	X	X	X	X
Patient gender	X	X	X	X
GP approved specialist (Using code 2dd)	X		X	X
Diagnosis, coded according to ICPC-2		X		X
<i>Codes from GP-Tariff:</i>				
2ad: Consultation	X	X	X	X
2cd: Additional fee for a consultation lasting > 20 minutes			X	X
2dd: Additional fee for a consultation by approved specialists in general practice	X		X	X
2hd: Additional fee for a consultation with a patient from another GP list ²	X			X
14: Multidisciplinary patient focused meeting	X	X	X	X
507c: Additional fee for spirometry			X	
701a: Addition fee for laboratory test			X	
707: Additional fee for ECG			X	
Fee per contact, Norwegian Kroner (NOK)				X

1) if the GP are registered in Regular GP Database

2) cannot be used for patients belonging to lists within the GP's group practices or to lists where the GP have an agreement to cover up for another GP temporarily

Claims for specialist fee from a GP were used to identify specialists in general practice. This was considered more reliable than the information in the regular GP database, because of a strict input control in the KUHR database on this item.

Socio-demographic variables for the persons in the list populations were aggregated on list level to characterise the GP practice population.

Variables from the KUHR database were aggregated for each regular GP to characterise each GP practice.

To assess GP practice in relation to the list size, *GP consultation rates* and *rates of multidisciplinary meetings* per GP were estimated using aggregated tariff data as numerator and list size as the denominators (**Paper I, II, III, IV**).

The *proportion of consultation ≥ 20 minutes* and the *proportion of psychological diagnosis* in consultations were used as indicators of GP practice characteristics (**Paper II and IV**).

In **Paper I** the consultations were also aggregated per patient and *population consultation rates* were estimated by grouping patients based on patient age or gender, use of GP services or characteristics of their regular GP or GP's list.

In **Paper I** an individual *UPC* (= number of consultation by the regular GP / number of all consultation with a GP) was calculated for each patient. UPC was also aggregated for each GP list (mean UPC).

An *index of socioeconomic level* for each patient list was constructed in **Paper III**. The following five variables or indicators were used: level of education (years), annual income and the proportion of the adult list population with disability pension, social assistance or unemployment benefit. The lists were first divided into deciles based on each of these five variables and given a rank from one to ten. These ranks were summarised and the patient lists grouped in quintiles based on this sum of ranks, giving five levels of socioeconomic status of the list populations. This is a modified version of the method used by Statistics Norway for ranking Norwegian municipalities by socio-demographic indicators [171]. Different combinations of variables on list level were tested, using several that were previously linked to health problems and used by Statistic Norway [171]. The chosen combination showed a gradual change of all five indicators across the five levels, and was therefore judged to be a reasonable method for studying variation in SES levels of patient lists.

3.6 Outcome variables

Paper I: UPC aggregated for each GP and population consultation rates.

Paper II: Rates of interdisciplinary meeting for each GP.

Paper III: GP consultation rates, average fee-for-services per patient per year and per consultation and proportion of consultations with the use of tariff code for laboratory test or consultation lasting > 20 minutes.

Paper IV: GP consultation rates in the age group 15–24 years.

3.7 Statistical methods

Both binary logistic regression giving odds ratio (OR) and Poisson regression models giving relative risk (RR) are used. These estimates are rather similar with outcomes < 10%, but diverge increasingly with more common outcomes [172]. In general OR is found to be intuitively interpreted as RR and using OR can be misleading by giving higher estimates with common outcomes. A Poisson regression model with robust error variance can be used to estimate RR with binary outcome [173]. When OR is presented in the **Paper II and Paper IV**, they are used with common outcomes and should not be interpreted as RR.

$P < 0.05$ was considered as significant in all statistical analyses.

Paper I

Significance of population trends in UPC were analysed using the STATA module nptrend, a non-parametric test of trend for ranks across ordered groups.

One-way analysis of variance was used to compare GP-, practice and list characteristics after grouping the GPs in quartiles according to UPC.

Poisson regression was used to estimate associations between high personal continuity ($UPC \geq 0.80$) and GP- list- and list population variables.

Paper II

One-way analysis of variance was used to compare GP-, practice and list characteristics after grouping the GPs in quartiles based on rates of multidisciplinary meetings.

Binary logistic regression was used to analyse associations between high rates (upper quartile) of participation in multidisciplinary meetings and GP-, list-, population- and municipality characteristics.

Paper III

The Kruskal-Wallis test for continuous variables was used to compare GP-, practice and list characteristics after grouping the GPs in quintiles based on the socioeconomic level in the list populations. This test was used since the variance in the subgroups differed. The Pearson chi-square test was used to compare categorical variables.

Linear regression models were used to analyse the association between the outcome measures of GP activity, using the socioeconomic level in the list population as a categorical explanatory variable, adjusting for GP- list- and list population variables.

Trends across strata of socioeconomic groups of GP lists were tested for by using the categorical socioeconomic grouping variable as a continuous variable in the models.

Paper IV

One-way-analyses of variance were used to test for differences in variables characterising the GPs and their practices across the GP groups based on rates of consultations with young people.

Binary logistic regression was used to analyse associations between high consultation rates with young people (upper quartile) and GP characteristics, practice profiling factors and list characteristics.

The statistical package STATA 11 was used for the analyses in **Papers I-III**; the SPSS 15.0 software package was used for **Paper IV**.

3.8 Methodological considerations

3.8.1 General consideration

A major strength of these studies is the use of comprehensive data on Norwegian general practice from nationwide registers, giving a large amount of information concerning the GP list populations and the GPs' activity in their practices.

The current studies are among the first using the possibility to describe the list populations for each GP based on detailed socio-demographic variables and related the GP's activity to the actual population they serve. In comparable international studies, population estimates are most often based on geographic areas and not the actual practice populations. Studies of association between variations in GP practice activity and the characteristics of their list have not previously been done to such extent in Norwegian general practice and may bring new knowledge to this field.

The use of register data gives more precise estimates for the use of GP services and the GPs' practice activity compared to the use of surveys in many earlier studies.

Another strength is that the studies include all regular GPs reporting their activity, with no selection bias based on interests or capacity for participation in research.

A major weakness is that the variables used to explain variation are few, and probably a large part of the variation between GPs is unexplained by these. The impact on the GP services as a whole when changing one fragment is therefore difficult to predict.

The lack of linking between individual socio-demographic data and the person's use of GP services is a weakness of the study. Therefore indirect measures using aggregated data were used. These measures are less accurate than direct measures and findings must be interpreted carefully.

There are no available outcome measures on health gain or patient satisfaction related to the use of GP services.

3.8.2 Data quality

The regular GP database collects data directly from HELFO and is considered reliable with respect to GPs with contracts as a regular GP and their list population.

A weakness is that the yearly update and changes during a calendar year are not possible to follow. The database also lack information on GPs working temporarily as locums or interns, and invoices from these GPs have no GP identity.

The FD-Trygd database is designed for research and administered by SSB and is regarded as highly valid.

The KUHR data include a large amount of information on the activity of largely all Norwegian GPs in the regular GP scheme. Based on the detailed GP-Tariff used in the fee-for-service system, there is reliable information on contacts between the patient and the GP. Also, details of the work performed by the GP as part of the practice activity are reported through the use of this tariff.

There are some methodological concerns about the KUHR data. GPs basically send the invoices to HELFO to get paid and not to report which services they have performed. This may result in bias in the use of diagnoses and tariffs. GPs may prefer to report diagnoses explaining the use of tariffs more frequently than diagnoses that actually describe the problems taken care of.

We assume a rather consistent and correct use of tariffs by the majority of GPs. This is based on a strict control in the KUHR database and regular information to GPs from HELFO and from the GPs' professional organisations. However, some tariffs may be used differently among GPs and might bias the results from register based studies.

However, this dataset is very likely accurate with respect to documenting that a contact, consultation or meeting has actually taken place. There may be some differences among GPs concerning the distinction between a "short contact" and a

consultation, and also by the distinction between a meeting and a short communication and the fees are very different, resulting in some uncertainty.

The diagnosis in the GP invoice must be used with caution since GPs probably seldom consult the manual of International Classification of Primary Care (ICPC-2) when formulating a diagnosis code [174]. There seems to be a reasonable consensus among GPs concerning diagnoses on ICPC-2 chapter level and that the diagnoses used in invoices reflect a present health problem [175,176]. In nearly 90 % of invoices only one diagnosis is reported. This shortcoming reduces the possibility of capturing co-morbidity and the breadth of the GPs' work.

The problem related to differences in fees for specialist and non-specialist GPs is discussed in section 4.2

3.8.3 Statistical methods

The method of categorising data by grouping GPs into quartiles or quintiles may reduce the size of variation in the GPs' practices. However, grouping of GPs was chosen to identify statistical indicators concerning larger population groups. This may be a more useful perspective when analysing the GP services in a population perspective. The same arguments are used when categorising explanatory variables.

The use of aggregated data may also call for caution. Since a substantial and variable number of consultations are not with the regular GP, as shown in **Paper I**, the interpretation of list characteristics as predictors of the regular GPs' practice activity is questionable. However, the greater part of work done by GPs is related to his or her list population, making it fairly reasonable to estimate such associations.

In cross sectional studies, statistical associations cannot be interpreted as causal relationships. Some explanatory variables such as GP age and gender and number of residents in municipalities clearly precede the outcome measures and a causal relationship is probable. However, factors like GP-, list- and practice characteristics

probably influence patients' choice of regular GP and the direction of causality becomes very uncertain.

3.9 Ethics and approvals

The use of register data and linkage of the different data sources is approved by the Norwegian Data Protection Authority and the linkage procedures done at Statistics Norway. Statistics Norway also made the data anonymous for researchers.

Approvals to use the register data and the linkage are also given by the authorities responsible for handling the different data sources:

- The Norwegian Labour and Welfare Organisation
- The Norwegian Directorate of Health
- Norwegian Directorate for Education and Training
- Norwegian Tax administration
- Statistics Norway

4. Results

4.1 Paper I

Hetlevik O, Gjesdal, S. Personal continuity of care in Norwegian general practice: A national cross-sectional study - Scandinavian Journal of Primary Health Care, 2012, (posted online 31th October).

The aims of this study were: (i) to assess patient use of their usual or chosen GP versus consultations with other GPs overall, and by patient, GP, and list characteristics; (ii) to estimate to what extent the level of personal continuity is predicted by the GP, list, and list-population characteristics; and (iii) to assess the impact of GP personal continuity on the utilisation of GP consultations by the list populations.

It was a cross-sectional register-based study from Norwegian general practice in 2009 including 3 220 GPs and 3 725 998 patients on the GP lists

The main outcome measure used was the Usual Provider Continuity Index (UPC), which measures the proportion of consultations made by the usual GP; outcome was estimated for patients and aggregated to the GP list level.

GPs were grouped into quartiles based on the UPC. The status of GP with a UPC in the two highest quartiles ($UPC \geq 0.80$) was the outcome in the statistical analyses. Poisson regression models were used to estimate relative risks (RR) for an $UPC \geq 0.80$.

Results

In practices without long-term interruptions, the overall UPC was 0.78, increasing gradually from 0.68 in patients <15 years of age to 0.86 for patients ≥ 60 years of age, and from 0.75 to 0.83 for patients with <3 annual consultations compared to patients

with >10 consultations. An UPC >0.80 was associated with longer patient lists and high GP consultation rates. Working in municipalities with <10,000 residents was negatively associated with a high UPC. There was a spread in population consultation rates from <2.10 in the lowest quartile to >2.82 in the highest. A significant association existed between the lowest consultation rates and being ranked on a GP list within the lowest quartile, and between the highest consultation rates and the highest quartile of UPC.

Conclusion

With the regular GP in regular practice, the goal of personal continuity in the Norwegian list patient system seems to be achieved overall with a mean UPC of 0.78 and 50% of lists with a UPC >0.80. However, the UPC varies substantially and 25% of the lists had a UPC <0.68. The personal continuity was lower among young people and in smaller municipalities.

A high GP consultation rate and longer lists were shown to predict a high UPC.

Models for shared responsibility should be tried out.

4.2 Paper II

Hetlevik O, Gjesdal S. Norwegian GPs' participation in multidisciplinary meetings: A register-based study from 2007. BMC Health Service Research. 2010;10:309.

The study explored Norwegian GPs' participation in multidisciplinary meetings concerning their patients, and the health problems addressed. The study investigated the widespread notion that the frequency of GPs' participation in multidisciplinary meetings is generally low, and that the work load of a large list size may be an important explanatory factor.

The aim of the study was to identify the impact of characteristics of GPs, patient list populations and the practice municipalities on the frequency of the GPs' participation in multidisciplinary meetings

The study was a national cross-sectional, register-based study of Norwegian general practice, including data on all (N=3179) GPs in regular practice in the Regular GP Scheme in 2007. GPs were grouped into quartiles based on the annual number of multidisciplinary meetings per patient on their list, and the groups were compared using one-way analysis of variance. Binary logistic regression was used to analyse associations between high rates of participation and characteristics of the GP, their list population and practice municipality.

Results

On average, GPs attended 30 multidisciplinary meetings per year. The majority of the meetings concerned patients in the age group 20-59 years. Psychological disorders were the agenda for 53% of the meetings. In a multivariate logistic regression model, the following characteristics predicted a high rate of attendance at multidisciplinary meetings: (i) younger age of the GP, with an OR of 1.6 (95% CI 1.2-2.1) for GPs < 45 years, (ii) a short patient list, with an OR of 4.9 (3.2-7.5) for list sizes below 800 compared to lists \geq 1600, (iii) higher proportion of psychological diagnosis in consultations (OR 3.4 (2.6-4.4)), (iv) a high proportion of the multidisciplinary meetings with elderly patients (OR 4.1 (3.3-5.4)) and (v) practising in municipalities with less than 10 000 inhabitants (OR 3.7 (2.8-4.9)). List with a high proportion of disability pensioners (OR 1.6 (1.2-2.2)) or patients receiving social assistance (OR 2.2 (1.7-2.8)) also predicted high rates of meetings.

Conclusions

Norwegian GPs have substantial participation in multidisciplinary patient-centred meetings, with an average of one meeting every two weeks. However, rates of attendance at multidisciplinary meetings vary considerably between GPs. The present study identified several structural and GP related factors that might influence GPs'

multidisciplinary co-operation. These findings should be considered when policy changes for general practice are developed.

4.3 Paper III

Hetlevik O, Gjesdal S. Does socioeconomic status of list populations affect GP practice? A register-based study of 2201 Norwegian GPs. The European Journal of General Practice. 2012 (Posted online 19th July 2012.)

The aim of this study was to determine how differences in the SES level in list populations predict the GP rates of consultations, use of time and medical procedures, co-operation with other health and social services, and income from fee-for-service.

It was a cross-sectional, register-based study, including all Norwegian specialist GPs (N=2210) practising during the whole year of 2008. After grouping GP lists into five levels based on a constructed index of SES, associations between SES and GP practice characteristics were analysed by analysis of variance and linear regression.

Results

GP lists with the lowest SES had higher consultation rates (regression coefficient, 0.31; $p < 0.001$) and a higher total fee-for-service (regression coefficient, 104; $p < 0.001$) than lists with the highest SES. Laboratory use in consultations was less frequent in the lowest SES group (regression coefficient, -3.1; $p < 0.001$). No differences were found in the frequency of long consultations or fee-for-service per consultation. The frequency of multidisciplinary meetings was 2.5 times higher in the lowest SES group compared to the highest SES group.

Conclusion

In this study there was a markedly higher use of GP services in list populations with a lower SES, as indicated by higher consultation rates and higher average fee-for-

services per patient per year. However, the consultation characteristics of GPs are less affected by patient SES. This study suggests that a fee-for-service payment model might contribute to meeting the increased need for health services among lower SES groups.

4.4 Paper IV

Hetlevik Ø, Haug K, Gjesdal S. Young people and their GP: a register-based study of 1717 Norwegian GPs. Family Practice. 2010;27:3-8.

The aim of the current study was to identify associations between a high consultation rate with young people (15–24 years) on the one hand, and GP characteristics, patient list characteristics and practice profiling factors on the other.

A cross-sectional, national register-based study from 2002–2004 in Norwegian general practice was carried out. Data on 1 717 GPs, their practice populations and a sample of 316 773 consultations with young people were used to estimate differences between GPs, using one-way ANOVA and logistic regression.

Results

The mean annual consultation rate with young people was 1.4 (95% CI 1.4-1.5) and 2.2 (2.1-2.2) for the age groups 15–19 and 20–24 respectively. List characteristics indicating free capacity – a shorter patient list, a growing patient list and high access for persons not on the patient list – were associated with a high youth consultation rate. Young age of the GP, low educational level among the list population and a high rate of interdisciplinary activity by the GP were also associated with a high youth consultation rate.

Conclusion

GPs seem to assign especially low priority to young people when workload is high or free capacity low. Increased awareness of these mechanisms and greater

interdisciplinary co-operation could increase the youth-friendliness of general practice.

5. Discussion

5.1 Summary of results

5.1.1 Utilisation of GP consultations

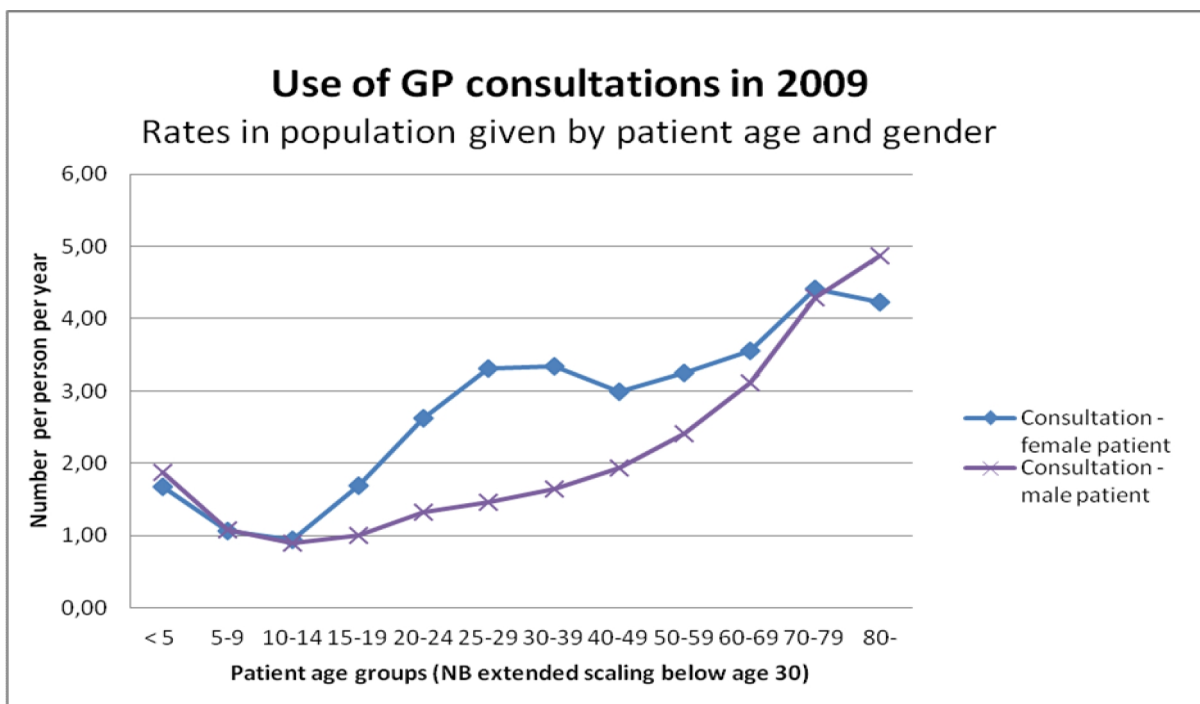


Figure 2

Norwegian regular GPs spend approximately 30 hours a week in direct patient contact, and the consultations are the basic activity [10,177,178]. Therefore consultation rates are used as the main measure of GP-patient contact (**Paper I, III and IV**). The overview of consultation rates shown in **Paper I** is expanded with respect to patient age groups in figure 2. This figure also supplements information on consultation rates among young people reported in **Paper IV**.

Figure 3 show the proportion of the population with ≥ 1 consultation within the regular GP scheme in each year between 2007 and 2009 and in one of these years. This figure is based on descriptive analyses partly presented in **Paper I**.

These figures show a frequent utilisation of GP services in the population, and could indicate that the Norwegian GP service is well known and largely accessible.

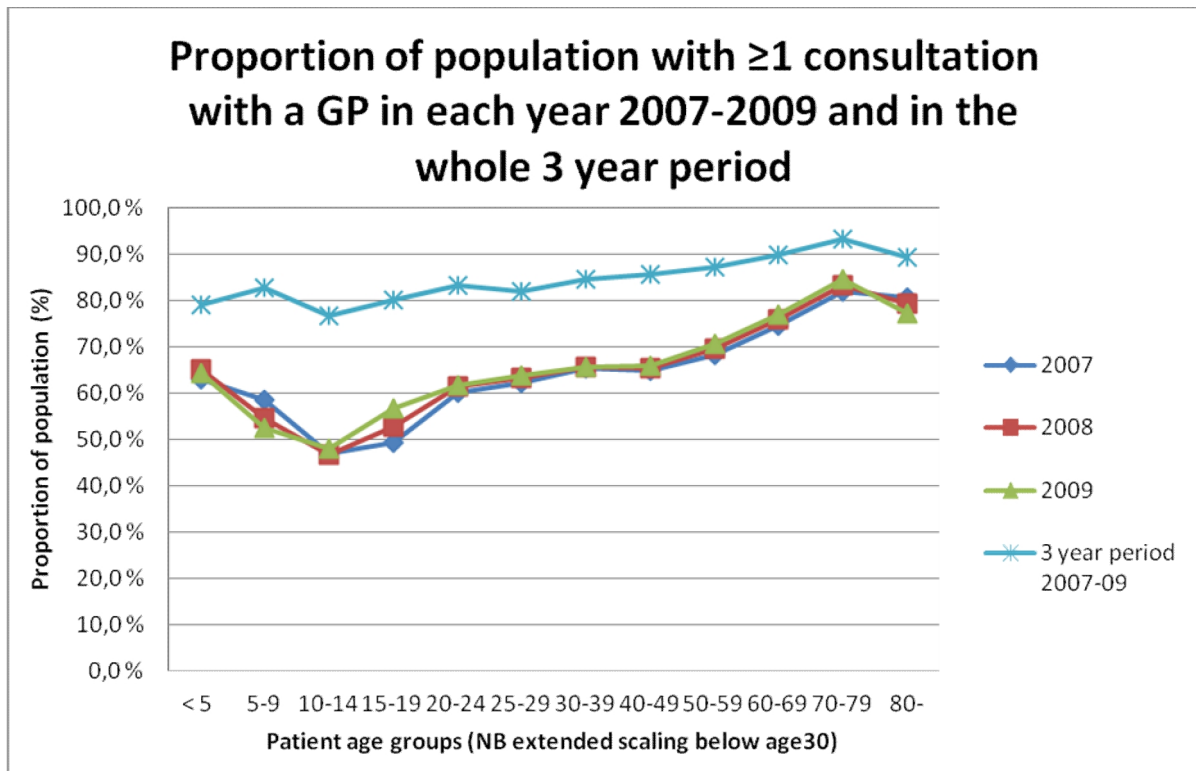


Figure 3

5.1.2 Continuity

Overall, for the patients belonging to a regular GP in regular practice, the aim of personal continuity seems to be achieved to an acceptable degree. In these list populations 78 % of consultations are with the regular GP, with even higher proportions for elderly and the frequent users. In half of GP lists $\geq 80\%$ of all consultations are with the regular GP. GPs are obliged to work in the municipal health service one day a week and combined with absence for further education and holidays, 80% can be considered a reasonable UPC [79].

The estimates are also in line with or somewhat higher than those found in other countries. In a Dutch patient survey 77– 81% of consultations were reported to be

with a familiar GP [28]. In a British survey, 62% (range 39–98) of patients reported seeing their usual GP [179]. Similar figures were reported in a British nationwide patient survey, where 53% of the respondents reported having a preferred GP within the practice they belonged to, and 65% “almost always” or “a lot of the times” consulted with their preferred GP [180]

On the other hand, in the quartile of Norwegian GP lists with the lowest UPC more than 32% of consultations were with another GP. The average UPC in this group was 0.53, indicating that the accessibility to the regular GP is too low to meet the aim of a personal GP for these patients.

However, at list population level the tariff for consulting a GP in other practices were seldom used in all UPC based groups of GPs, with a rate of 1.3-1.5% of all consultation (**Paper I**). Additional analyses of the use of out-of-hours services showed annual consultation rates of 0.17-0.18 per list patient in all quartiles of GPs, grouped by UPC. These findings indicate that groups of GP colleagues usually share the responsibility for a common patient population by covering up for each other if the patient’s regular GP is less accessible.

The GP’s UPC is associated with total utilisation of GP consultations. In **Paper I**, low UPC on a GP list level was associated with a lower average consultation rate in the list populations, and high UPC with higher consultation rates. An interpretation of this finding is that low continuity by the regular GP reduces accessibility and that local colleagues in these situations not always or fully cover the patients’ need for services.

The regulations for the regular GP scheme allow “common lists” within a group practice. Among the 3220 GPs studied in **Paper I**, 245 GPs (7.0%) had “common lists”, 175 worked in municipalities with less than < 10.000 residents. However, they are all registered with a personal list in the regular GP database. In the analyses in **Paper I** these GP lists are treated as a personal GP list. Additional analyses of UPC for GPs registered with “common lists” showed approximately 15% lower UPC

compared to all other GPs. The use of “common lists” may contribute to the lower UPC in smaller municipalities.

The “common lists” model is sparsely described in regulations and agreements and is not evaluated. One could argue for a move towards a strengthened model of common responsibility within a group of GPs. This might be a more correct way to present the GP service when personal continuity is low. The concept of continuity of care may be satisfactory taken care of if the GPs are few and the patients are familiar with them [28,42].

The continuity estimations in **Paper I** were based on the 79% of the GPs who, according to the inclusion criteria used, were in regular practices during the whole study year. Changes in the GP services are unavoidable: temporary absence because of sick leave, maternity leave and educational periods and permanent changes when a list is transferred to a new GP. The frequency of permanent changes was identified by an additional analysis showing that only 64% of the regular GPs in 2009 had a practice contract with the same municipality as in 2001. Such changes reduce continuity for a specific part of the population each year, but with varying list populations affected. Long-term locums contribute to longitudinal continuity for some patients. Eight percent of the study population switched from one GP list to another during 2009, and were excluded from the study because the patient’s GP affiliation was known only at the end of the year.

To test the estimates presented in **Paper I**, an analysis based on the total dataset was performed giving an estimated UPC of 0.71, without any correction for the GP being in regular practice or not or for patient list switch. This method probably underestimates the UPC since the regular GP database is updated only yearly, and the correct UPC for the whole population is somewhere between 0.71 and 0.78.

In the current studies, the regular GP was defined as the preferred, chosen GP. However, there is no completely free choice of GP since 58% of all GP lists are closed. This limits the patients’ free choice and may reduce the motivation to consult

the regular GP; the resulting uncertainty as to whether the GP is preferred by the patient is a weakness of the study.

Measuring continuity based on register data without information on relational components is an obvious weakness since the relational components are necessary for the beneficial outcomes related to personal continuity [29]. However, the study indicated that the current list patient system provides a reasonable opportunity to achieve longitudinal continuity as a basis for building GP-patient relation [36]. The system is also flexible, giving the patient an opportunity to use other GPs if needed.

5.1.3 Collaboration

The average Norwegian GP participated in 30 patient centred meetings in 2007, giving an annual rate of 25 per 1000 patients (**Paper II**). The majority of multidisciplinary meetings pertained to patients 25–60 years of age and half of the meetings were related to mental disease. No standards or comparable studies were found.

Additional data from 2008, available after the completion of **Paper II** showed a total of 124 913 multidisciplinary meetings that year, similar to the total in 2007. At this time, the GP invoices could be aggregated at patient level, and these meetings were found to concern 65 090 different patients, approximately 1 out of 70 list patients. “Sick-leave related” meetings are not included.

The greater part of multidisciplinary meetings are assumed to concern patients from the target groups for individual care planning in which the participants constitute some sort of a team [181]. The lack of certainty as to the participants in the teams and the aim of the meetings, aside from the main diagnosis on the GP invoice, is regarded as an important weakness of this sub-study.

Our findings contrast with the reported findings in surveys among employees in municipal health and social services that GPs seldom take part in the individual

planning work [81,82], a point of view also taken by the national health authorities [80,83].

The GPs' practices seem to differ considerably with respect to participation multidisciplinary meetings. The expectation that the list patient reform would stimulate uniform collaborative practice in this field seems not to be achieved so far [84].

Although the present literature seems to be in favour of formal multidisciplinary teamwork as a tool to improve care for patients with chronic conditions, the effect is moderate. Well functioning teamwork is probably essential. The Norwegian Directorate of Health has promoted the multidisciplinary approach in most policy documents and guidelines during the last decades, strengthened by the current Coordination reform [80]. However, the process of establishing well functioning collaborative teams may not be given sufficient attention [182]. Differences in the GPs' self-perception of their roles and attitude towards co-operation may partly explain the differences found in **Paper II** [74].

GPs experience conflicts between policy demands to promote coordinated care and the expectation that GPs should be available in their practices providing easy access for the same patients [183]. Even with positive attitudes and a desire for more multidisciplinary work, the lack of resources and inflexible co-operation systems are barriers to participation.

Counting meetings reveals only a partial truth about co-operation. There are other forms of collaboration not assessed in the current study such as shorter personal communications in the office, by telephone or letters. However, formal meetings between professionals can build a common ground important for co-operation and will probably also strengthen mutual knowledge and reduce barriers [182].

5.1.4 Equity

Socioeconomic status and use of GP services in Norway

The GPs workload increased with lower socioeconomic levels in their list populations (**Paper III**). A 13% higher consultation rate and a 26% higher average fee-for-service per patient per year were found across strata from high to low socioeconomic level, after adjusting for other GP- and list factors. The increase in total fee-for-service was only partly explained by higher consultation rates. Also rates of short contacts and collaborative work increased with lower socioeconomic level in list populations. These activities were not further explored with respect to socioeconomic level.

This is in line with the majority of studies showing a pro-poor profile in the use of GP services [95,99]. The present study cannot, however, add to the discussion about whether these differences in utilisation compensate for the differences in need or only contribute partly towards a horizontal equity.

On the other hand, characteristics of consultation such as time expenditure, use of laboratory tests and fees per consultation did not vary systematically with socioeconomic level of the list populations. This is in accordance with studies indicating that the content of services is less pro-poor oriented [104,108].

In a recent survey, Norwegian physicians fully agreed on giving the same services to all with comparable diseases, regardless of socioeconomic status [184]. Some 55% were also of the opinion that physicians should provide extra services to patients from lower socioeconomic groups, in some contrast to findings in **Paper III** showing no differences in use of time or other procedures in consultations. There is an ongoing, unsettled discussion concerning the degree to which health service should give extra services to the least well-off patients with the aim of reducing inequity [185,186]. Norwegian GPs seem to practice mostly according to a principle of “treating all alike” since there was no differentiation of consultation characteristics across socioeconomic strata (**Paper III**).

It is shown previously that GPs have limited knowledge of socioeconomic factors related to patients [117]. In the referenced survey, the majority of physicians still reported low attention to patients' socioeconomic background in their treatment [184]. This may explain why GP consultation characteristics did not vary between groups of list populations with different socioeconomic levels.

It is thought-provoking that equal access to the gatekeeping GP results in a pro-rich profile in utilisation of out-patient specialist care [187-189]. However, a recent Norwegian study showed a reduction in this inequity after introducing the list patient system [190]. This could indicate that having a regular GP following the patient over time may improve access to specialised care for patients from underprivileged groups.

In a survey, 4.6 % of the Norwegian population reported great difficulties in paying for health services [191]. The patient co-payment in the regular GP scheme may result in an underuse among low income groups [192]. A Danish study showed that poor adults had low use of GP services even with free services [106], showing the lowest socioeconomic group may be hard to reach for reasons beyond financial barriers.

When planning the regular GP scheme, there was a concern that the chosen financial model with a large part of income from fee-for-service would influence the GPs to give priority to patients with fewer or more simple health problems, easier to deal with. The present finding of a markedly higher utilisation of GP services in population groups with expected higher needs indicates that the mixed financial model works as intended by stimulating the work with patient in need for more services.

Young people's use of GP services

Consultation rates among young people are relatively low, but increasing during this age period, most among females (Figure 2). Half of the population aged 15–24 years had at least one consultation with a GP during one calendar year, and approximately 80% had ≥ 1 consultation with a GP during a three year period (Figure 3). The consultation rates shown in figure 2 for the age group 15–19 years and 20–24 years

are similar to the estimates in **Paper IV** based on a sample of GP invoices from 2002–04. This indicates that the dataset used in **Paper IV** is representative.

When approximately 80 % of young people see a GP during a three year period (figure 3), young people appear to be familiar with the GP services offered. However, the proportion of young people consulting a GP during a year, according to our additional analyses, was lower than reported in a Norwegian survey [193], and also compared to other countries [123-125].

In line with similar studies, dermatological, respiratory and musculoskeletal diagnoses were most frequently recorded in consultations [120,194].

Interestingly, the proportion of consultations with psychological diagnoses increased from the age group 15–19 years to the 20–24 year group. In the latter group the rate was comparable to the adult population. This contrasts with studies finding that young people seldom consult GPs for psychological problems [131,134,195]. The low proportion of consultations with psychological diagnoses among these 15-19-year-olds is in line with another Norwegian study showing that teenagers seek help for such problems elsewhere [134].

The increase in consultation rates and the proportion of psychological diagnoses from the 15-19 year age group to the 20-24 year may be interpreted as a sign of improved knowledge of GP services during adolescence.

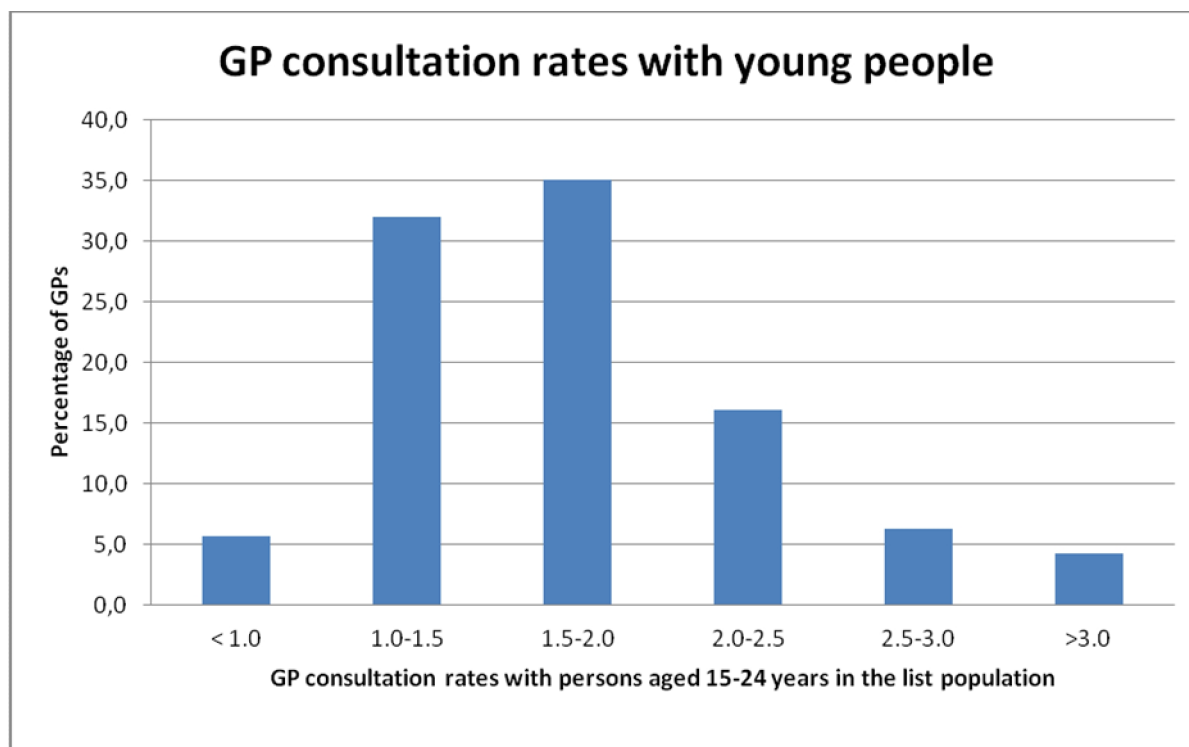


Figure 4

The rates of consultation with young people varied considerably among GPs as shown in figure 4 (data not shown in **Paper IV**). Young patients more often use other GPs, illustrated by the lower UPC in this age group (**Paper I**). The frequent use of other GPs may be a reflection of worries about confidentiality and embarrassment when using the same GP as their parents [127,196]. Young people moving to places distant from the parental home when pursuing higher education may also partly explain these differences. Lastly, a preference for quick access among young people may also be of importance in explaining variations.

Findings in **Paper IV** indicate that higher total workload for the regular GP may reduce accessibility for young patients. This could reflect organisational factors and longer waiting times earlier shown to reduce access for this age group or indicate a low priority of the young patient often using a minor health problem as the reason for contact [120,127,194]. Introducing the concept of youth friendliness more actively into Norwegian general practice might reduce such barriers [120,136].

5.2 Possible explanations for the variations in GP practice

5.2.1 The GP

Age and gender

Higher age of GPs was associated with higher continuity. GP age below 45 was associated with higher rates of multidisciplinary meetings and more frequent encounters with young patients. It is possible that self-perception of the GP's role has changed, resulting in different priorities between GPs of different ages. There have been important changes in structure and function of primary health care during recent decades. The demand for new co-operation models may be difficult to incorporate into the traditional role of a personally responsible GP [74].

Female patients prefer female GPs, resulting in large differences in gender composition in the lists [197]. This is also shown among young patients in **Paper IV**. Female GPs had a slightly lower UPC (**Paper I**). Additional analyses not included in **Paper I** showed an annual consultation rate of 2.4 among male GPs compared to 2.2 among female GPs ($p < 0.001$). This seems contradictory since female patients' use GPs more frequently than do male patients (figure 2) and female patients constitute a larger part of female GPs'.

These GP gender differences in consultation rates and UPC indicate that male GPs have might have a higher accessibility related to their list population compared to female GPs. This is shown among young patients in **Paper IV**, where young female patients more often consulted their GP when the GP was a male. However, female GPs have higher average socioeconomic levels in their lists, and this reduces the demand for services and may partly explain lower consultation rates (**Paper III**). Despite of these differences in list compositions, GP gender used as an explanatory variable had modest impact in the sub-studies.

Practice characteristics

The variables used to characterise the GP practice in the sub-studies partly reflect the different demand for services related to list population variations. However, GP practice characteristics have been shown to be stable also when GPs change practice population [198].

The *GP consultation rate* has earlier been found to be associated with increased patient satisfaction [199]. This may be mediated through association between the higher continuity by the regular GP measured by UPC and high consultation rates, since continuity is a predictor of patient satisfaction (**Paper I**) [23,200].

Earlier Norwegian studies have found that total numbers of consultations and large list sizes were associated with less adherence to guidelines for the use of antibiotics [201,202]. A high GP consultation rate is connected to both large list size and high total number of consultations. These studies indicate that achieving a high personal continuity among GPs with large list size may affect other quality aspects of care.

The GP's rate of multidisciplinary meetings was inversely associated with UPC but positively associated with rate of consultations with young people. Since collaboration with other professionals is seen as a central element in youth medicine, the latter association is not surprising [196].

The *proportion of consultation ≥ 20 minutes* was not associated with rates of consultation with young people; nor did the proportion of long consultations vary between list populations with different socioeconomic status. This indicates that the use of long consultations is mostly a part of a GP's work style, in line with earlier findings [198].

A high *proportion of psychological diagnosis* was associated with an increased rate of multidisciplinary meetings. The majority of meetings concerned psychological problems and this finding may reflect a variation in the degree of involvement in the field of mental health among GPs.

On the other hand, the *proportion of psychological diagnosis* was not associated with consultation rates with young people. This is somewhat surprising since mental health problems are probably the field with most uncovered needs in this age group and GPs working more with this field could be expected to have a higher consultation rate among young people [121,203].

5.2.2 List size

Longer lists were associated with higher personal continuity measured by UPC. This may be partly explained by the GP's number of weekly practice days. Probably the majority of GPs with lists sizes above 1100-1200 have four practice days a week, while the GPs with shorter list have fewer. However, there is no data available to clarify the impact of practice days on UPC.

One could assume that GPs with the longest list should rely more on colleagues to cope with workload. On the contrary, **Paper I** showed that the UPC increased with longer list size, indicating that the GPs coped with the demand for consultations even when they had the largest lists. This is in line with a study showing no restriction of GP consultations with larger list sizes [204]. This is consistent with findings in **Paper III**, showing that GPs adapt list size to workload by choosing shorter lists when the list population has a lower socioeconomic profile; this is also in line with findings among Danish GPs [205]. The proportion of Norwegian GPs who reported "often" or "quite often" having an unacceptable workload was reduced from 38.1% in 2000 to 25.5% in 2008 [178]. This was interpreted as an indication that the list patient system improved the GPs' possibility to control workload and is clearly concurrent with findings in **Paper III**.

Large list size was negatively associated with the rate of multidisciplinary meetings for the GP. Reducing participation in meetings may be a way of coping with the workload in the office. It may also reflect an attitude on a part of the GPs who assess collaborative meetings as less useful. List size is a marker of workload but probably

also a proxy for work style or GP preferences, and the extent to which a list reduction will affect, for example, the GPs' participation in meetings is not easy to predict.

Free list capacity is the difference between actual list size and the limit set by the GPs. This has been studied extensively by health economists, with ambiguous findings regarding the effect of GPs work style and remuneration [148,149]. Free list capacity has been found to be associated with lower patient satisfaction and increased patient switching [206,207]. Free list capacity was used as an explanatory variable in preliminary analyses in all papers with surprisingly modest effects and was therefore not used in the final models. An interpretation of this finding is that the GPs in general set the limit for their lists in order to cope with the demand for services in the list population.

Among those with free list capacity, there are probably GPs who are not popular [207], but also newly started practices wanting more patients. In **Paper IV**, increasing lists size was associated with higher rates of consultations with young people.

5.2.3 List population

The higher utilisation of GP services in the female population and among the elderly is a well known fact and is also shown in figure 2. The proportion of women and elderly in the list populations will affect the demand for GP services. These variables are not in focus in the current project but are controlled for in the analyses.

When grouping GP lists in five levels by socioeconomic status of the list populations, there was a marked increase in workload measured by total fee-for-service and consultation rates across these groups (**Paper III**). Also among young people, lower education level was associated with higher consultation rates (**Paper IV**). Lower socioeconomic level in the list population was associated with higher rates of multidisciplinary meetings, coherent with the increased disease burden in these groups (**Paper II**). The findings are in line with surveys assessing variations in use of health care [99,105]. However, associations between socioeconomic status in the list

population and the GP's practice have not been previously shown for Norwegian general practice.

A high proportion of patients ≥ 70 years in the list population was negatively associated with rates of consultation with young people (**Paper IV**). The list composition may have an impact on GPs work priorities, in this case giving less priority to young people. The association might run in the opposite direction: GP characteristics predict list composition by appealing to patients comfortable with the actual GP, while others find another GP, if available. It was beyond the scope of this study to assess the relationship between GP characteristics and the population's choice of GP.

5.2.4 Municipality characteristics

GPs in the smaller municipalities had lower UPC, higher meeting rates and were overrepresented among the lists with patients in the lower socioeconomic level.

GP services in smaller municipalities more frequent use locums or interns, and this is a partial explanation for the lower UPC in smaller municipalities. With the available data, this could not be investigated further.

Health professionals knowing each other and with clear knowledge of each other's roles in the local health care system, combined with easy communication, may facilitate teamwork [70]. These factors may partly explain the higher rates of multidisciplinary meetings in smaller municipalities, combined with more easy logistics.

5.2.5 Remuneration

In the different sub-studies, the claims for fee-for-services were used as a measure of GPs' activity. The way GPs are paid may also influence their priorities. A system where fee-for-service makes up a large part of the GP's income has been regarded as

unfavourable for deprived patient groups. The findings in **Paper III** did not support this, showing a marked increase in remuneration per patient for GPs having a list population with higher need for health service. This study cannot determine whether the variation in fees results in a fair differentiation of the GPs' income, the work load taken into account. A Danish study found that a similar mixed model undercompensated for the increased workload of GPs working with disadvantaged population groups [205]. However, a "fair" payment of GPs reflecting the increased workload in deprived groups seems difficult to achieve [208,209].

The remuneration for multidisciplinary meetings increased prior to the introduction of the regular GP scheme in order to match the normal practice income. In a busy practice, income per hour may still be higher than the meeting fee and can partly explain lower rates for meetings among GPs with large list sizes.

Being a salaried GP was tested as a variable in preliminary analyses with a slightly negative impact on UPC and rates of multidisciplinary meetings. This is in line with a study indicating an increased service production with fee-for-service compared to fixed salary [210]. On the other hand, the minor impact on variations in practices measures between salaried and self-employed GPs is also shown earlier [211]. In addition, the salaried GPs were few and mainly worked in smaller municipalities. Therefore employment arrangements for GPs were not used as an explanatory variable in the final analyses.

As self-employed professionals, the GPs have an independent position and can largely manage their own work in line with medical knowledge, ethics of the profession and the regulations and policies formulated by the authorities. Economic incentives should encourage this professionalism and "*stimulate primary care professionals to exert their passion and expertise, rather than control their performance*", as recommended by Dutch researchers with experiences from similar reforms [140].

The thesis indicates that the core values of continuity, collaboration and equity are clearly reflected in current Norwegian general practice. The financial model in the regular GP scheme seems to be a useful support for these professional values.

5.2.6 Does variation matter ?

The variation in UPC (**Paper I**) indicates that the aim of continuity in the GP-patient relationship is not reached for a considerable part of the population. Personal continuity is shown to have a positive effect on outcome of care and patient satisfaction, and one consequence of low UPC can be reduced quality measured by such variables [20,23]. With good local routines for co-operation the relational and informational continuity may be achieved in co-operation between GPs. This may compensate for a possible quality reduction following lower personal continuity by the regular GP. However, this is not always the situation since low UPC by a GP seems to predict lower use of services in the list populations.

With respect to the patient right to individual care planning, there are grounds for concern due to the variations in the GPs' participation in multidisciplinary meetings [76]. The regular GP is an important professional in patient treatment and without the GPs knowledge and competence, useful perspectives on patient care will be lacking [73]. Low rates of participation in multidisciplinary meetings by GPs may reduce the quality of care and result in the patient's right to individual planning not being fully ensured.

The variations in workload due to socioeconomic list differences (**Paper III**) are expected if GP services reflect unequal health needs [87]. It could, at least partly, be interpreted as evidence of pro-poor GP services.

Consultation rates among young people (**Paper IV**) vary considerably and in some lists, access is probably poor. The association found with GP workload indicators may suggest a connection with GP priorities. The reasons for variations cannot be further

investigated in register data, but the large variations should motivate GPs to assess the way they meet young patients in their practices [120].

However, allowing variance in general practice is necessary to meet the different needs and expectations of the very different patients. It is probable that variations between list populations that are not accounted for in the available explanatory variables demand a diversity in GP services to achieve proper care for the individual patient [212].

6. Conclusion

This thesis has been written with an understanding that the elements of general practice chosen for studies are tiny fragments of a complex whole. Using detached findings from studies like this as a basis for changes of GP services should be done with respect for this complexity.

A total of 78 per cent of consultations were by the regular GP when the GP was in regular practice. Personal continuity was highest among elderly patients, among patients using GPs most frequently and for patients belonging to the larger patient lists. However, in 25 % of the lists with the GP in regular practice, one third or more of the consultations were with a GP other than the chosen one.

On average, Norwegian GPs participate in 30 patient centred multidisciplinary meetings yearly, but the variation was large and 25% of GPs reported seven or fewer meetings.

A high rate of multidisciplinary meetings was negatively associated with the personal continuity offered by the GP measured by UPC.

Shorter lists and younger GPs were associated with a higher rate of participation in multidisciplinary meetings and also with higher rates of consultations with young people.

The use of GP services increased with lower socioeconomic level in the list population, indicating a reasonable equity in GP service delivery. However, time expenditures and other procedures in consultations did not differ as a result of the socioeconomic status of the list population.

Overall, the core values – continuity, collaboration and equity – were clearly reflected in Norwegian general practice, but achieved to variable degrees among the GPs.

7. Future perspectives

Younger GPs are the future of general practice and based on the sub-studies in this thesis one can predict that collaboration between GPs and other services will increase. And hopefully, these GPs will remain young in mind with passing years and will continue a youth friendly practice.

However, there may be a challenge to ensure personal continuity when the aging generation of GPs, the “masters of the offices”, leave the field of general practice.

Continuity and collaboration will become more overlapping core values, both within practices and in collaboration between GPs and other services, as a result of changes in patterns of diseases, organisational factors and governmental policies. The concept of management continuity will gain increased importance and the concept of relational continuity in patient treatment will include more health care providers. The way this development affects health outcomes and patient satisfaction should be assessed in further studies following patients over time and through organisational changes. Studies assessing the effect of multidisciplinary collaboration on patient outcomes are especially needed.

Equity in the use of GP services related to socioeconomic status and different age groups should be investigated further using register data at the individual patient level. Equity in the content of the services should be assessed further and probably improved.

A reduction of the largest lists seems necessary to enable the GPs to cope with the different aspects of both continuity and collaboration and to improve the content of the services for the least privileged patient. However, this must be done without reducing the GP practice days to avoid a markedly decrease in the personal continuity.

It is a challenge for both the physicians' organisations and the authorities to develop a GP service that will retain GPs committed to the core values of the professional field.

The use of regulation and remuneration should carefully guide this development, balancing the need for uniform services and the necessary space for diversities.

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