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EERO MERILIND

Primary health care performance: impact of payment and practice-based characteristics

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Primary health care performance: impact of payment and practice-based characteristics

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Institute of Family Medicine and Public Health University of Tartu Estonia

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Supervisor: Professor Ruth Kalda, MD, Dr Med Sci
Institute of Family Medicine and Public Health,
University of Tartu, Estonia

Reviewers: Kaja Põlluste, MD, PhD
Senior researcher, Institute of Clinical Medicine,
University of Tartu, Estonia

Mati Rahu, PhD
Lead researcher, Department of Epidemiology and Biostatistics,
National Institute for Health Development, Tallinn, Estonia

Opponent: Professor Igor Švab, MD, PhD, Department of Family Medicine,
Vice-dean, Faculty of Medicine, University of Ljubljana, Slovenia

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Eero Merilind (Study I, II, III, IV) has made substantial contributions to the conception, coordination and design of the study, also analysis and interpretation of data.

Rauno Salupere (Study I, II, III, IV) and **Anastassia Kolde** (Study I) performed the statistical analysis.

Katrin Västra (Study I, II, III, IV) and **Reet Põldsam** (Study III) have made substantial contributions to the acquisition of data.

Ruth Kalda (Study I, II, III, IV) has been involved in drafting the manuscript and revising it critically.

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ABBREVIATIONS

CHD	Coronary heart disease
EHIF	Estonian Health Insurance Fund
EHR	Electronic health records
FD	Family doctor
FFS	Fee-for-service
GP	General practitioner
ICD	International Classification of Diseases
IOM	Institute of Medicine
NHS	National Health Service (United Kingdom)
PHC	Primary health care
P4P	Payment for performance
SCORE	Systematic Coronary Risk Evaluation
QI	Quality indicator
QOF	Quality and Outcomes Framework
UK	United Kingdom

1. INTRODUCTION

There is overwhelming evidence, from many countries, that health care is often not delivered in accordance with scientifically set and commonly-agreed professional standards. The result is that poor quality and unsafe care harms tens of thousands of people every year, and scarce health care resources are squandered. [1] Many countries, which differ enormously in the way that their health systems are structured, are improving the quality of health care. Measuring quality is a first and essential step to reach that goal. [2]

Quality of care is one the key dimensions of value. Engaging primary care practices in quality improvement activities is essential to achieving the triple aim of improving the health of the population, enhancing patient experiences and outcomes, and reducing the per capita cost of care, and to improving provider experience. [3]

Central to quality improvement are processes for continuously monitoring and improving quality and systems of accountability. Components of clinical governance include evidence-based practice, clinical audit, risk management, mechanisms to monitor the outcomes of care, lifelong learning and systems for managing poor performance. [4]

Different payment methods, capitation, salary, fee-for-service and mixed systems of payment have different effects on the behaviour of primary care physicians [5] and quality of care. [6] One possibility to encourage a better outcome is payment for performance (P4P). P4P financial incentive schemes reward doctors based on the quality and the outcomes of their treatment. [7]

There have been discussions [8–11] about how to describe quality in health care [12], how to measure it, how to choose quality indicators, whether they should monitor process or health outcome targets, how to find suitable indicators and how to combine it with financial incentives. Health care providers have questions about different quality dimensions in patients and professionals, increased or changed workload, lack of time for prevention and care of patients with chronic conditions, motivation triggers and of course the reliant payment. Policymakers and health care administrators want to know who should be rewarded in P4P, how large the financial reward should be and whether this guarantees an improvement in health outcomes or healthcare system quality.

In 2002 the US implemented P4P schemes and in 2004 the National Health Service (NHS) in the United Kingdom (UK) began a P4P initiative known as the Quality and Outcomes Framework (QOF). [13] Several studies followed thereafter and described positive [14–17] or negative [18–19] effects of P4P in primary health care (PHC) and for the whole health care system.

When Estonia started the P4P system to improve health care quality in 2006, the aim was to promote the quality of family health care services, stimulate family doctors (FD) to provide more and a wider range of services and reduce the burden on specialised medical care. It is now almost 10 years since this

system has existed and some results should be noticeable. Our recent studies will give more knowledge about this topic.

This dissertation describes three aspects of payment for performance: effects on family doctors workload, differences in childhood immunisation coverage and impact on specialist consultations and number of hospital bed days, and discusses different practice and patient-related characteristics to find out predictors for a good outcome.

2. ESTONIAN CONTEXT

2.1. Primary healthcare system

The health care system in Estonia has seen profound reform since the early 1990s. Among the main objectives of the health care reform were reorganising the public funding system and the overextended hospital system, improving the quality and accessibility of general medical care service, and a more efficient use of resources, including reform of primary care, which began in 1991 and was successfully completed by 2003. The training and introduction of FDs was central to this reform. In 2015, there were 806 working FDs in Estonia (52 FDs per 100 000 inhabitants). In Europe several countries have general practitioners (GP) in the primary healthcare system, which are called FDs in Estonia.

In Estonia, the FD works together with the family nurse and is an independent contractor with the Estonian Health Insurance Fund (EHIF). The FD's contract contains different parts: payment per capita (five age groups), basic allowance for equipment and rooms, a fund for medical examinations and tests, a separate "therapeutic" fund, fee for distance from the nearest hospital and payment for second nurse and payment for the quality, etc. FDs in Estonia work as gatekeepers to diminish visits to secondary care. Every FD is responsible for the patients on their list, which could be from 1 200 up to 2 400 patients. If the FD's list has more than 2 000 patients on the list, the employment of another doctor as an assistant doctor is needed. In 2015, 44.1 per cent worked as a single FD (one doctor practice) and 55.9 per cent worked as a group practice (more than one FD together).

In 2006 Estonia started P4P for FDs. [20] The P4P is aimed at forcing FDs to pay more attention to prevention and monitoring chronic diseases. [21] FDs achieving a good outcome will receive an extra 5 per cent for the investigations (up to 37 per cent of the per capita payment). In 2014, 96.7 per cent of FDs were joined to P4P.

The Estonian P4P for FDs includes clinical quality indicators for children (0–7 years old) as follow-up and immunisation indicators, screening of cardiovascular disease risk factors (40–60 years old), monitoring of patients with type 2 diabetes and hypertension according to Estonian guidelines, follow-up of patients with hypothyreosis and post-myocardial infarction patients, providing minor surgery procedures and PAP smears, observation of pregnancy and participation in CME courses for at least 60 hours per year. All 40–60 year old patients from FDs' lists involved in the cardiovascular disease prevention program (CDVP) were entitled to calculate their cardiovascular risk according to SCORE (Systematic Coronary Risk Evaluation) tables (from 2009) and Body Mass Index, to measure blood pressure, glucose level and cholesterol with fractions. Patients with a risk SCORE of more than 5 per cent were considered high cardiovascular risk patients and could be counselled by a nurse. Since 2014 generic prescription angiotensin-converting-enzyme inhibitors (ACE inhibitors) for hypertensive patients is also involved in the P4P system.

2.2. Payment schemes in primary health care

The components of the payment system for FDs in Estonia are presented below (Figure 1).

1. **Capitation payments.** These depend on the number of patients in the FDs' practice list and are aimed at covering main services and expenditures with furnishing, practice pay funds and daily supplies. Since 2012 capitation payment is split into five groups (<3, 3–7, 7–50, 50–70 and ≥70 years). FDs with less than the minimum of 1 200 patients receive capitation for 1 200 people in order to cover their fixed costs. Initially (starting from 1998), the capitation rates were equal for all age groups, but in 1999 adjustments for age were introduced, while in 2003 the difference in capitation across age groups was further expanded by raising the rate for children under two years of age by more than 50 per cent. [22–23]
2. **Basic allowance** monthly payment 986.23 euros (data from 01.01.2016) aimed at covering the fixed operating cost of the practice: computers, programs, rent of the premises and other payments, vehicle payments or transportation.
3. **Fund for medical examinations and tests** is seen as an incentive to provide services not covered by the capitation fee and it is disbursed after the provision of services based on invoices. This is in fact a fee-for-service payment adding up to 29 per cent of the total capitated amount and 34 per cent for FDs taking part in the quality bonus system. FDs achieving a good outcome in P4P will receive an extra 5 per cent for the investigations (up to 39 per cent of the per capita payment).
4. **A separate "therapeutic fund"** up to 3 per cent of capitation (cover services provided by psychologists and speech therapists) and **activity fund** with no cap including minor surgery and gynaecological procedures that an FD can do by themself.
5. **Distance allowance** provides additional income depending on the distance to the nearest hospital. It is paid to FDs working more than 20 km from the nearest hospital. Two categories are distinguished: 20–40 km (monthly additional payment 133.65 euros) and more than 40 km from the nearest hospital (monthly additional payment 382.94 euros).
6. **Pay-for-performance**. Annually negotiated, it is paid once a year and depends on the level of provision of certain services. In January 2006 a performance-based payment system for FDs was launched to increase the quality and effectiveness of preventive care and improve the monitoring of chronic illnesses.
7. **Payment for second nurse.** Since 2013 FDs have the possibility to employ a second nurse, which is covered by the EHIF (monthly additional payment 1 377.95 euros).
8. **Payment for late opening times**. Primary health care centres have the possibility to widen their opening times and earn additional income (hourly additional payment 25.04 euros for FDs and 15.85 euros for nurses).

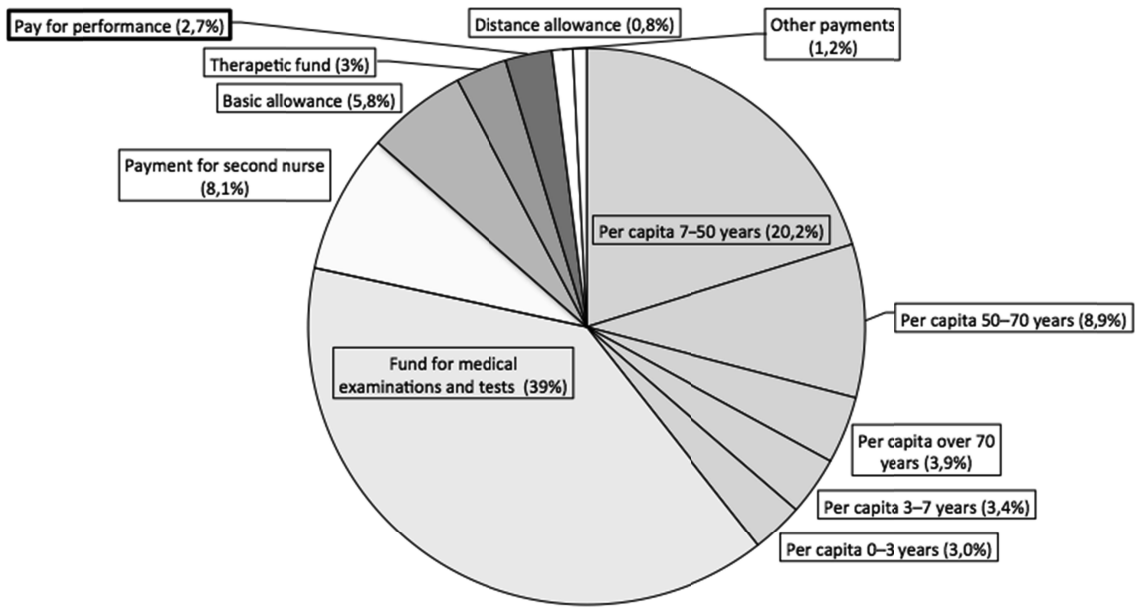

Figure 1. The components of the payment system for FDs in Estonia (based on one specific contract).

9. **Other additional payments.** This includes payment for additional competence (annual payment 1 377.95 euros), excellent outcome of the primary health care centre (annual payment 159.78 euros) and for a good outcome in the cancer screening programme (not included into P4P) (annual payment 958.68 euros).

2.3. Payment for performance

The Estonian P4P for FDs contains three major parts: prevention, monitoring of patients with chronic diseases according to national guidelines and professional competency (Table 1).

FDs fulfilling all these criteria are entitled to extra payment. Payment-for-performance is a reward for a good outcome, but its influence on the general budget is relatively small in different countries and in Estonia (2–4 per cent of the total budget of the FDs).

Joining the P4P is a voluntary process for all FDs, is a part of the FDs contract and there are no sanctions if a doctor does not participate in the P4P. FDs participating in the P4P receive some increase of funds for investigations as a bonus. From this fund (which constitutes 27–32 per cent of the per capita payment) all investigations (X-rays, ultrasounds, blood tests, urine tests, ECGs, etc.) should be performed.

Coverage targets in P4P are universal to all FDs and are increasing stepwise every year. FDs who achieved these targets earn points. The maximum number of points FDs can achieve in the P4P is 640, if the FD has collected more than 75 per cent of the points (480 points), this is considered a good outcome. If FDs collect less than 75 per cent of the points this is considered a poor outcome. In a good outcome two different payments are foreseen – FDs who achieved 480–539 points (75–84.4 per cent of the maximum) will earn 4 332.83 euros as annual payment and FDs with 540–640 points (84.5–100 per cent of the maximum) will earn 5 483.24 euros. FDs who achieved less than 479 points (less than 74.9 per cent of the maximum) have no extra payment.

Since 2012, 96.6 per cent of FDs are joined to P4P and are motivated to achieve a good outcome. Every year the number of FDs with a good outcome has increased, but only half of FDs achieved a good outcome (in 2012).

Since 2013 P4P is a part of FDs' contract (with the EHIF) and all FDs are involved in P4P.

In addition, some new indicators (type of prescribed medications to treat hypertension and percentage of generic prescriptions) are implemented.

Since 2015 P4P is mandatory for all FDs.

Table 1. P4P components in Estonian family practice quality payment scheme

Indicator	Description
Part 1 (Prevention)	
Immunisations	Pertussis, Diphtheria, Tetanus, Poliomyelitis, Measles, Mumps, Rubella, Hepatitis B, Haemophilus influenza type b according to immunisation plan
Children health controls	in 1, 3, 6, and 12 months old, 2 years old, preschool health control
Cardiovascular disease prevention programme	40–60 years old, blood pressure, glucose, cholesterol with fractions. SCORE calculation – High and low cardiovascular risk charts based on gender, age, total cholesterol, systolic blood pressure and smoking status, with relative risk chart, qualifiers and instructions
Part 2 (Chronic diseases)	
Diabetes mellitus type 2	Register of patients with type 2 diabetes, measuring glucose and HbA1c, cholesterol with fractions, serum creatinine testing, urine tests to detect microalbuminuria, blood pressure measurement, nurse counselling
Hypertension	Register of patients with hypertension (divided into three stages), glucose, cholesterol with fractions, serum creatinine testing, urine tests to detect microalbuminuria, blood pressure measurement, ECG, nurse counselling, treatment with ACE inhibitors
Myocardial infarction	Register of patients with myocardial infarction, cholesterol with fractions, ECG, blood pressure measurement, nurse counselling
Hypothyroidism	Register of patients with hypothyreosis, TSH testing
Part 3 (Enhanced services)	
	Observation of pregnancy, PAP smear tests, minor surgery procedures
	Participation in CME courses (at least 60 hours per year)
Maximum number of points 640	
Good outcome more than 480 points (≥75%)	
Poor outcome less than 479 points (<74.9%)	

3. REVIEW OF THE LITERATURE

3.1. Primary health care

Primary health care can be characterised as the first level of access to care and is provided near patients' homes. [24–26] Primary health care includes curative and rehabilitative care, preventive care and health education. [27] A major challenge in health services research is to show what configurations of PHC are associated with better outcomes, in terms of quality, equity and costs. [28]

A major step in the global attention for primary care has been the WHO Declaration of Alma-Ata from 1978. [29] The Declaration stressed the importance of creating and sustaining a strong primary (health) care system, not just as a part of the health care system, but in particular linked to other sectors as well. [30] Alma-Ata has inspired countries in Europe to develop their own structure of the 'first line' health care services. After the collapse of the Communist regimes in 1991, countries in Central and Eastern Europe were forced to fundamentally restructure their health care systems, including primary care. [31–32] Today, the strengthening of primary care worldwide is probably higher on the agenda than ever. [33]

3.2. Different payment models of primary care

The traditional classification of PHC includes three main systems of payment, i.e. salary, capitation and fee-for-service (FFS). However, in practice, varieties of them exist, such as integrated capitation and mixed payment systems [6] (Table 2).

Table 2. A description of payment terms according to Appleby et al. [34]

Payment term/system	Description
Capitation	Lump sum payment per patient/member of population served by a provider for comprehensive services or particular categories of service regardless of treatment. Is the majority of FDs' income and payment is related to the number of patients on their list weighted by their age.
Fee-for-service	Activity-based (prospectively set) unit payment for a defined intervention regardless of patient characteristics. Is part of FDs' contract for providing specified services and investigations.
Pay-for-performance	Payment linked to achievement of specific performance targets. FDs earn extra payments if they provide specified levels of service.
Mixed systems	A combination of different payment methods. Is usually used in FDs contracts.

For FDs' services the mixed systems of payments for infrastructure plus weighted capitation and pay-for-performance are widely used. [35]

In an environment where FDs are of differing quality and heterogeneous patients have different preferences for quality, it is shown that FFS coupled with balance billing is a superior payment scheme to just FFS or capitation payments, as it generates an efficient allocation of FDs between high and low quality and an efficient allocation of patients between FDs. Where patients have more than one condition it is shown that FFS allows patients to seek treatment from FDs of differing quality conditional on the medical condition they have. [36]

3.3. Definitions of quality

There are many definitions of quality used both in relation to health care and health systems.

Avedis Donabedian defines quality: "Quality of care is the kind of care which is expected to maximise an inclusive measure of patient welfare, after one has taken account of the balance of expected gains and losses that attend the process of care in all its parts." [37]

The Institute of Medicine describes healthcare quality as the extent to which health services provided to individuals and patient populations improve desired health outcomes. The care should be based on the strongest clinical evidence and provided in a technically and culturally competent manner with good communication and shared decision-making. [38]

The World Health Organization says quality of care is the level of attainment of health systems' intrinsic goals for health improvement and responsiveness to legitimate expectations of the population. [39]

In 1994, the Institute of Medicine (IOM) Committee on the Future of Primary Care defined primary care as "the provision of integrated, accessible health care services by clinicians who are accountable for addressing a large majority of personal health care needs, developing a sustained partnership with patients, and practising in the context of family and the community." [40] Safran et al. [41] developed the Primary Care Assessment Survey (PCAS), a patient-completed questionnaire that operationalises formal definitions of primary care. The PCAS measures seven domains of care through 11 summary scales: accessibility (organisational, financial), continuity (longitudinal, visit-based), comprehensiveness (contextual knowledge of patient, preventive counselling), integration, clinical interaction (clinician-patient communication, thoroughness of physical examinations), interpersonal treatment, and trust.

Scientific research, both international comparisons and within the United States, has shown that well developed PHC systems have better coordination and continuity of care and better opportunities to control costs. [42–45] Research from the USA has shown that availability of FDs and first contact care are associated with reduced unnecessary care (avoidable hospitalisation) and increased accessibility. [46–48] Avoidable hospital admissions can be used as

an indicator of health care performance. The availability of FDs and insurance coverage for PHC are related to lower rates of avoidable hospitalisations. [49] A negative effect is that patient satisfaction seems to be lower in health care systems with regulated access to specialist services by gate keeping. [50–51]

Health policies aimed at strengthening primary care are associated with better levels of health. [52] Strong primary care is associated with better health outcomes such as lower rates of all-cause, heart disease, and cancer mortalities. [53]

In Europe there were contrasts between regions within Europe and FDs within countries showed large differences in their service profiles. The international differences were related to characteristics of the health care systems, such as the FDs' employment status, gate keeping role and mode of remuneration. [54–56]

3.4. Quality indicators (QI)

Quality indicators are specific and measurable elements of practice that can be used to assess the quality of care. [57] "They are usually derived from retrospective reviews of medical records or routine information sources. The good QI should define care that is attributable and within the control of the person who is delivering the care. QI are different from guidelines and from standards. It is important to recognise that QI are *indicators*, rather than definitive judgements about quality." [58]

Different studies have investigated how to choose different QI to achieve better outcomes, how financial incentives in P4P programmes have improved the quality of care and what the consequences are. [59–60] Jones et al. [60] showed that the selection of QI is important and poor indicator selection may result in unintended consequences.

There is wide variation in the number of indicators included in P4P schemes. [61] For example, in the UK there are currently 134, the Queensland Practice Incentives Program pilot in Australia had 7, Medicare Australia's Practice Incentives Program has 13, Tuscany's Performance Evaluation System has 50 measures consisting of more than 130 indicators, and Centers for Medicare & Medicaid Services/Premier (CMS-Premier) pilot also had several QIs. [62–65] The decision on how many indicators to include is a delicate balancing act. On the one hand, there is the desire to cover all issues to guard against selective focus through the implication that activities not measured are unimportant. On the other hand, as the number of indicators grows, so do the resources of time and health information technology required to collect and analyse the data.

Through the use of a structured expert review process, the OECD Health Care Quality Indicators project has identified rates of avoidable admissions for long-term conditions and internationally comparable indicators of the quality of primary care. Some other important Health Care Quality Indicators are: asthma, diabetes, congestive heart failure hospital admission rates, rate of childhood vaccination for pertussis, measles and rate of influenza vaccination for elderly

people. Further indicators on the quality and safety of prescribing in primary care are under development. [66]

3.5. QI – process or health outcome targets?

There is the question of whether to set process or health outcome targets. The ultimate goal of P4P schemes is to improve the health through improvements in quality, equity, and efficiency of care of populations served. [67–68] However, outcome targets are problematic in several respects. First, except for in the case of mortality and morbidity caused by medical errors, desired health outcomes frequently do not take place in the short-term period over which measurement is taking place. Second, for those that can be measured in the short term (reductions in blood pressure, HbA1c level, cholesterol), information asymmetry issues arise between the physician who provides guidance on appropriate disease management and the patient who may, or may not, follow that prescribed course of care. [69–70]

On the question of whether P4P measures do actually cause improvement in health, the literature is fairly lean. In one interrupted time series study of the impact of the UK's QOF (Quality and Outcomes Framework), Serumaga et al. [71] found that after controlling for secular trends, the QOF had no discernible impact on cumulative incidence of stroke, myocardial infarction, renal failure, heart failure, or all-cause mortality. They do note, however, that the quality of care pre-QOF implementation was already quite high, a fact noted by other researchers as well. [72]

Crosson et al. [73] compared care processes and intermediate outcomes of US and UK practices on P4P measures of randomly selected patients with diabetes or coronary artery disease prior to pay-for-performance initiatives, and found gaps in chronic illness care quality across both samples.

Different European countries like Denmark, England, France, Germany, the Netherlands and Sweden, with the addition of Australia and Canada have different financial incentives for better management of chronic diseases. [74–75] As health systems differ widely, each country must find their own solution. [76]

3.6. QI and financial incentives for improving the quality

Measurable international indicators to monitor the quality of primary care are used in more than 30 European countries. [77] Available data for 10 countries primary care QI are used and combined with financial incentives. In eight countries QI can influence the finances/salary of family physicians with a bonus of 1–25 per cent of their total income. The influence of incentives was weak in Spain and in Italy [78] (Table 3).

Table 3. European countries with primary care Quality Indicators (QI) related to payment

Year of introduction	Number of QI	Main fields of QI	QI related increase of income (in %) (approximately)
2004	134	Clinical services, organisational, patient's experience, additional services	25
2006	66	Indicators for FDs, nurses, odontology, paediatrics, social workers	1–2
2006	40	Access to care, cardiovascular risk, diabetes, maternity services, paediatric care	10
2006	60	P4P: prevention, chronic disease management, comprehensive care	2–4 [79]
2009	15 (adult), 6 (paediatric)	Prevention, screening activity, hypertension, lipids, coronary heart disease, diabetes, referrals	5
2010	21	Prevention, chronic disease management (e.g. diabetes, hypertension), ambulance visits	5
2010	1	Diabetes (different in 20 regions)	< 1
2010	17–20	Diabetes, COPD	7 (local experiment)
2011	22	Bonus payment: population care coverage, prevention, hospitalisation, chronic diseases	9
2011	20	Prevention, COPD, asthma	10

Over the past two decades funders and policymakers worldwide have experimented with initiatives to change physicians' behaviour and improve the quality and efficiency of medical care. [80] The NHS in the UK, Medicare in the United States and many private insurers have adopted P4P schemes as a key strategy. The schemes are based on a basic tenet of economics and psychology: that people respond to rewards. [81]

Scott et al. [19] state that use of financial incentives to reward FDs for improving the quality of primary healthcare services is growing. However, there is insufficient evidence to support or not support the use of financial incentives to improve the quality of PHC.

Patients, professionals, managers, funders and policymakers alike are interested in increasing the performance of health services, but are also worried about the costs. One way of aligning performance with costs is to work with appropriate financial and non-financial incentives. The underlying goal of incentives is therefore not simply rewarding good performance or punishing bad performance. The goal of using incentives is to support the change in the status quo by stimulating both immediate and long-term improvements in perfo-

rmance through reinforcing positive performance by creating alignment between expectations and rewards (financial/non-financial) and removing financial barriers that perversely effect desired performance. [82]

3.7. Different types of incentive models for funders of health services

1. **Bonuses** – Increased allocation based on the achievement of performance measures.
2. **Enhanced payment/bonus** – The purpose is to address the 'costs of compliance' health service providers are required to make in order to meet the performance expectations. The amount will depend on the benefits/savings the targeted organisation can derive from the improvement.
3. **Link funding increase to performance** – Similar to the bonus model, part of the allocation is based on performance. Unlike bonuses, it is not in the form of additional money but puts (part of) potential rate increases at risk based on performance.
4. **Savings from efficiency** – Health service providers are allowed to keep the surplus or parts of it.
5. **Gain sharing** – Share savings between funder and health service provider where savings for the funder are anticipated from performance improvement.
6. **Grants** – To promote and share best practices. This provides an incentive to develop new and innovative ways to improve performance by recognising and rewarding excellent practices of the health service provider.
7. **Performance fund** – Health service providers are eligible (non-competitive) for financial support to build capacity or developing and implementing performance improvement activities.
8. **Pay for activities** – Pay health service providers separately for services that improve performance.
9. **Public disclosure and/or recognition** – Disclosure of information to the public on the improvement of health service providers' performance. Recognition would be one step further where the best performance is 'highlighted'.

3.8. P4P in different countries

P4P payment schemes have been introduced in many countries over the last 10 years. [83] We choose some of them for description. These policies base a part of each doctor's income on indicators designed to measure individual performance. [64] Many countries are using or also considering financial incentive schemes. [84–86]

3.8.1. Australia

Australia focused on increasing immunisation rates in children with the General Practice Immunization Incentive Scheme, launched in 1997. [87] In addition, in 1998 Medicare Australia began making bonus payments to GP practices that met, or were working towards meeting, accreditation standards under the Practice Incentives Program (PIP-1). More recently, in 2006, the Veteran's Affairs Department of the Commonwealth began a P4P scheme that pays hospitals that serve veterans for meeting surgical outcomes, patient safety and satisfaction, and chronic disease management targets. [64] Finally, Medicare Australia began piloting a new version of the Practice Incentives Program (PIP-2) system in 2007 aimed at GP practices. The PIP-2 currently comprises 13 incentives including quality prescribing, diabetes, cervical screening, asthma, indigenous health, e-Health, after hours care, teaching, rural loading, aged care access, and a final incentive aimed at ensuring access to surgical, anaesthetic, and obstetric services in rural regions. [63]

3.8.2. Canada

Ontario's health care system was the first in Canada to integrate P4P goals into physician compensation and has done so only since 2004 to 2005 when it gave FDs the option of switching from the traditional FFS contract to either a blended capitation contract called the "Family Health Network" or an enhanced FFS contract called the "Family Health Group"; by 2006, the number of FDs enrolled in these models together exceeded the traditional FFS contract. [88–89] Both of the new contracts incorporate P4P incentives aimed at targets in the following areas: access/after-hour care, chronic disease management, smoking cessation, preventive care, group management and leadership, and serious mental illness. [61]

3.8.3. Italy

GP payment systems are three-tiered, with the first tier a fixed component based on the adjusted risk of the GP's patient list, the second tier is a variable component based on "other" services provided (minor surgery, prevention activities, post-surgery follow-up), and the final "additional" component is effectively a reward for cost containment and is assessed on the basis of the costs of labs, pharmaceuticals, and services prescribed. [90–91]

3.8.4. Spain

Spain decentralised its national health care system in 2000. While primary care providers are paid across most of the country via retrospective payment

systems, the Catalonia region in the 1990s began developing contracts with primary care providers that include adjusted capitation budgets and variable components based on quality-based performance indicators in the areas of quality of care, coordination, and efficiency. [92–93] These variable components currently make up 15 of the payments made to primary care providers for the region and are linked to health promotion and prevention activities.

3.8.5. United Kingdom

In the UK, the NHS began a major pay-for-performance initiative in 2004, known as the Quality and Outcomes Framework (QOF). Aimed at FDs, the QOF was launched with the goal of reducing variations in the quality of care in the UK. Altogether, 138 indicators covered clinical care for 10 chronic diseases, practice organisation, patient experience, and an "other" category covers specific priorities in a given year. [94]

The initial QOF consisted of 146 indicators, including several measures of patient satisfaction which, due to high levels of satisfaction across the board and the cost involved with data collection, were replaced with one measure of patient experience (patient consultation length) in 2006. [27]

After the first year of the programme, FDs met 96.7 per cent of the clinical targets and received payment increase in the annual income of individual physicians, which was 22 per cent more than the NHS had budgeted. [14]

3.8.6. United States

The United States has a multipayer system with the majority of the payers being private, for-profit insurance companies, although the federal government via Medicaid, Medicare, and the Veteran's Administration is the largest single payer. [95] With per capita health care costs that are the highest in the world, and health outcomes that do not rise to that level of spending, individual payers and the federal government started piloting P4P programmes in 2002 in reaction to the Institute of Medicine's Crossing the Quality Chasm call to action. [96] In their 2004 systematic review, Rosenthal et al. [97] identified 37 P4P initiatives implemented by 31 for-profit plans in the United States, covering a patient population of 20 million. The largest P4P pilot initiative in the United States was CMS-Premier Hospital Quality Incentive Demonstration (HQID), a partnership between the Centres for Medicare & Medicaid Services and Premier Healthcare Informatics, which launched in 2003. [65]

3.9. Effects of P4P

P4P is intended to bring the best scientific evidence to primary care practice. [98] Several reviews of the impact of P4P in primary care suggest that the programmes generally have had limited **positive** impacts [12,14,17,99–100] and various countries are looking at whether a similar initiative could be used in their primary care systems. [101–103] Positive effects of financial incentives [17] include cost savings to the Medicaid programme from shorter nursing home stays [104], small improvements in cervical cancer screening and improved immunisation rates. [105] As positive effects of P4P, Lai [106] showed that when physicians participated in the P4P programme, this increased the likelihood that patients would receive guideline-recommended tests or examinations. Gillam and Siriwardena [107] described modest cost-effective reductions in mortality and hospital admissions in some domains.

However, several studies found either **no effect** [108] **or negative effects**, such as reduced access to health care for the most severely ill patients [109], they also noted a tendency towards improvements in documentation of care rather than a change in the actual quality of care. [110]

The introduction of P4P schemes seemed to accelerate in programme named activities, but quality quickly reached a plateau. Incentives had little apparent impact on non-incentivised activities in the short term, but seem to have had some detrimental effects in the longer term, possibly because of practices focusing on patients for whom rewards applied. [111]

High scores on the QOF might have partly resulted from “gaming”. Some practices seemed to have achieved high scores by excluding large numbers of patients, although it was unclear whether these exclusions were for sound clinical reasons or in order to maximise income. [112] One study from Chen et al. [113] confirmed that older patients and patients with more comorbidities or more severe conditions are prone to be excluded from P4P programmes.

Evidence on the **effect of P4P on quality** is limited. P4P schemes can have an effect on the behaviour of physicians and can lead to better clinical management of disease, but there is cause for concern about the impact on the quality of care. [114]

The main idea of P4P is that there are associations between the size of financial payment for achievement of an indicator and the expected health gain. Fleetcroft et al. [115] measured health gain as expected lives saved in one year and in quality adjusted life years. They found evidence for lives saved or quality adjusted life years gained for 28 indicators accounting for 41 of the total incentive payments. No associations were found between the size of financial payment for achievement of an indicator and the expected health gain at the performance threshold for maximum payment measured in lives saved or quality adjusted life years.

3.9.1. Family doctors workload

Already several years since the UK started the pay-for-performance programmes in family practices, [14] different countries are thinking about the value for money [116] and assessed the workload before and after the introduction of the pay-for-performance contracts.

The findings from previous studies suggest that general practices responded to the 2004 GP contract in the UK by increasing the numbers of FDs, nursing staff and administrative staff. Implementing the new contract required attention to clinical and information systems needed to comply with new performance criteria. It is therefore unsurprising that practices increased the numbers of their administrative staff. The relative increase in nursing staff was higher than that for FDs. While there was no change in the average hours per week devoted to patient care by either nursing staff or FDs, the number of visits to nursing staff increased while the number of visits to FDs declined. [117]

This suggests that, as with the 1990 GP contract [118], the extra clinical workload placed on general practices by the 2004 contract has been absorbed more by nursing staff than by doctors. Charles-Jones et al. [119] also showed that the difficulty of FDs' work may have increased as routine care is delegated to nursing staff, leaving FDs to manage the more complex patient problems. In contrast to doctors, nursing staff reported an increase in both visit rates and the complexity of those visits. This is understandable, as nursing staff assumed greater responsibility for patient management.

Overall, the findings suggest that expanding nursing staff roles may be an effective strategy for increasing the quality of primary care. Systematic reviews of previous research suggest that primary care nursing staff can deliver as high-quality care as FDs in the areas of preventive health care, routine follow-up of patients with long-term conditions and first- contact care for people with minor illness. [120–121]

Most UK GPs reported that the new contract had increased their income (88 per cent), but decreased their professional autonomy (71 per cent) and increased their administrative (94 per cent) and clinical (86 per cent) workloads. [122]

3.9.2. Specialist consultations and hospitalisations

Iezzi et al. [123] showed that financial payment might help improve the quality of care and reduce hospitalisations. In another study, the implementation of P4P reduced the rate of specialist consultations and hospitalisations. [124] Recent studies showed that P4P reduced the likelihood of diabetes-related hospitalisations for diabetic patients. [125–126] A P4P scheme can significantly increase the receipt of quality care and decrease hospitalisation rates among patients with diabetes. [127–128] Harrison et al. [129] described that the introduction of a major national P4P scheme for primary care in England was associated with a decrease in emergency admissions for incentivised conditions compared with

conditions that were not incentivised. Patients enrolled in the P4P programme underwent significantly more diabetes-specific examinations and tests after enrolment; the differences between the intervention and comparison groups declined gradually over time but remained significant. Patients in the intervention groups had a significantly higher number of diabetes-related physician visits in only the first year after enrolment and had fewer diabetes-related hospitalisations in the follow-up period. [130] For coronary heart disease, the lack of an association between quality scores and admission rates suggests that improving the quality of primary care may not reduce demands on the hospital sector. [131]

Edwards et al. [132] investigated the number of visits to generalists and specialists. The proportion of visits to generalists increased from 88.4 per cent in 1997 to 92.4 per cent in 2010. The proportion of specialist decreased from 30.6 per cent in 1997 to 9.8 per cent in 2010 ($p < 0.01$).

Specialists like to take care of older patients (mean age 61 years) and dedicate most of their visits to chronic disease management (51.0 per cent), while generalists will see younger patients (mean age 55.4 years) and most commonly for new problems (40.5 per cent). Quality of care for cardiovascular disease was better in visits to cardiologists than in visits to generalists, but was similar or better in visits to generalists compared to visits to other medical specialists.

3.9.3. Prevention

P4P includes several activities for prevention (smoking cessation counselling, diabetes testing, cancer screens, immunisations, etc.).

Coleman [133] mentioned that financial incentives undoubtedly influence FDs' activities, but delivery of health promotion counselling may not always have the effects intended. There is strong, observational evidence that targets and incentives intended to increase smoking cessation counselling by FDs have merely increased their propensity to record this activity in patients' medical records. Greene [134] investigated P4P in Australia and found there was a short-term increase in diabetes testing and cervical cancer screens after programme implementation. The increase, however, was for all FDs. Neither signing onto the programme nor claiming incentive payments was associated with increased diabetes testing or cervical cancer screening. FDs reported that the incentive did not influence their behaviour, largely due to the modest payment and the complexity of tracking patients and claiming payment.

In 2005 physician groups in California participating in a pay-for-performance programme showed across the board improvement on cervical cancer screening, diabetes screening and childhood immunisations, according to the Integrated Healthcare Association. Participating physician groups provided about 60 000 more cervical cancer screenings and 12 000 more diabetes screenings in 2005 than in 2004. Among health maintenance organisation

members, childhood immunisations were up about 30 000, the Integrated Healthcare Association said. [16]

Tara et al. [135] found no significant step change in the screening rate for any of the three cancers the year after incentives were introduced. Colon cancer screening was increasing at a rate of 3.0 per cent per year before the incentives were introduced and 4.7 per year after. The cervical and breast cancer screening rates did not change significantly from year to year before or after the incentives were introduced. Between 2006–2007 and 2009–2010, US$28.3 million, US$31.3 million and US$50.0 million were spent on financial incentives for cervical, breast, and colorectal cancer screening, respectively (Ontario, Canada). In conclusion, Tara wrote that P4P was associated with little or no improvement in screening rates despite substantial expenditure.

Immunisation plays a big part in FDs' work and immunisation coverage rate is an important public health goal. Chien et al. [136] showed the impact of P4P programmes aimed at rewarding up-to-date immunisation delivery to 2-year-olds according to the recommended series (New York; USA). The Hudson Health Plan introduced a US$200 bonus payment for each fully immunised 2-year-old and provided administrative supports for identifying children who may need immunisations. Immunisation rates within the Hudson Health Plan increased significantly among other health plans.

In the UK (QOF) influenza immunisation is a part of P4P [137] (for patients with coronary heart disease (CHD), chronic obstructive pulmonary disease, diabetes, and stroke) and it showed increases in the proportion of immunised CHD patients, as negative consequences and increased exceptions rates and led to "gaming". [138] After this clinical quality indicator was withdrawn from a national incentive scheme, influenza immunisation became less statistically significant. [139]

3.9.4. Management of chronic diseases

It was found that payment methods have important implications for the nature and quality of services provided to chronically ill patients.

Pay-for-performance programmes are often aimed at improving the management of chronic diseases. Pape et al. [140] focused on targets for intermediate outcomes in patients with cardiovascular disease and diabetes and found that P4P led to significantly higher target achievements (hypertension, CHD, diabetes, stroke), but one reason for achieving a good outcome was higher rates of exception reporting in patients with all conditions except for stroke. Exception reporting allows practitioners to exclude patients from target calculations if certain criteria are met. There were no statistically significant improvements in mean blood pressure, cholesterol or HbA1c levels.

Kirschner et al. [141] showed that after one year, a significant improvement was shown for the process indicators for all chronic conditions (diabetes, COPD, asthma, cardiovascular risk management) ranging from +7.9 improve-

ment for cardiovascular risk management to +11.5 for asthma. Five outcome indicators significantly improved as well as patients' experiences with GP's functioning and organisation of care. No significant improvements were seen for influenza vaccination rate and the cervical cancer screening uptake. The clinical process and outcome indicators, as well as patient experience indicators were affected by baseline measures. Karunaratne et al. [142] investigated risk factors related to chronic kidney disease and management of hypertension in primary care and estimated the cost implications of the resulting changes in prescribing patterns of antihypertensive medication. As a result, the authors described that population blood pressure control has improved since the introduction of P4P renal indicators, and this improvement has been sustained. This was associated with a significant increase in the use of antihypertensive medication, resulting in increased prescription cost. Hjerpe et al. [143] showed that in Sweden, after the introduction of the new reimbursement system, registered codes for hypertension and cancer diseases in the Skaraborg primary care database increased for hypertension and cancer, probably partly due to an increased diagnosis coding.

Cardiovascular disease (CVD) patients who were treated by physicians participating in P4P were more likely to receive quality care than patients who were not. Patients who received quality care were less likely to have new coronary events or be hospitalised, or have uncontrolled lipids than patients who did not. A P4P programme was associated with increased lipid monitoring and treatment. [144] Lee et al. [145] studied mean systolic and diastolic blood pressure and cholesterol levels and concluded that the implementation of P4P resulted in improvements in blood pressure control.

The important role of management of chronic diseases falls on nurses. In countries where primary care is based largely on multi-professional teams of physicians, nurses and other health professionals and where patients are registered with a specific primary care facility, there has been a progressive increase in the role of nurses in managing many chronic diseases. [146]

3.10. Who should be rewarded in P4P?

An important point relevant to P4P rewards is who gets paid. The most common theme discussed in the literature is whether to pay individual providers versus making payments to the group practice, leaving the distribution of rewards up to group management. Paying individual providers can reduce coordination of care because providers want to get credit for gains made by patients; in addition, these rewards can fail to incentivise systems improvements (i.e. management, information tracking processes) that are best addressed by collective action. [61] On the contrary, paying the group can result in a subset of providers electing to "free-ride" off of others. In regions where single-handed practices prevail, this is not an issue; however, for hospitals and areas where large and/or

integrated provider groups predominate, a mix of individual and group rewards is likely optimal. [147]

Notably, P4P rewards are generally paid to physicians or top management with no guidance as to how best to distribute the rewards, with the exception of the Catalonia region of Spain where the management by objective policy provides individual objectives for physicians, nurses and managers. [148]

In the UK's QOF, Campbell et al. [149] identified resentment among nurses who were providing valuable chronic disease management and other care to meet the QOF indicators but generally were not seeing the financial rewards. In the UK, the QOF rewards are paid to practices and management and often the physician(s) decides how to distribute it.

The question arises as to how large the financial reward should be to motivate physicians, by their selection of profession, by financial reward versus the knowledge of knowing they are doing a good job. While not discussed in the literature, the answer to this question might be correlated to base level of pay, which varies significantly across countries. In addition, there is some concern that if the rewards are too large, negative incentives to game the system will become problems. One qualitative study that surveyed 643 health maintenance organisation managers (44 per cent response rate) found that a bonus amounting to 5 per cent of a physician's salary is necessary to motivate action. [150]

4. STUDY RATIONALE

Estonian research has long traditions to study PHC and health care quality [151–154] and in the scientific literature we can find a positive and negative description of the experience from different countries.

The studies [19,100] in this field showed that P4P has an impact on outpatient visits in primary and secondary care, as well as on hospitalisations and bed days of patients with two main chronic diseases (hypertension and type 2 diabetes). [155–157]

FDs who achieved a good outcome in P4P have better continuity of care for chronic diseases. This situation also reduced the number of specialist consultations. FDs who achieved a good outcome in P4P had less chronic patients in their lists. The study suggested that it should be considered to provide extra incentives for these FDs who have more chronic patients in their lists. [124]

We have chosen several indicators (workload, immunisation coverage rate, patient and practice-related characteristics on good outcome) that are available and describe the P4P most accurately. Workload had a previous correlation to P4P, while immunisation coverage is a generally accepted indicator for the assessment of prevention. Reduced number of hospitalisations can be used as an indicator of PHC performance.

We chose those indicators because we had reliable data available and the information was well documented. We obtained information about all FDs and we could test some hypotheses from previous studies.

As Estonia has had a P4P scheme already for 10 years, an evaluation of the effects of P4P on the FDs' work and on the whole health care system can be made.

5. AIMS OF THE STUDY

The aim of the study was to find out the impact of P4P on health care system as well as to discover what effects the patient and practice-related characteristics have on a good outcome in the P4P system.

For this purpose the following specific aims were set:

1. To investigate the impact of P4P on the workload of family practices, specialists and number of hospital days in Estonia
2. To study the impact of P4P in prevention: differences in immunisation coverage rate between FDs participating in the P4P and those not participating
3. To explain the preconditions of good outcome in a P4P system.

6. SUBJECTS AND METHODS

6.1. Study design

We conducted four different quantitative research studies to investigate the effects of P4P. The study design, samples, objectives, methods and observation periods are described below (Table 4).

Table 4. Overview of conducted studies

Studies	Study design	Study sample	Objective	Methods	Observation period
Study I	Retro-spective	All FDs in Estonia (Figure 2)	Workload Workload was defined as: 1) the total number of visits to the FDs and family nurses in Estonia, and 2) the number of visits per one family doctor and one family nurse.	2 groups: FDs joined and FDs not joined in P4P	2005–2011
Study II	Retro-spective	All FDs in Estonia (Figure 2)	Immunisation coverage rate	2 groups: FDs joined and FDs not joined in P4P	2006–2012
Study III	Longi-tudinal	Study sample	Number of FDs visits, specialist consultations and days in hospital	FDs who had a good outcome in a P4P system and those who did not have in P4P	2014 (01.01.2014–31.01.2014)
Study IV	Retro-spective	All FDs in Estonia 500 (2006) – 772 (2012)	Different practice and patient-related characteristics	FDs who had a good outcome in a P4P system and those who did not have in P4P	2006–2012

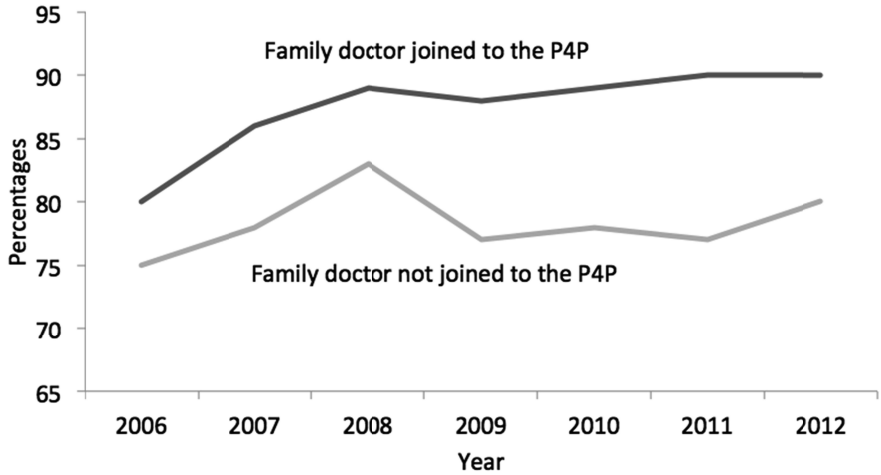

Figure 2. Percentage of FDs joined to the P4P and not joined to the P4P in Estonia, 2006–2012.

6.2. Data sources

The studies were conducted using the database from the Estonian Health Insurance Fund, which consists of health-related data of 96 per cent of the Estonian population. The database does not cover the data of those 4 per cent of the population who have no medical insurance. The database was created on the basis of the health service invoices sent by family physicians to the EHIF for payment. These invoices list all services provided to the patients including all visits to FDs and family nurses, as well as the diagnoses of the patients according to the International Classification of Diseases (ICD-10). The data of service-providing family physicians are also included in the health service invoices. Data sources for all studies were health service invoices sent to the EHIF database (Table 5).

To be able to assess FDs and nurses performance according to health service invoices, special new codes were entered on invoices, such as nurse visit, refusal of vaccinations, codes for small children check-ups, etc. Based on collected data we could evaluate the performance of every single FD and nurse.

Table 5. Data sources

Studies	Data
Study I	The total number of visits, number of primary visits (first visit during the episode of the illness during one calendar year), secondary visits (repeated visits which are needed during the episode of the certain illness during one calendar year), home visits and visits provided by the nurse were analysed
Study II	All immunisations have a separate code according to state health service price list and are marked on FDs' invoices. Refusals or contraindications to immunisations are also coded and listed in the invoice. Every FD has their own list of patients and the target group for vaccinations is known for the period starting from 1 January and ending on 31 December. To achieve the maximum number of quality points the vaccination target group should be vaccinated according to coverage targets of 90 per cent or higher. We also observed the DTP3 vaccination as an indicator to describe the functioning of the health system
Study III	Please see below
Study IV	The total number of visits, number of primary visits (first visit during the episode of the illness during one calendar year), secondary visits (repeated visits which are needed during the episode of the certain illness during one calendar year), home visits and visits provided by the nurse were analysed

In Study I, II and IV we used data of the whole population and all FDs have been involved in the study. In Study III we made a random sampling of the FDs. For this longitudinal study we observed P4P outcome results from the EHIF database data during one calendar year (01.01.2014–31.12.2014). All working FDs in Estonia (N=803) were divided into two groups according to their outcome in the P4P (Table 6). For the study we randomly selected 80 FDs (10 per cent of all working FDs): 40 FDs (50 per cent) with a good outcome and 40 FDs (50 per cent) with a poor outcome, proportionally from the cities and rural areas, and from FDs with a median size of the patient in their lists. Patient lists varied from 1 500 to 2 400. We excluded FDs with big and small size lists. To the group of FDs with a good outcome we selected those who achieved more than 600 points and to the group of FDs with a poor outcome those with less than 200 points in the study period. We selected FDs with a high score and a low score to have more differences between study groups.

Patients with a diagnosis of hypertension and type 2 diabetes (confirmed by FDs according to ICD-10) and who had at least three hypertension or diabetes-related physician visits before the year 2014 were included to the study. There were no age restrictions in the study.

All patients in the study received a unique ID for studying personal level data and we counted all patient visits to health care providers (HCP): FDs' visits, all outpatient specialist visits and hospital bed days with selected diagnoses (all stages of the hypertension and/or diabetes mellitus type 2) during the period 01.01.2014–31.12.2014 (Study III, Table 2).

Table 6. Number of patients included and/or excluded in the study in Estonia, 2014

Indicator	Number
Number of FDs with list of patients	803
Number of FDs included to the study (10)	80
Number of FDs with a good outcome (480–800 points) (50%)	40
Number of FDs with a poor outcome (0–200 points) (50%)	40
Number of patients in the study group	49 841
Number of patients excluded from the study (3.8%)	1 921
Patients changed FDs list	1 010
Patients died during the study period	911
Number of patients not visited FD within year	1 728
Number of patients included to the study	46 192
Number of visits included to the study	172 623

A visit was defined as one contact with an HCP – face to face consultation, telephone advice or e-mail-based consultation. All these types of visits are counted on EHIF invoices with special service codes.

We counted all visits to the FD and all specialist consultations, numbers of hospital days during the study period and all reasons for hospitalisations. We selected all patients with all diagnoses of hypertension and/or diabetes mellitus type 2 and calculated their mean number of bed days during the study period. We have not investigated the number of hospitalisations.

To understand the possible impact of comorbidity on the visits and hospitalisation, we counted the number of different diagnoses per one person in both groups (Figure 3).

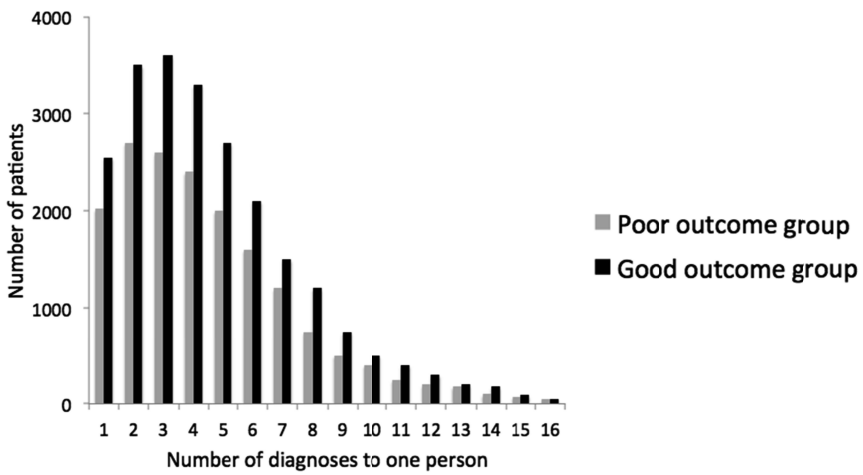

Figure 3. Comorbidity: Number of different of diagnoses per one person in P4P in Estonia, 2014.

6.3. Statistical methods

For all of our studies we used descriptive statistics and the software IBM SPSS Statistics 19. For Study I we also used the software R 2.13.1

The differences between study groups were compared using the non-parametric Mann-Whitney U-test, as the data were not normally distributed; if p was < 0.05, the difference was considered statistically significant (Studies I–IV).

6.4. Ethics

The Research Ethics Committee of the University of Tartu has approved all studies (approval number 162/T-5).

7. RESULTS. IMPACT OF P4P

7.1. FDs and family nurses workload

During the observation period 2005–2011, the number of FDs participating in the P4P increased from 48.2 per cent to 69.2 per cent (Table 6).

At the same time, the number of all visits in primary care, and number of nurse visits, increased as well (Figure 4).

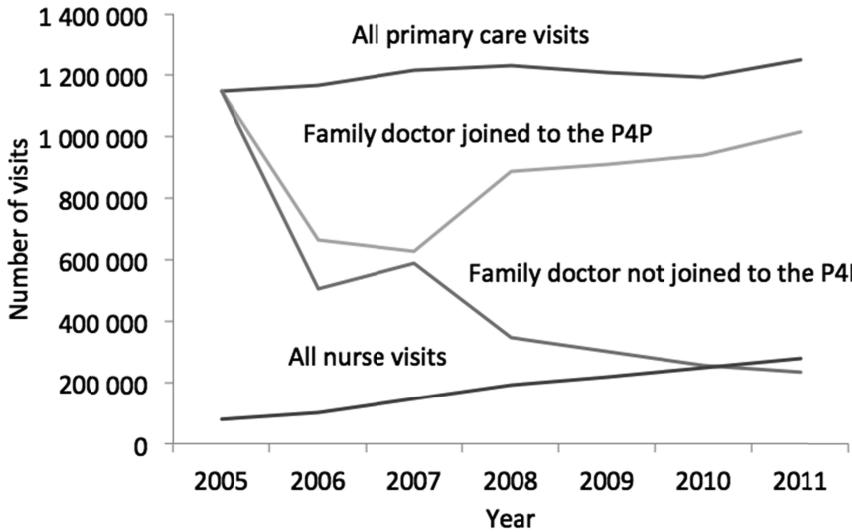

Figure 4. Number of all visits in primary care in Estonia, 2005-2011 (all primary care visits, visits to the family doctor joined to the quality system, visits to the family doctor not joined to the quality system, all nurse visits).

There was a difference in workload between the two groups. FDs participating in P4P had more visits compared to FDs not participating in P4P. In 2006 the difference between the two groups was marginal (1.3 times), but in 2011 the difference was 4.3 times.

The number of visits per one FD differs in the two groups of doctors (Table 7).

Table 7. Number of primary visits (9001), secondary visits (9002), home visits (9004) and nurse visits (9015) per doctor in two groups of FDs in Estonia, 2005–2011

Year	Family doctors joined to P4P				Family doctors not joined to P4P			
	9001	**9002**	**9004**	**9015**	**9001**	**9002**	**9004**	**9015**
2005	n/a	n/a	n/a	n/a	861	712	96	77
2006	1 040	877	116	130	703	605	64	67
2007	1 059	921	102	214	724	645	55	86
2008	1 039	923	80	249	591	532	35	80
2009	987	888	73	277	564	486	31	86
2010	940	816	56	302	485	396	20	96
2011	956	868	54	323	452	389	16	106

We investigated the numbers of primary visits and secondary visits and the tendency was the same – doctors participating in the P4P had more primary and secondary visits compared to doctors not participating in the P4P. The number of home visits decreased in both groups, but less in the group participating in the P4P (Table 7).

During the observation period 2005–2011, the number of visits per one FD was about the same in the group participating in P4P (1 340 visits in 2006 and 1 355 visits in 2011), but decreased (948 visits in 2006 and 702 visits in 2011) in the group not participating in the P4P. An interesting finding was the shift of the workload to nurses of those FDs participating in P4P (Figure 5).

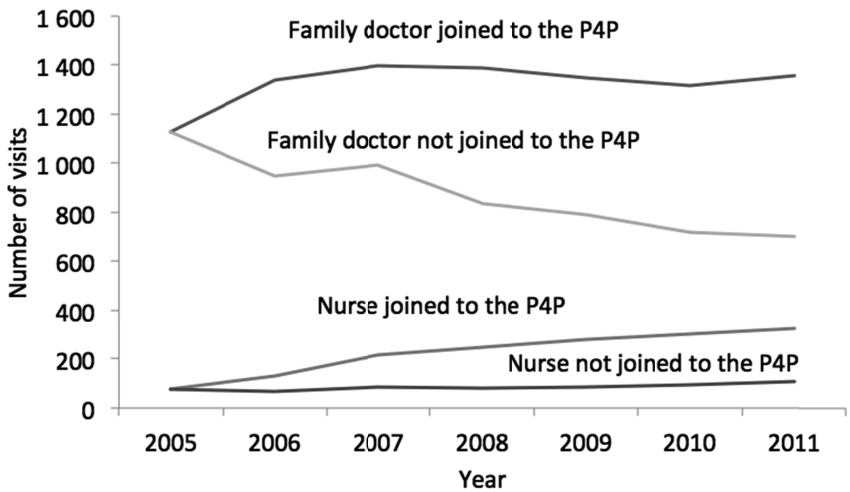

Figure 5. Number of visits per doctor and number of nurse visits in two different groups in Estonia, 2005–2011.

7.2. Childhood immunisation coverage

Comparing the two groups of FDs, joined to the P4P and not joined, there are significant differences in vaccination coverage in almost all of the vaccinations. There was difference in pertussis I and haemophilus influenza I vaccinations in 2006. In 2012 the difference between the two study groups was not significant for several vaccinations (pertussis I, II, III, diphtheria II and III, tetanus II and III, poliomyelitis II). The largest difference between 2006 and 2012 was in making second and third vaccinations (pertussis, diphtheria, tetanus, poliomyelitis and hepatitis B) (Study II, Table 2).

FDs participating in the P4P reached higher levels of vaccination coverage in all cases of vaccinations compared to FDs not participating to the P4P, and there was an improvement in both groups during the observation period (Figure 6).

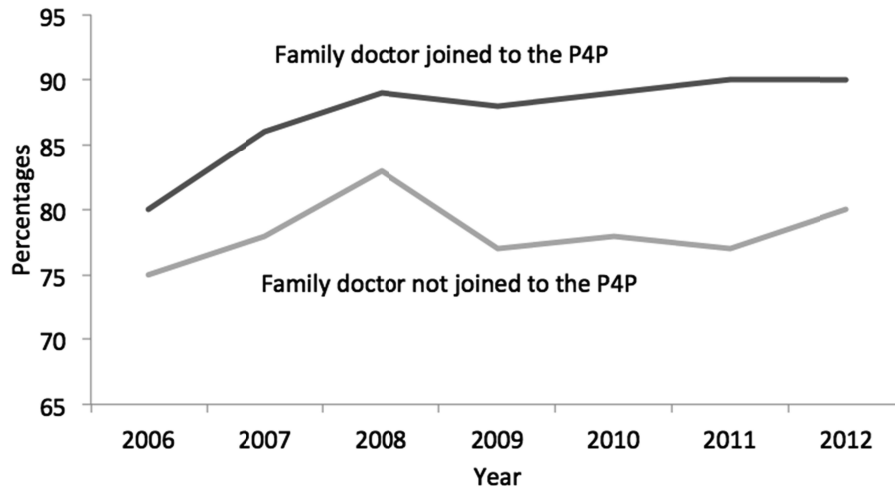

Figure 6. Vaccination coverage (%) of all vaccinations (pertussis, diphtheria, tetanus, poliomyelitis, hepatitis B, Haemophilus influenza, measles, mumps, rubella) between family doctors participating and not participating to the P4P in Estonia, 2006–2012.

The diphtheria-tetanus-pertussis (DTP3) vaccination coverage rate increased during the observation period in both groups, but FDs participating in the P4P showed higher coverage rates compared to FDs not participating in the P4P (Figure 7 and 8).

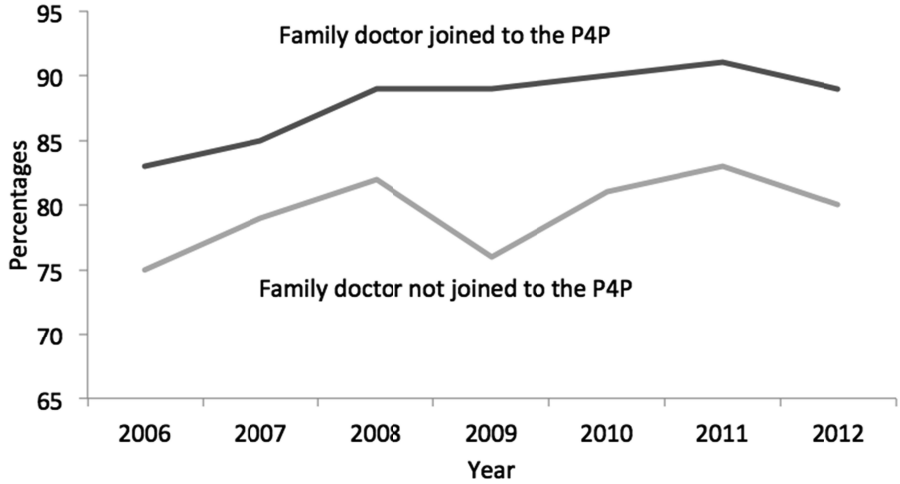

Figure 7. DTP3 vaccination coverage between family doctors participating and not participating in the quality system in Estonia, 2006–2012.

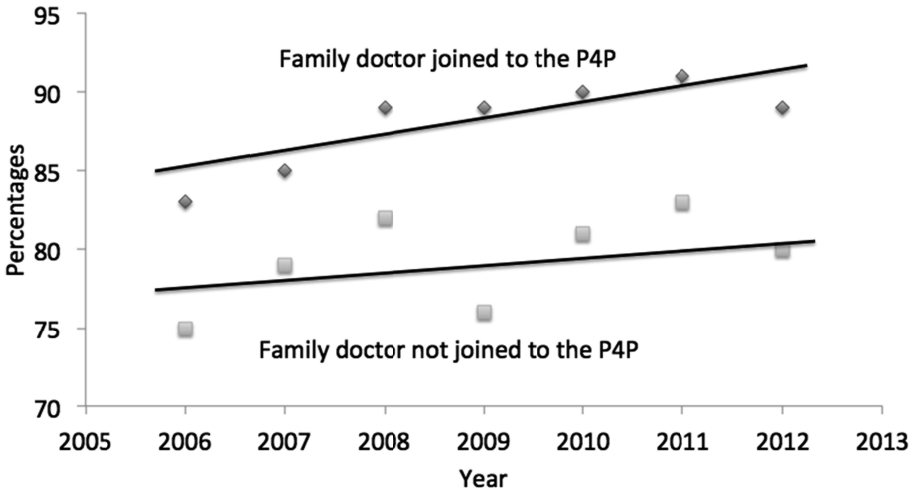

Figure 8. Two linear regression models to test the hypothesis that FDs joined to the P4P reached higher levels (percentages) of vaccinations compared to FDs not joined to the P4P in Estonia, 2006–2012.

7.3. The impact of P4P on the number of specialist consultations and hospital bed days

We found significant differences in the mean number of FDs visits. FDs with a good outcome provided more visits to patients with all stages of the hypertension (I, II, or III) and for patients with diabetes mellitus type 2 compared to the poor outcome group. There was also an increased rate of specialist consultations in the good outcome group by patients with hypertension and reduced hospital bed days by both patients with hypertension and diabetes mellitus type 2 compared to poor outcome FDs (Study III, Table 2).

7.4. Number of patients with chronic diseases

One of our findings is that the number of patients with chronic diseases (hypertension, type 2 diabetes, myocardial infarction and hypothyreosis) increased greatly during 2006–2012 (Figure 9).

In addition, in Estonia FDs should produce a register of all patients with chronic diseases, search intensively for preventable risk factors and provide counselling and treatment. This means an increased workload and more pressure on primary care team members.

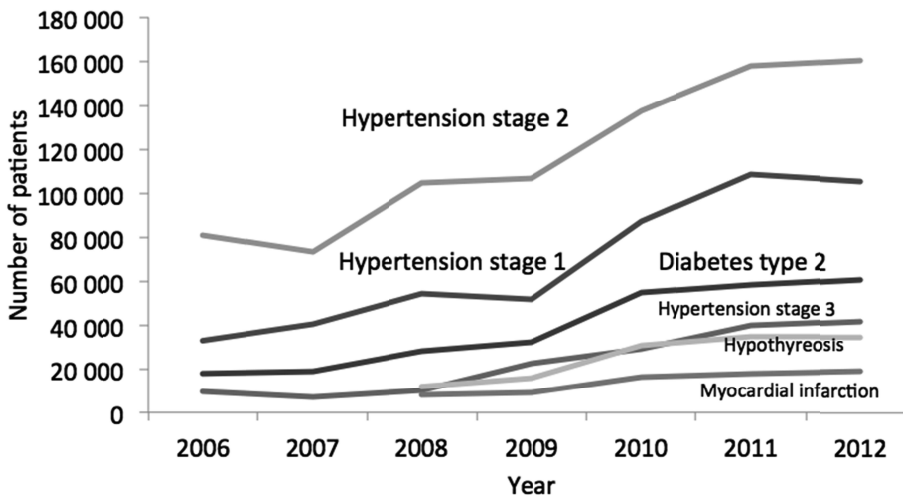

Figure 9. Number of patients of family doctors by groups of chronic diseases in Estonia, 2006–2012.

7.5. Predictors of a good outcome in the P4P system

During the observation period 2006–2012, the number of FDs who achieved a good outcome in the P4P increased. At the beginning of the study period, only 6 per cent of FDs achieved a good outcome, but in 2012 a good outcome was attained by 53 per cent of FDs (Table 8).

Table 8. Number of family doctors achieving a good outcome or poor outcome in the P4P system (official results of the P4P system during in Estonia, 2006–2012)

Outcome	2006	2007	2008	2009	2010	2011	2012
Good outcome	30	175	224	355	282	397	412
	(6%)	(39%)	(35%)	(52%)	(39%)	(53%)	(53%)
Poor outcome	470	277	418	323	436	358	360
	(94%)	(61%)	(65%)	(48%)	(61%)	(47%)	(47%)

From practice-related characteristics we found the time period of joining the P4P to be one predictor for a good outcome. FDs with a longer history of P4P more often had good outcomes compared to FDs with a shorter history. The number of FDs working in a primary care team had an impact on a good outcome. At the beginning of the study period (in 2006 and 2007) smaller teams achieved a good outcome, but after 2011 teams with more doctors achieved a good outcome.

The number of patients on FDs' lists had an impact on a good outcome only in some years (2010 and 2012), but no impact in other years (2007–2009 and 2011).

Regarding the proportion of chronically ill patients in FDs' lists, only the number of patients with hypertension had an effect on a good outcome in most of the years (2006–2007 and 2009–2012). The number of patients with type 2 diabetes, myocardial infarction and hypothyreosis had an impact on a good outcome only in single year (Table 9 and 10).

Table 9. Practice and patient-related characteristics by groups in Estonia, 2006–2008

Year		2006			2007			2008		
Characteristics	**Groups in P4P**	**Mean**	**SD**	***p***	**Mean**	**SD**	***p***	**Mean**	**SD**	***p***
1. Practice related characteristics										
Time since joining the P4P (years)	Poor outcome				1 .90	0 .02	0 .95	2 .40	0 .04	0 .48
	Good outcome				1 .90	0 .02		2 .47	0 .05	
Number of FDs in primary care team	Poor outcome	5 .71	0 .33	**0 .02**	7 .25	0.50	**0 .00**	5 .44	0 .36	0 .27
	Good outcome	2 .23	0 .31		3 .81	0.40		4.3	0 .37	
2. List size										
Number of patients in FDs list	Poor outcome				1739 .38	22 .17	0 .43	1737 .39	19 .08	0 .11
	Good outcome				1756 .49	26 .13		1783 .93	24 .26	
3. Composition of the patient age in FDs list										
Number of patients 0–2 years old	Poor outcome				32 .33	2 .32	**0 .00**	34 .73	1 .7	0 .21
	Good outcome				39 .46	2 .37		35 .22	1 .95	
Number of patients 2–69 years old	Poor outcome				1342 .40	20 .18	**0 .04**	1357 .04	17 .32	0 .18
	Good outcome				1403 .30	25 .08		1398 .82	23 .09	
Number of patients 70+ years old	Poor outcome				203 .31	7 .22	**0 .00**	197 .8	6 .12	0 .53
	Good outcome				167 .67	8 .7		201 .5	7 .96	
4. Composition of the patient diseases (chronic diseases)										
Patients with type 2 diabetes	Poor outcome	37 .58	1 .29	0 .08	46 .55	1 .91	**0 .00**	43 .61	1 .5	0 .45
	Good outcome	29 .97	4 .94		35 .25	2 .26		45 .77	2 .14	
Patients with hypertension stage 1	Poor outcome	67 .16	3 .57	0 .09	88 .11	5 .69	0 .72	85 .71	4 .17	0 .96
	Good outcome	49 .38	13 .28		91 .59	8 .29		88 .14	5 .93	
Patients with hypertension stage 2	Poor outcome	166.45	6 .45	**0 .02**	187 .79	9 .01	**0 .00**	165 .44	6 .8	0 .96
	Good outcome	97 .07	11 .65		121 .81	8 .84		163 .99	9 .12	
Patients with hypertension stage 3	Poor outcome	22 .48	1 .23	0 .21	20 .52	1 .44	**0 .00**	19 .28	1 .18	0 .09
	Good outcome	14 .14	2 .47		13 .18	1 .23		16 .91	1 .71	
Patients with myocardial infarction	Poor outcome							13 .72	0 .6	0 .89
	Good outcome							13 .23	0 .71	
Patients with hypothyreosis	Poor outcome							18 .69	0 .84	0 .09
	Good outcome							19 .79	1 .03	

SD= Standard deviation

Table 10. Practice and patient-related characteristics by groups in Estonia, 2009–2012

Year		2009			2010			2011			2012		
Characteristics	**Groups in P4P**	**Mean**	**SD**	***p***	**Mean**	**SD**	***p***	**Mean**	**SD**	***p***	**Mean**	**SD**	***p***
1.Practice related characteristics													
Time since joining the P4P (years)	Poor outcome	2 .94	0 .06	**0 .00**	3 .77	0 .06	**0 .00**	4 .32	0 .09	**0 .00**	5 .09	0 .09	**0 .00**
	Good outcome	3 .52	0 .04		4 .47	0 .06		5 .33	0 .05		6 .31	0 .05	
Number of FDs in primary care team	Poor outcome	5 .10	0 .39	0 .92	4 .74	0 .30	0 .70	4 .01	0 .29	**0 .00**	3 .85	0 .28	0 .00
	Good outcome	4 .95	0 .35		4 .83	0 .37		5 .12	0 .31		5 .01	0 .31	
2. List size													
Number of patients in FDs list	Poor outcome	1764 .94	22 .41	0 .96	1748 .18	18 .13	**0 .05**	1745 .79	21 .59	0 .11	1727 .10	22 .04	**0 .00**
	Good outcome	1763 .46	19 .01		1795 .62	21 .75		1795 .9	16 .83		1810 .77	17 .11	
3. Composition of the patient age in FDs list													
Number of patients 0–2 years old	Poor outcome	35 .11	1 .95	**0 .00**	37 .35	1 .52	**0 .04**	36 .22	1 .65	**0 .00**	55 .00*	2 .00	**0 .00**
	Good outcome	38 .49	1 .57		41 .58	1 .89		41 .05	1 .41		61 .00*	2 .00	
Number of patients 2–69 years old	Poor outcome	1351 .96	20 .37	0 .44	1326 .09	16 .50	**0 .04**	1292 .68	19 .13	**0 .04**	1310 .12*	20 .56	**0 .00**
	Good outcome	1372 .59	18 .02		1384 .88	20 .93		1348 .48	16 .26		1399 .25*	17 .82	
Number of patients years 70+ old	Poor outcome	219 .04	7 .44	0 .06	220 .58	6 .17	0 .07	224 .96	6 .78	0 .24	225 .91*	6 .89	0 .83
	Good outcome	196 .75	6 .31		201 .69	7 .48		211 .71	6 .48		220 .55*	6 .55	
4. Composition of the patient diseases (chronic diseases)													
Patients with type 2 diabetes	Poor outcome	47 .63	1 .86	0 .78	72 .55	2 .12	0 .06	76 .04	2 .39	0 .66	77 .16	2 .46	0 .57
	Good outcome	47 .62	1 .67		64 .34	2 .21		73 .23	2 .11		77 .09	2 .14	
Patients with hypertension stage 1	Poor outcome	67 .81	3 .83	**0 .00**	162 .56	5 .69	0 .09	137 .43	4 .58	0 .86	125 .55	4 .08	**0 .02**
	Good outcome	84 .53	4 .41		147 .99	6 .74		138 .46	4 .59		141 .30	4 .42	
Patients with hypertension stage 2	Poor outcome	175 .78	7 .92	**0 .00**	196 .55	7 .15	**0 .01**	210 .82	7 .27	**0 .02**	212 .44	7 .22	**0 .02**
	Good outcome	140 .25	6 .33		164 .07	7 .36		190 .48	6 .77		193 .41	6 .66	
Patients with hypertension stage 3	Poor outcome	34 .9	2 .43	0 .74	39.00	2 .05	0 .70	53 .22	2 .86	0 .24	56 .20	2 .96	0 .08
	Good outcome	35 .58	2 .60		40 .66	2 .89		49 .43	2 .52		50 .43	2 .51	
Patients with myocardial infarction	Poor outcome	14 .34	0 .69	0 .33	21 .86	0 .75	0 .42	22 .45	0 .84	0 .33	22 .90	0 .83	**0 .01**
	Good outcome	14 .93	0 .63		20 .86	0 .89		23 .58	0 .82		25 .81	0 .84	
Patients with hypothyreosis	Poor outcome	23 .39	1 .10	0 .71	41 .22	1 .53	0 .47	44 .09	1 .77	0 .10	41 .65	1 .59	**0 .00**
	Good outcome	22 .92	0 .94		36 .42	1 .17		44 .26	1 .29		46 .07	1 .33	

Notes: * in 2012 0–3 years and 3–70 years; SD= Standard deviation

8. DISCUSSION. IMPACT OF P4P

In 2005 all FD practices in Estonia worked with similar principles. Since 2006 when P4P started, there have been two groups of FDs – participating in P4P and not participating in P4P and according to results in the P4P scheme – FDs with good outcome and FDs with poor outcome. This gave us a good opportunity to investigate the effects of P4P.

Our studies which aimed to find out the impact of P4P on FDs' work and effects for health care (impact on the number of specialist visits and bed days) are one of the few studies in this topic in international literature.

8.1. The workload

We investigated the impact of P4P on workload and found increased workload for FDs and nurses participating in P4P. Falzon et al. [158] also found that P4P had an effect on workload and work intensification. The explanation for increased workload could be more intensive work and recall of chronically ill patients to annual health checks, as well as the more intensive search and call of the patients from FDs' lists to perform activities named in the P4P scheme. P4P is based on preventive work (small children immunisations, check-ups of chronic diseases and visits to detect cardiovascular diseases) and the role of the practice nurse is very important. Since 2013 the EHIF is also funding the second nurse in the FDs' contract and this could help to divide the workload between nurses and give FDs more time and attention to chronic and preventive care.

8.2. Prevention

From preventive work we observed childhood immunisations and have found that FDs participating in the P4P had better immunisation coverage rates than FDs not participating in the P4P. FDs participating in the P4P met the WHO criteria in all vaccinations and FDs not participating in the P4P met none of them. Several countries include paediatric immunisations in their P4P systems, which have had positive effects on childhood immunisation coverage rates [137,158–159] and the OECD has included immunisation coverage rates to important QIs. [160] In addition, P4P in Estonia includes childhood immunisation rates. Coverage rates for the DTP3 vaccine are used as an indicator of how well the health system is functioning. [161] This is because children require multiple contacts with the health system for full vaccination. [162] The total immunisation coverage with three doses of the DTP3 vaccine has been sustained at 78 per cent until 2004. One hundred and two countries have reached DTP3 coverage of 90 per cent or more and 80 countries are within the 50–89 per cent range. [163] Estonian DTP3 coverage in 2013 (94 per cent) is behind Finland (98 per cent) and Sweden (98 per cent), but at the same level as

Latvia (94 per cent) and Norway (94 per cent) and better than Lithuania (93 per cent). [164] The DTP3 coverage was lowest in Estonia at 1991 (67 per cent), increasing stepwise until 2005 (96 per cent) and remains stable until nowadays (93–94 per cent). In our study, the DTP3 vaccines coverage rate was better in FDs participating in the P4P (reaching almost 90 per cent coverage), but FDs not participating in the P4P were below this criterion during the whole observation period. The explanation for this could be the influence of P4P and motivation to deal more accurately with small children check-ups and immunisations.

To achieve high levels of vaccination and revaccination coverage rates, FDs should combine different methodologies [165] (regular visits, reminders and recalling, providing information about the importance of vaccinations and recommendations for vaccinations and revaccinations). Achieving target levels is sometimes very difficult and FDs should work harder and encourage parents to get their children vaccinated at the right time, but this extra work is rewarded with extra payment form P4P.

8.3. Number of specialist consultations and hospital bed days in Estonia

Several studies have investigated the role of primary care [25–26] and the role of P4P to link financial rewards of quality and performance [166] and to motivate FDs for activities to reduce specialist visits and avoid hospitalisations for chronic patients. Iezzi et al. [123] showed that financial payment might help improve the quality of care and reduce hospitalisations.

In our study, P4P had an impact on the number of visits to FDs, increasing it. P4P has also increased the number of visits to the specialists. It is probably because FDs in the P4P system pay more attention to detecting chronic diseases in their early stages, and actively recall patients for general health check-ups. This increases the number of visits, both of the FDs and the nurses. [85] One earlier study showed that the implementation of P4P reduced the rate of specialist consultations and hospitalisations [124] and we also expected that with more accurate monitoring of chronic diseases in primary care we could reduce the workload for specialists, but we could not prove it. Another expectation for our study was to find out how P4P affects hospitalisations. Caminal et al. [169] described the role of primary care as being responsible for preventing hospitalisation. This included primary prevention, early detection and monitoring of acute episodes, and follow-up and monitoring of chronic conditions. Recent studies showed that P4P reduced the likelihood of diabetes-related hospitalisations for diabetic patients [127–128] and we have similar findings. In our study, hypertensive patients were in hospital for fewer days. However, it is very difficult to conclude whether the decreased number of days in hospital was due to the P4P.

8.4. Chronic diseases

The National Chronic Disease Strategy states that chronic diseases have clearly preventable risk factors, therefore early detection of them is very important to reduce the onset, causes, complications or recurrence of disease.[170] Paying more attention to detecting chronic diseases in their early stages, recalling patients for general health check-ups and immunising children can increase the number of the patients in the target groups of chronically ill patients, due to a "seek and you will find" strategy, and intensifies the work thereof even more. In our study we have found an increased number of patients with chronic diseases in FDs' lists. The explanation for this could be the intensive search of diseases mentioned in the P4P scheme and better counting in electronic health records (EHR) and EHIF invoices. Sometimes EHR and EHIF invoices are not absolutely correct and there could be some mistakes in ICD coding (double or false coding), and this could influence the number of chronic diseases in FDs' lists. In addition, there could be mistakes from specialist consultations and their EHIF invoices, when the symptoms are classified as ICD diseases code. For example, elevated blood pressure or elevated glucose level are classified as hypertension or diabetes. The number of patients with myocardial infarction is usually not a result of double or false coding, this number increased as a result of intensive search.

Chronically ill patients are included into FDs' P4P observation list only if the same patient has the same diagnosis a minimum of three times, to exclude data entry errors and misdiagnosis. Since 2010 EHIF has collected all ICD-10 codes from the EHIF database and formed for FDs a list of chronically diseases and FDs had possibility to exclude or include patients from or into these lists. If a patient is in a FD's list with false coding of chronically disease (hypertension, type 2 diabetes, myocardial infarction, hypothyreosis), it is very difficult for FDs to exclude this patient from this list and this could be also reason for increased numbers of patients with chronically diseases in FDs' lists.

8.5. Preconditions for good outcome in P4P system

P4P is an incentive scheme and should motivate all participants to achieve a good outcome. [171] For policymakers it is very important to know which aspects of P4P could predict a good outcome, save money and have an influence on health gain. We observed different practice and patient-related characteristics to find out their impact on good outcomes.

Kelly and Stoye [172] showed that smaller practices are associated with poorer quality in primary care services. Single-handed practices have the lowest average QOF scores, while large practices (with more than six FDs) achieve the highest average scores. We also had similar findings and if we examine our study for different practice and patient-related characteristics and evaluate their impact on a good outcome, then primary care teams with a higher number of

FDs, longer history of participation in the P4P and smaller number of patients on FDs' lists showed better results. Older patients with increased rates of chronic disease and a higher number of patients with chronic diseases on FDs' lists are more typical for a poor outcome [173], which was also confirmed in our study. Van den Hombergh and Campbell [174] investigated the optimal size of practices and concluded that larger practices can do better. Devlin at al. [175] also described that a larger group size is associated with better access and comprehensiveness. Gillam et al. [107] showed that group practices have better outcomes and patient satisfaction, as well as better continuity of care. We also had similar findings, as at the beginning of the P4P, single-handed FDs also showed a good outcome, but it seems that over time small teams became overloaded with increased workloads (more detected chronically ill patients in the list and higher target levels) and did not achieve a good outcome. At the same time, primary care teams with multiple FDs were probably able to organise their work more efficiently to achieve a good outcome.

8.6. Strengths and limitations of the study

The strength of the study is that we have used the data of the majority of the population and all FDs have been involved in the study in Study I–II and IV. For Study III we used random sampling. We believe that our sample was representative and reliable.

A limitation of this study can be that the data obtained from the registry database can contain some data entry errors and the reliability of the source data cannot be checked without conducting a follow-up study. Furthermore, health service invoices that are electronically submitted to the EHIF are governed by specific rules. Previous studies on data quality in the Cancer Registry and Birth Registry have shown that medical data in the registries are reliable. We assumed that any inaccuracies were distributed evenly all over the Estonian population. Chronically ill patients are included into FDs' P4P observation list only if the same patient has the same diagnosis a minimum of three times, to exclude data entry errors and misdiagnosis.

9. CONCLUSIONS

1. P4P has a substantial impact on the workload of the primary care team and their members: the number of visits increased for doctors (FDs and specialists) and nurses.

   Although hospital bed days were reduced in some circumstances, we could not see the clear effects of P4P on better outcomes for the health care.
2. FDs participating in the P4P scheme had better immunisation coverage than FDs not participating in the P4P.
3. Primary care teams with multiple FDs and a longer history of participation in the P4P showed better results.

10. SUMMARY IN ESTONIAN

Perearstiabi tulemuslikkus: tasustamise ja praksisetegurite mõju

Sissejuhatus

Eesti tervishoiusüsteemi osad on esmatasandi arstiabi (perearstiabi, seaduses defineeritud kui üldarstiabi), eriarstiabi (ambulatoorne ja statsionaarne eriarstiabi), hambaravi ja ennetustegevus (skriininguprogrammid, koolitervishoid jt). Eesti perearstide enamiku moodustavad iseseisvad eraettevõtjad, kellel on Eesti Haigekassaga üldarstiabi rahastamise leping. Perearstide leping Eesti Haigekassaga on mitmetahuline, hetkel kehtiv leping koosneb pearahast (viis vanuserühma), baastasust, uuringufondist (protsent pearahast), teraapia- ja tegevusfondist, kauguse tasust (kaks kategooriat), kvaliteeditasust, lisatasust teise pereõe olemasolul ja lisatasust pikendatud lahtioleku korral.

Perearstide kvaliteedisüsteem (PKS) on süsteemne lähenemine, mille eesmärk on haigused varakult avastada ja vältida nende progresseerumist esmatasandis. PKS Eestis koosneb kolmest osast: haiguste ennetamine (vaktsineerimine, laste tervise kontroll, südame- ja veresoonkonna haiguste ennetamine), krooniliste haigustega (teist tüüpi diabeet, kõrgvererõhutõbi, müokardiinfarkti ravi järel ja hüpotüreoos) patsientide jälgimine ja täiendavad lisategevused. Perearsti kvaliteeditasus osalemine on vabatahtlik, osalemine PKSis suurendab perearsti uuringufondi ja hea tulemus (kaks kategooriat) suurendab perearsti lepingutasu 2–4%. Iga teostatud tegevus annab perearstile teatud arvu punkte, mille alusel makstakse lisatasu. Vähem kui 479 punkti (<75% punktidest) annab rahuldava (meie uuringutes *poor outcome*), 480–539 punkti hea ja 540–640 punkti väga hea tulemuse (meie uuringutes kaks viimast kokku *good outcome*).

PKSid on kasutusel paljudes riikides (Ühendkuningriik (UK), USA, Austraalia, Kanada, Itaalia, Hispaania jt) ja on riigiti erinevalt tasustatud. Kvaliteedi mõõtmiseks kasutatakse kvaliteediindikaatoreid, mida võib olla vähe (nt Austraalias 7) või palju (nt UK-s 134). Kvaliteediindikaatorite valik on keeruline ja aeganõudev, iga riik on leidnud oma lahenduse.

Esmatasandi arstiabi kvaliteeti jälgitakse enam kui 30 Euroopa riigis ning kvaliteeditasu suurus varieerub riigiti. UK-s moodustab see kuni 25% perearstide sissetulekust, aga teistes riikides keskmiselt 5–10% (Eestis 2–4%), sh Itaalias ja Hispaanias 1%.

PKSile on omistatud hulgaliselt kasulikke omadusi: tervishoiukulutuste parem jälgimine, vaktsineerimiste kasv, väiksem hospitaliseerimiste arv, vähenenud hooldusabi vajadus jne.

Samas on uuringuid, mis ei ole leidnud nii olulist mõju. On kirjeldatud ka negatiivset efekti: raske haigusega patsientidele muutus tervishoiusüsteemi sissepääsemine keerulisemaks, sest tervishoiuteenuse osutajatel tekkis tahtmine selliseid patsiente mitte vastu või arvele võtta, et niiviisi parandada oma tulemust kvaliteedisüsteemis. Samuti on leitud, et PKSi rakendamise esimestel

aastatel andsid programmilised tegevused häid tulemusi, ent mõne aasta pärast saavutati teatud nivoo ja edasist arengut ei toimunud.

On leitud, et PKS suurendab arstide töökoormust. UK-s tõusis pärast kvaliteedisüsteemi rakendamist perearstide töökoormus ja tekkis vajadus võtta tööle rohkem perearste, õdesid ja administratiivtöötajaid. Perearstid hakkasid tegelema keerulisemate haigusjuhtumitega, rutiinsed ülevaatused suunati õdedele, kelle töökoormus kasvas seetõttu hüppeliselt.

PKSi tulemusel on paranenud ravikvaliteet ja vähenenud hospitaliseerimiste arv, seda eelkõige krooniliste haigustega (nt diabeet) patsientide puhul (Austraalia). Esimesel aastal suurenes diabeediga patsientidel perearsti visiitide arv 4% ja eriarsti visiitide arv vähenes 20%, vähem hospitaliseeriti selliseid patsiente ka järgnevatel aastatel. On täheldatud PKSi positiivset mõju haiguste ennetamisele (nt vaktsineerimine, vähi skriininguprogrammid) (USA; Hudson Health Plan). Krooniliste haiguste (hüpertensioon, diabeet jt) jälgimine paranes ja perearstide nimistutesse lisandus selliste haigustega patsiente. PKSi haaratud patsientidel oli vererõhk ja lipiidide profiil parema kontrolli all, neid oli harvem hospitaliseeritud kardiovaskulaarsetel põhjustel (USA).

Eestis rakendus PKS 2006. aastal eesmärgiga soodustada kvaliteetsete teenuste osutamist esmatasandis, motiveerida perearste tegelema krooniliste haigete ja laste jälgimisega (vaktsineerimine) ja vähendada eriarstiabi vajadust. Tänaseks on PKSi juurutamisest möödas juba kümme aastat, saame teha järeldusi ja kokkuvõtteid.

Uurimistöö eesmärgid

Uurimistöö eesmärk oli võrrelda kvaliteedisüsteemiga ühinenud ja mitteühinenud perearstide töökoormust (esimene artikkel) ning kvaliteeditasu mõju vaktsineerimisega hõlmatusele (teine artikkel). Kolmanda artikli eesmärk oli leida kvaliteeditasu mõju perearstide ja eriarstide töökoormusele ning haigla ravipäevade arvule. Neljandas artiklis analüüsisime eri tegureid, mis võivad mõjutada kvaliteedisüsteemis osalemise tulemuslikkust.

Uuritavad ja meetodid

Esimesse, teise ja neljandasse uuringusse kaasati kõik Eestis töötavad perearstid: PKSiga ühinenud perearstid (500 (37,3%) 2006. aastal ja 772 (96,6%) 2012. aastal) ning PKSiga mitteühinenud perearstid (vastavalt 297 (62,7%) ja 27 (3,4%)). Kolmas uuring tehti valimi põhjal. Eesti Haigekassasse saadetud raviarvete alusel analüüsiti perearstide töökoormust, laste vaktsineerimisega hõlmatust, perearstide ja eriarstide visiitide arvu ning krooniliste haigustega patsientide (hüpertensioon ja teist tüüpi diabeet) haigla voodipäevade hõlmatust. Vaadeldi perearstipraksist iseloomustavate tegurite mõju kvaliteeditasu tulemusele. Võrdlusrühmad moodustati PKSis saadud tulemuste põhjal.

Esimeses töös uuriti PKSi mõju PKSis osalevate ja PKSis mitteosalevate perearstide töökoormusele 2005.–2012. aastal. Töökoormus oli määratletud kahel viisil: 1) perearsti ja pereõe visiitide arv Eestis uuritavas ajavahemikus, 2) visiitide arv perearsti ja pereõe kohta.

Arvesse võeti kõikide visiitide arv, esmaste visiitide (esmane perearsti külastus ühe haigusperioodi vältel ühes kalendriaastas), korduvate visiitide (ühe haigusepisoodi vältel kõik järgnevad visiidid pärast esmast visiiti ühe kalendriaasta jooksul), koduvisiitide ja pereõe visiitide arv.

Teises uuringus võrreldi PKSis osalevate ja PKSis mitteosalevate perearstide nimistutes olevate laste vaktsineerimisega hõlmatust 2006.–2012. aastal.

Kolmandas uuringus vaadeldi PKSi mõju PKSis hea ja rahuldava tulemuse saanud perearstide ja eriarstide visiitidele ning haigla voodipäeva hõlmatusele ühe kalendriaasta vältel (01.01.2014–31.12.2014). Kõikidest 2014. aastal Eestis töötavatest perearstidest (N = 803) valiti juhuvalikuga välja 80 perearsti (10%), kes said PKSis hea tulemuse (*good outcome*) ja 80 perearsti, kes said rahuldava tulemuse (*poor outcome*). Valim koosnes proportsionaalselt maal ja linnas töötavatest perearstidest ja nimistutest suurusega 1500–2400 patsienti. Valimisse ei valitud väga suuri (>2400) ega väga väikesi (<1500) nimistuid. Hea tulemusega perearstid said PKSis üle 600 ja rahuldava tulemusega perearstid alla 200 punkti.

Krooniliste haiguste korral vaatlesime hüpertensiooniga (kõik raskusastmed) ja teist tüüpi diabeediga patsiente; uuringusse kaasasime ainult need, kellel oli enne 2014. aastat vähemalt kolm nimetatud haigustega seotud visiiti. Kõik patsiendid said unikaalse märgistuse, lugesime kokku iga patsiendi kõik visiidid tervishoiuteenuse osutajate juurde: perearsti visiidid, eriarsti ambulatoorsed visiidid ja voodipäeva hõlmatuse uuringuperioodil ning eelpool nimetatud kahe haiguse korral. Visiidina käsitlesime patsiendi konsulteerimist arstikabinetis, telefonikonsultatsiooni ja meili teel nõustamist. Kõik need visiidid on Eesti Haigekassa arvetel tähistatud erinevate teenusekoodidega. Uuringus ei vaadeldud hospitaliseerimiste arvu.

Neljandas uuringus otsiti praksisest ja nimistu struktuurist lähtuvate tunnuste alusel erinevusi, mis on rohkem iseloomulikud PKSis hea tulemuse saavutanud perearstidele. Uuritav ajavahemik oli 2006.–2012. aasta, mille ajal suurenes osalejate arv 500-lt 772-le. Perearstid jagati kahte rühma nende tulemuse järgi PKSis: hea tulemusega 30 (6%) perearsti 2006. aastal ja 412 (53%) perearsti 2012. aastal ning rahuldava tulemusega vastavalt 470 (94%) ja 360 (47%) perearsti. Töös vaadeldi perearstipraksiste iseloomustavaid tunnuseid (nimistu suurus, koos töötavate perearstide arv) ja nimistut iseloomustavaid tunnuseid (patsiendi vanus, krooniliste haigete arv nimistus). Krooniliste haiguste all mõeldi PKSis jälgitavaid haigusi (kõrgvererõhutõve kõik astmed, teist tüüpi diabeet, müokardiinfarkt ja hüpotüreoos).

Andmete uurimisel kasutasime kirjeldava statistika meetodit. Erinevust kahe rühma vahel võrdlesime mitteparameetrilise Manni-Whitney U-testiga, sest andmed ei olnud normaaljaotusega. Kui p väärtus oli <0,05, siis oli erinevus statistiliselt oluline. Teises uuringus kasutasime lisaks kaht lineaarse regressiooni mudelit, et võrrelda vaktsineerimisega hõlmatust kahe uuringurühma vahel.

Andmete analüüsimisel kasutasime andmetöötlustarkvara R 2.13.1 (esimene uuring) ja IBM SPSS Statistics 19 (esimene kuni neljas uuring).

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Uurimustöö peamised tulemused

Uuringuperioodil (2005.–2012. aastal) suurenes PKSis osalevate perearstide arv 48,2%-lt 69,2%-le. Samal ajavahemikul suurenes perearstidele ja pereõdedele tehtud visiitide arv. PKSiga ühinenud perearstidele tehti rohkem visiite kui mitteühinenud perearstidele. 2006. aastal oli erinevus 1,3-, ent 2011. aastal juba 4,3-kordne. PKSiga ühinenud perearstidele tehti rohkem nii esmaseid kui korduvaid visiite. Visiitide arv perearsti kohta oli PKSiga ühinenud perearstidel praktiliselt muutumatu (1 340 visiiti 2006. aastal ja 1 355 visiiti 2011. aastal), kuid PKSiga mitteühinenud perearstidel vähenes see rohkem kui 200 visiidi võrra (vastavalt 948 ja 702 visiiti). Pereõdede töökoormus kasvas PKSiga ühinenud perearstidel, kuid ei muutunud mitteühinenutel (esimene uuring).

PKSiga ühinenud ja mitteühinenud perearstidel oli laste vaktsineerimisega hõlmatus erinev. Suurim erinevus ilmnes teise ja kolmanda vaktsineerimise (difteeria-teetanus-läkaköha-poliomüeliit ja B-hepatiidi) puhul. PKSiga ühinenud perearstidel oli laste kõikide vaktsineerimistega hõlmatus 2006. aastal 80% ja 2012. aastal 90%, samas mitteühinenud perearstidel vastavalt 75% ja 80% (teine uuring).

Krooniliste haiguste (hüpertensiooni kõik astmed ja teist tüüpi diabeet) jälgimine suurendas PKSis hea tulemuse saanud perearstide (esimene rühm) visiitide arvu võrreldes rahuldava tulemuse saanud perearstidega (teine rühm). Esimeses rühmas suurenes eriarstide visiitide arv hüpertensiooniga patsientidel. Samal ajal vähenes seal voodipäeva hõlmatus hüpertensiooniga ja teist tüüpi diabeediga patsientidel võrreldes teise rühmaga (kolmas uuring).

2006.–2012. aastal suurenes esimese rühma perearstide arv. Kui 2006. aastal saavutas PKSis hea tulemuse 6% perearste, siis 2012. aastal juba 53%. Hea tulemusega perearstidel oli PKSiga liitumise aeg (1,90 aastat 2007. aastal; 6,31 aastat 2012. aastal) ja koos töötavate perearstide arv (2,23 2006. aastal; 5,01 2012. aastal) ning rahuldava tulemusega perearstidel PKSiga liitumise aeg (vastavalt 1,90 ja 5,09), koos töötavate perearstide arv (vastavalt 2,23 ja 3,85). Seega, mida pikemalt on perearst PKSiga liitunud olnud ja mida rohkem on koos töötavaid perearste, seda paremad on tulemused.

Patsientide arv perearstide nimistutes mõjutas PKSis head tulemust kahel aastal (2010 ja 2012), ülejäänud aastatel (2007–2009 ja 2011) aga nimistu suurusel tulemusele mõju ei olnud. Krooniliste haigete arv perearsti nimistus avaldas mõju peaaegu kõigil aastatel (2006–2007 ja 2009–2012). Väiksem nimistu, rohkem lapsi nimistus ja vähem kroonilisi haigeid annab parema tulemuse PKSis (neljas uuring).

Uurimistöö tugevused ning puudused

Uurimistöö tugevus seisneb asjaolus, et oleme kasutanud kogu rahvastikku hõlmavaid andmeid ja et kõik perearstid on kaasatud uuringusse (esimene, teine ja neljas uuring).

Puuduseks on, et kasutatud andmebaas võib sisaldada andmesisestusvigu ja topeltkirjeid, samuti ei ole võimalik kontrollida andmebaasi usaldusväärsust eriuuringuta. Raviteenuste arved edastatakse Eesti Haigekassasse elektroonselt ja töödeldakse vastavalt eeskirjadele. Varasemad uuringud Eesti Vähiregistri ja Meditsiinilise Sünniregistri alusel on näidanud, et niimoodi saadud meditsiinilised andmed on usaldusväärsed. Uuringutes eeldasime, et ebatäpsused on jaotunud ühtlaselt üle kogu andmestiku.

Krooniliste haigustega patsientide puhul on patsient kaasatud PKSi nimekirja juhul, kui samal patsiendil on sama diagnoos vähemalt kolm korda, et välistada andmete sisestusvigu ja väärdiagnoose.

Järeldused

PKS suurendas perearsti ja temaga koos töötavate pereõdede koormust. Pereõdede töökoormus suurenes isegi rohkem, mistõttu perearsti meeskond peaks suurenema, et tööga toime tulla.

Laste vaktsineerimise hõlmatus oli parem PKSiga ühinenud perearstidel. PKSiga mitteühinenud perearstidel oli laste vaktsineerimise hõlmatus allpool nõutud vaktsineerimistaset.

PKS suurendab nii perearstide kui ka eriarstide töökoormust ning ainult vähesel määral vähendab krooniliste haigustega patsientide haiglaravi päevade arvu.

Kuigi PKSis hea tulemuse saanud perearstide krooniliste haigustega patsientide (hüpertensioon ja teist tüüpi diabeet) haigla voodipäevade arv väheneb mõnevõrra, on see muutus tervishoiukorralduslikult mitteoluline; me ei saa kinnitada, et see oleks ainult PKSi mõju.

PKSis saavad parema tulemuse reeglina grupipraksised ja kauem PKSis osalenud perearstid. Väiksem nimistu, rohkem lapsi ja vähem kroonilisi haigeid annab parema tulemuse.

Kokkuvõtteks

PKSil on nii positiivseid kui negatiivseid külgi. PKSiga ühinenud perearstid on paremini motiveeritud, et saada head tulemust, tegelevad intensiivsemalt kõikide oma nimistu patsientidega, avastavad ja kontrollivad haigusi ning organiseerivad tervisekontrolle. Vastukaaluks suureneb töökoormus ja muutub praksisesisene töökorraldus, perearstid suunavad krooniliste haiguste rutiinse kontrolli sagedamini pereõdedele. On näha, et suurenenud nõudmised vajavad suuremat perearsti meeskonda, sest parem tulemus saavutatakse suuremates meeskondades (grupipraksistes). Praegu ei ole meil veel kindlat alust väita, et PKSis osalemisega oleks võimalik saavutada üldises tervishoiusüsteemis paremaid tulemusi. Laste vaktsineerimistega hõlmatus on siin meeldiv positiivne erand.

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PUBLICATIONS

CURRICULUM VITAE

Name: Eero Merilind
Date of birth: April 20, 1971
Citizenship: Estonian
Address: Institute of Family Medicine and Public Health, University of Tartu, Ravila 19, 50411, Tartu, Estonia
Phone: (+372) 737 4190
Mobile phone: (+372) 51 12 901
E-mail: Eero.Merilind@arst.ee

Education:

1978–1989	Tallinn 42 Secondary School. Silver medal
1989–1995	University of Tartu, Faculty of Medicine. MD
1995–1997	University of Tartu, Faculty of Medicine. Internship. General practitioner
1998–2000	University of Tartu, vocational training in Family Medicine. Family doctor
2008–	University of Tartu, Family Medicine Clinic, PhD student

Professional Employment:

1997–2000	General practitioner in Rae district (Vaida and Lagedi), Harju County
2000–2005	Nõmme Family Doctors Center, OÜ Meditiim – Family doctor
2005–2006	Swale PCT, Kent county, United Kingdom, General practitioner
2006–	Nõmme Family Doctors Centre, OÜ Meditiim – Family doctor
2008–	University of Tartu, Family Medicine Clinic, PhD student

Membership in scientific organisations:
Estonian Doctors Association, Doctors Association in Tallinn, Estonian Society of Family Doctors, Society of Family Doctors in Tallinn.

Publications:

1. Merilind E, Västra K, Salupere R, Kolde A, Kalda R. **The impact of P4P on the workload of family practices in Estonia**. Qual Prim Care. 2014; 22(2):109–114.
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ELULOOKIRJELDUS

Nimi: Eero Merilind
Sünniaeg: 20. aprill, 1971
Kodakondsus: Eesti
Aadress: Tartu Ülikooli peremeditsiini ja rahvatervishoiu instituut
Ravila 19, 50411, Tartu, Eesti Vabariik
Telefon: (+372) 737 4190
Mobiiltelefon: (+372) 51 12 901
E-post: Eero.Merilind@arst.ee

Hariduskäik:

1978–1989	Tallinna 42 Keskkool. Hõbemedal
1989–1995	Tartu Ülikool arstiteaduskond, ravi eriala. MD
1995–1997	Tartu Ülikool arstiteaduskond üldinternatuur. Üldarst
1998–2000	Tartu Ülikool perearstiks spetsialiseerumise kursused. Perearst
2008–	Tartu Ülikool Peremeditsiinikliinik, doktorantuur

Erialane teenistuskäik:

1997–2000	Vaida ja Lagedi piirkonna üldarst Rae vallas Harju maakonnas
2000–2005	Nõmme Perearstikeskus OÜ Meditiim – perearst
2005–2006	Swale PCT perearst, Kenti maakond, Suurbritannia
2006–	Nõmme Perearstikeskus OÜ Meditiim – perearst
2008–	Tartu Ülikool Peremeditsiinikliinik doktorant

Osalemine erialaseltsides:
Eesti Arstide Liit, Tallinna Arstide Liit, Eesti Perearstide Selts, Tallinna Perearstide Selts.

Publikatsioonid:

1. Merilind E, Västra K, Salupere R, Kolde A, Kalda R. **The impact of P4P on the workload of family practices in Estonia**. Qual Prim Care. 2014; 22(2): 109–114.
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