ANNELI RÄTSEP

Type 2 diabetes care in family medicine

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CONTENTS

I. LIST OF ORIGINAL PUBLICATIONS

This thesis is based on the following original publications referred to in the text by Roman numerals.

  I Rätsep A. Teist tüüpi diabeediga haigete ravikuulekust mõjutavad patsiendipoolsed tegurid – kvalitatiivne uuring. Eesti Arst 2003; 82:353–356.

  II Vermeire E, Hearnshaw H, Rätsep A, Levasseur G, Petek D, van Dam H, van der Horst F, Vinter-Repalust N, Wens J, Dale J, Van Royen P. Obstacles to adherence in living with type-2 diabetes: An international qualitative study using meta-ethnography (EUROBSTACLE). Prim Care Diabetes 2007;1: 15–23.

  III Kalda R, Rätsep A, Lember M. Predictors of quality of life of patients with type 2 diabetes. Patient Preferences and Adherence 2008; 2: 21–26

  IV Rätsep A, Kalda R, Lember M. Meeting targets in type 2 diabetes care and factors contributing to adequate glycemic control. J Diabetes Complications. (Submitted)

  V Rätsep A, Kalda R, Oja I, Lember M. Family doctors knowledge and self-reported care of type 2 diabetes patients in comparison to the clinical practice guideline: cross-sectional study. BMC Fam Pract 2006;7:36.

  VI Lember M, Ratsep A, Kalda R, Oja I. The impact of clinical practice guidelines should not be overestimated. J Am Board Fam Pract. 2005;18:153–154.

  VII Rätsep A, Oja I, Kalda R, Lember M. Family doctors' assessment of patient- and health care system-related factors contributing to non-adherence to diabetes mellitus guidelines. Prim Care Diabetes 2007; 2:93–97.

Author's contribution:

I The author was the main person responsible for the study preparation, performance, data analysis and writing the manuscript.

II The author performed a qualitative study in Estonia, carried out the first-order interpretation of the data, participated in the second-order interpretation of Estonian data and contributed to the manuscript development.

III The author contributed to the design of the study, data collection, statistical analysis and manuscript writing.

IV The author participated in the study design, carried out telephone interviews with the patients, carried out statistical analysis and wrote the manuscript.

V, VII The author participated in the study design, carried out the study, performed statistical analysis and wrote the manuscript.

VI The author participated in the study design, carried out the study, performed statistical analysis and contributed to the manuscript.

2. ABBREVIATIONS

BMI   body mass index
CI   confidence interval
CPG   clinical practice guidelines
DM2   diabetes mellitus type 2
FBG   fasting blood glycose
FD   family doctor
HbA1 c   glycosylated (or glycated) hemoglobin
RCT   randomised controlled trial
QoL   quality of life
SD   standard deviation
SF – 36   the short form 36 health survey instrument
SBP/DBP   systolic blood pressure/diastolic blood pressure
SMBG   self-monitoring of blood glycose
UKPDS   United Kingdom Prospective Diabetes Study

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3. INTRODUCTION

Increasing prevalence of type 2 diabetes (DM2) is a growing public health burden across the world which imposes a significant medical and economic impact on health care systems (Sloan et al., 2008; Wild et al., 2004). Diabetes mortality and costs in health care are closely related to complications, especially of cardiovascular diseases (Caro et al., 2002; Williams et al., 2002). In recent decades treatment of DM2 has improved. However, the conclusions of different studies indicate that the proportion of patients meeting targets to prevent complications and mortality remain far from expected (Liebl et al., 2002; Saydah et al., 2004a). Evaluation of factors associated with quality of diabetes care have revealed great variations at the level of the patient (O'Connor et al., 2008), the physician (Belfiglio et al., 2001) and the medical team (Khunti et al., 2001; Krein et al., 2002).

In Estonia, the care of patients with type 2 diabetes has been shifted from secondary care to the primary health care system through changes in health care in the 1990s. The health care reform in Estonia started with the reorganization of primary care. The former system was highly hierarchical, centrally controlled, and based on policlinics and other facilities providing extensive specialist services at the first level of contact (Lember, 2002). The new family medicine system was able to start functioning owing to the retraining of previous district doctors and district paediatricians through providing them with comprehensive education. The implementation of the gate-keeping functions of family doctors (FD), as well as the patient list system have changed the principles of care. Currently most patients with DM2 in Estonia receive care from FDs. The role of specialists in the management of patients with chronic disease is mostly defined as that of consultants, and the majority of patients who need to see specialists receive referrals from their FDs. The diabetes care of children, young people and pregnant women, as well as the treatment of severe complications is concentrated in the specialised system of medical care. Some diabetes nurses are also available for FDs' patients at hospitals. Estonian inhabitants have accepted the new family medicine system, and during the first years of the formal implementation of the primary health care reform, the rate of satisfaction with FDs has increased (Kalda et al., 2003; Polluste et al., 2000). Persons with chronic conditions in Estonia visit their FDs and specialists more often compared with people without chronic conditions (Põlluste et al., 2007).

In Estonia, for improvement of the quality of care, the Estonian Society of Family Doctors started to develop national clinical practice guidelines (CPG) in collaboration with specialist societies in 1994. The type 2 diabetes guidelines for FDs were developed in 2000 by a multidisciplinary team led by FDs, based on the International Diabetes Federation Europe DM2 guidelines (IDF, 1999). The new version of the DM2 guidelines was published in 2008 and it is available in the internet (EPS and EES., 2008). There are currently 30 official CPG available for doctors in Estonia.

In the current health care system of Estonia, the management DM2 in family practice has not been assessed before. There is no knowledge either of the patient or the physician related problems associated with the management of the disease. Therefore the aim of this study was to assess the DM2 patient and physician related factors influencing diabetes management in family practice.

4. REVIEW OF THE LITERATURE

4.1. Patient adherence to type 2 diabetes management

Diabetes management is a comprehensive process involving first of all life-style activities and pharmacotherapy. Consistent decision making about diet and exercise, need for weight reduction, self monitoring of blood glycose, knowledge of foot care – all this demands significant life-style adaptations by the patient. These activities affect virtually all aspects of daily life. Medical treatment often means polypharmacotherapy and might include insulin injections, medication for hyperglycaemia, but also drugs for control blood pressure and lipids. The asymptomatic course of the disease and its life-long treatment make the treatment regimen even more difficult to accept. Sometimes, emotional factors associated with diabetes may worry patients more than biomedical aspects. Depression and anxiety are far more common in persons with diabetes compared to persons without the condition; this in turn suppresses the initiative to cope with the treatment regimen (Hermanns, 2005; Katon, 2008; Li et al., 2008).

Glycaemic control is the most widely used proxy for assessing DM2 management outcomes. Barriers to optimal glycaemic control are present in almost every aspect of diabetes care. Assessing the provider or patient related factors associated with glycaemic control, most of the variability of HbA1c was explained by factors at the patient level (O'Connor et al., 2008; Tuerk et al., 2008). It is known that about one in four persons does not adhere well to prescribed drug therapy and this leads to increased mortality and hospitalization, and also causes a major public health burden (Ho et al., 2006; Schectman et al., 2002; Simpson et al., 2006). "Compliance" has been a default term in medical literature to describe taking of medication and is defined to what extent the patients' actual history of drug administration corresponds to the prescribed regimen. The term "adherence" is promoted by the World Health Organization for use in the case of chronic disorders. Adherence to the medical regimen has a broader meaning and can be defined as the extent to which a person's behaviour – taking medication, following a diet, and/or making lifestyle changes – corresponds to the recommendations given by the health care provider. While compliance and adherence are related just to the patient behaviour towards the treatment regimen, the third term "concordance" has been used to explore the process of treatment even more widely. Concordance does not refer only to the patient's medicine-taking behaviour, but rather to the nature of the interaction between the clinician and the patient (Bell, 2007). It is based on the notion that consultation between the clinician and the patient is negotiation between equals. Paternalism cannot be appropriate nowadays as patient participation in decision making is becoming more inevitable (Deber, 1994).

Adherence may be related to different factors: health care system, condition related factors, characteristics of therapy and patient related factors (Osterberg and Blaschke, 2005). Three decades of research have been performed on compliance/adherence to treatment, hundreds of different variables have been studied but none of the factors has been found to have a high predictive value for non-adherence (Vermeire et al., 2001). Self-reports on medications use, pill counts, medication possession ratios, and electronic monitoring devices are the common tools used to measure compliance/adherence (Odegard and Capoccia, 2007). Often, more focus has been placed on taking medication and less on coping with treatment regimens in the broader meaning. Research results about the disease characteristics, referral process, clinical settings, and associations of the therapeutic regimen with adherence to treatment have been contradictory (Vermeire et al., 2001).

Doctor-patient relationship seems to be an important variable in adherence, but it is complicated to measure the interaction and its components (Britten et al., 1995). However, it has been demonstrated that the physicians' comprehensive ("whole person") knowledge of patients and the patients' trust in their physician are the variables strongly associated with adherence (Safran et al., 1998). Patient-centred collaborative care "empowerment" is tailored to match the realities of diabetes care, helping patients discover and develop the capacity to be responsible for one's own life through teaching self-management skills has shown some positive results (Anderson et al., 1995). In the short term, evidence supports the effectiveness of self-management training in type 2 diabetes outcomes (Norris et al., 2001). Importance of patient participation like assistant-guided patient consultations, empowering group education, group consultations, or automated telephone management were found to be effective instead of concentration on patient-centred consulting style and provider behaviour change (van Dam et al., 2003). The question remains whether this knowledge is implementable in routine care for all patients and what kind of effect it has on diabetes complications and mortality.

Not long time ago the patient perspective of health and illness was taken into account in traditional compliance research. However, little attention was paid to the fact what sense individuals make of the advice given to them and what ideas they have about their disease and treatment. This kind of knowledge might help explain some problems of non-adherence and provide directions for future improvements. In the last decade qualitative studies, widely used in social science, were introduced in the field of health care (Morse, 2006). Health research has shown more interest in the holistic understanding of health and illness using broader interdisciplinary approach for answering comprehensive empirical questions. Therefore, in addition to biomedical and epidemiological perspectives, the knowledge of social science is needed to investigate the individual perception of health aspects of those to whom care is mainly provided (Giacomini, 2001). In studies where it has been appropriate to use, good agreement of results was achieved using both methods. The qualitative

part of studies allowed to cover the aspects that the questionnaire failed to detect (Abusabha and Woelfel, 2003; Pope and Mays, 1995). As different approaches in qualitative and quantitative studies address essentially different questions about the world, their findings tend to complement rather than to compete when contributing to new knowledge. By considering qualitative evidence, clinicians gain new and useful insights about social phenomena in health that are not available in any other way (Giacomini, 2001).

Addressing the question about the meaning of DM2 treatment for the patient, the answer is not of natural causation but rather of the social meaning of the disease. When the question about adherence to treatment for a quantitative study would be "What is the proportion of patients who stop taking their diabetes medication for at least three consecutive days during a six-month period?" the analogous question in qualitative research might be "What is the meaning of it in everyday life for patients taking diabetes medication?" The essence of qualitative research is to capture life as it is lived explaining the meaning of it, to interpret or to translate the meaning for others, especially with the aim to understand a new or little studied group, setting or phenomenon. Interpretations need to be meaningful and relevant to the group whose attitudes, understandings and behaviour are studied (Pope and Mays, 1995; Pope et al., 2000). In qualitative study, recruitment of study participants is not based on the representative sample from population but on the importance of investigated people in relation to the studied issue. Qualitative methods can also explore issues of a process and functioning of systems, for generation and development of theories as well for complementing quantitative research (Britten et al., 1995; Pope and Mays, 1995).

Among different qualitative methodologies, grounded theory approach is exploited for hypothesising inductively from data, using the subjects' own categories and concepts, especially to study previously underinvestigated areas (Glaser and Strauss, 1967; Pope and Mays, 1995). The goal of a grounded theory is to discover the participants' main concern and how they continually try to resolve it. Resulting theory is generated from empirical data, aids understanding and action in the area under investigation and fits the original dataset (Heath and Cowley, 2004). The result of grounded theory is not a reporting of facts but a set of probability statements about the relationship between concepts. The researcher uses complex method to generate results, which means repeated returning to stages of the study already passed through (Laherand and Orn, 2008). Data analysis is the circle of induction and deduction, where the hypotheses emerging in the process of induction are tested by deductive reasoning. The prerequisite for inductive-deductive data handling is the simultaneous running of the process of data collection, coding and analysis (Charmaz, 2006). Data analysis is the process of coding containing three steps: open coding, axial coding (inductive approach) and selective coding (deductive approach). These steps cannot be strictly separated as they represent different ways of interpreting the text (Laherand and Orn, 2008). Open coding means

constant comparison of words, phrases and sentences from the text related to the research question. Thereafter the codes are grouped into categories and the emerging categories will be collocated by the axial coding process followed by deductive connection with all related preliminary codes. The last step – selective coding – is the most abstracted, and characterises the main idea or content of the study.

For the synthesis of qualitative evidence, the methodology of metha-etnography was introduced by Noblit and Hare in 1988 (Noblit and Hare, 1988). Analysing different qualitative studies is not simply aggregating the findings in a summary list of themes emerging from primary analysis, but to seek deeper insight and to reach a conceptual development richer than individual studies. The process involves inductive analysis of the data generated from research, development of hypotheses, and testing of hypothetical relationships creating new interpretations in the process (Britten et al., 2002; Noblit and Hare, 1988).

When diabetes patients are confronted with the disease, they first generate their own sets of beliefs and theories about health and illness, treatment and control. Whether those are in line with the providers' agenda is not well known. Yet a few studies have been performed on this topic, mainly among minority groups (Anderson et al., 1996; Maillet et al., 1996; McCord and Brandenburg, 1995). Whether qualitative research could be used for boarder DM2 patient groups to assess barriers in adherence to treatment, and whether patients experience similar problems in different cultural and health care settings still remain questions for further studies.

4.2. Assessment of patient outcomes in type 2 diabetes care

Outcomes are used to evaluate the effectiveness of health technologies on routine clinical practice. They can be divided as outcomes having clinical relevance and outcomes having relevance to patients (Donabedian, 2005; Valderas et al., 2008). Clinical outcomes tend to be more important to clinicians and may not capture the meanings for the patient.

4.2.1. Patient-reported outcome – quality of life

Quality of life (QoL) is a patient-reported outcome measure assessing wellbeing in different aspects. Patients' perception of emotional, social and physical wellbeing and their ability to cope with ordinary tasks of living can be defined by the term quality of life (Rubin and Peyrot, 1999). This is particularly important for patients with chronic conditions that are likely to have an impact on their physical, psychological, and social wellbeing (Wandell, 2005; Wang et

al., 2008). Although clinicians are more focused on clinical measures indicating the risk of cardiovascular complications and mortality, these can not be of such importance for patients. It has been shown that as a result of DM2 complications, the quality of life of patients with diabetes is remarkably lower than the quality of life in general population (Hanninen et al., 1998; Keinanen-Kiukaanniemi et al., 1996; Rubin and Peyrot, 1999; Wandell, 2005; Wang et al., 2008). The health behaviour of DM2 patients may also influence QoL, while those taking up less healthy activities were more likely to report poor mental of physical health (Li et al., 2007). The prevalence of obesity among DM2 patients in different studies is 30–85% and it is closely related to patient's reduced health status (Hassan et al., 2003; Hänninen et al., 1998; Rejeski et al., 2006). It might be presumed that an intensive treatment regimen might negatively influence the patients' QoL because of polypharmacy, insulin injection, potential side effects and more frequent glycose monitoring. Nevertheless, most studies demonstrate no change or improvement in QoL evaluations after intensification of the treatment regimen (Braun et al., 2008; Janssen et al., 2009; Menard et al., 2007; Pitale et al., 2005; UK Prospective Diabetes Study Group, 1999). Whether any change of the HbA1c value is related to patients' QoL is less clear. Some studies have shown that decreased HbA1c is associated with short-term improvement in quality of life (Braun et al., 2008; Testa and Simonson, 1998) while other studies have shown no such association (Aalto et al., 1997; Sundaram et al., 2007).

Tools for measuring QoL can be general and condition-specific. The short form 36 health survey instrument (SF-36) is a very common and widely validated tool which allows to measure QoL in general and makes it possible to compare persons with other conditions and general population (Hays and Morales, 2001; Hays et al., 1993; Ware, 1993). Specific health-related quality of life is usually employed for measurement of particular disease-related impairments, functional states, perceptions, and social opportunities (Rubin and Peyrot, 1999). There are several specific health-related quality of life measures for diabetes patients, all of which are not adequately validated (El Achhab et al., 2008).

It has been found that physician ratings of patient health do not necessarily correspond to patient ratings (Nerenz et al., 1992). Evaluation of aspects of patients' quality of life is a meaningful treatment outcome from the patients' perspective. Therefore, it is important to find out how patients with DM2 under-stand the factors that determine their quality of life. The QoL of DM2 patients in Estonia has not been assessed before and the association of QoL with glycaemic control is not yet clear.

4.2.2. Clinical outcome – glycaemic control

Glycosylated haemoglobin is a widely accepted indicator of glycaemic control while promising data from the series of United Kingdom Prospective Diabetes Studies have shown reduction of the risk of some diabetes related complications and mortality with intensive treatment of hyperglycaemia (Stratton et al., 2000; Stratton et al., 2006; Turner et al., 1998; UK Prospective Diabetes Study Group, 1998b). Some data have even demonstrated associations of decrease of level in glycosylated haemoglobin (HbA1c) with reduction of medical costs and health care utilisation. Improvement of HbA1c values during patients' follow-up reduced health care utilisation in primary and specialist care while significant cost saving was attained (Wagner et al., 2001). However, even stronger predictors for cost increase are related to diabetes *per se*, coronary heart disease and hypertension (Gilmer et al., 2005).

Establishment of factors, apart from pharmacological treatment, that might influence glycaemic control has been a matter of interest. Patient and treatment related factors associated with worse glycaemic control are female sex, overweight and longer duration of diabetes, being treated with oral hypo-glycaemic agents or insulin versus nonmedical treatment, as well as inadequate health literacy (Bebb, 2005; Goudswaard et al., 2004; Schillinger et al., 2002). Literature offers numerous reports designed to determine effective interventions which might improve glyacemic control, but most of them were not able to definitely demonstrate the superiority of any of them. However, as revealed by a meta-analysis (Shojania et al., 2006), case management and shared care were the interventions at the organisational level that resulted in improvement in patient diabetes control (de Sonnaville et al., 1997; The California Medi-Cal Type 2 Diabetes Study Group, 2004).

Knowledge is a prerequisite for change in attitude and behaviour. Yet improvement of patient knowledge with education on diabetes management has not resulted in constant reduction of hyperglycaemia (Dunn et al., 1990). A patient with diabetes needs to know a lot. Only a few studies have dealt with the patient knowledge and understanding of HbA1c testing (Delamater, 2006). Patients with type1diabetes have demonstrated good knowledge but this does not hold true for DM2 patients (Harwell et al., 2002; Heisler et al., 2005; Skeie et al., 2001). Nevertheless, regular testing of HbA1c and provision of immediate feedback of the HbA1c test result showed some improvements in DM2 patients' glycaemic control (Cagliero et al., 1999; Larsen et al., 1990), whereas the patients' knowledge of the test was not assessed. Still, it is not known why some patients' knowledge is better than others', which factors are associated with the improved understanding of the disease and whether this is associated with better glycaemic control.

4.3. Challenges of type 2 diabetes care in family practice

4.3.1. Provision of type 2 diabetes care

According to the definition of The European Society of General Practice/ Family Medicine, family doctors are personal doctors primarily responsible for the provision of comprehensive and continuing care to every individual seeking medical care irrespective of age, sex and illness (WONCA, 2005). Continuity of care has been regarded as fundamental to primary care and crucial to the quality of care. It compasses informational, management and relational continuity (Haggerty et al., 2003). These qualities are especially important in providing and coordinating care of patients with chronic conditions. Health care should match the needs of the system and provide available skills and necessary care in a situation where good quality should be delivered at the lowest possible cost (Hopkins et al., 1996). During the two last decades the work of different health care professionals has been shifting and the provision of DM2 care in different countries has moved from specialist care to primary care (Goyder et al., 1998; Wilkes and Lawton, 1980). Nowadays 70–90% of the care of DM2 patients is provided by FDs in different health care settings (Goyder et al., 1998; Khunti and Ganguli, 2000; Pierce et al., 2000). The same trend has taken place in Estonia where in the 1990s previous highly specialized primary medical care was changed into a primary care-oriented and family doctor-based system (Lember, 2002).

Long debate has been held about whether the diabetes care provided in primary care has the same quality as that in secondary care. Several studies have pointed out the superiority of diabetes care in primary care (Greenfield et al., 1995; Worrall et al., 1997b) while other studies have been in favour of specialist care (De Berardis et al., 2004; Zgibor et al., 2000). Their comparison has been based on the intermediate endpoints of process and on outcome measures. Often the performance of different activities can be better in specialist care but patient related outcome measures remain the same. In a recent cohort study where the outcome measure was all-cause mortality, the patients seen by the specialist were more likely to receive recommended treatment but survival remained lower compared to primary care (McAlister et al., 2007). This difference remained also significant after adjustment for age, medication, and comorbidities.

It is important that specialists and FDs have a common understanding of diabetes care. Therefore, the CPG developed in collaboration with different specialities share common ground for collaboration in different care settings while the objective for all providers is to manage diabetes patients according to the best available knowledge and possibilities.

Data from epidemiological studies continuously demonstrate the increased risk of cardiovascular mortality, myocardial infarction and stroke in presence of hyperglycaemia (Donnan et al., 2006; Lehto et al., 1996; Turner et al., 1998; Wei et al., 1998) and about 75% of those with type 2 diabetes die from macro-vascular complications (Haffner et al., 1998). The contribution of fasting and postprandial glycose to HbA1c is known (Monnier and Colette, 2006; Woerle et al., 2007). However, clinical trials have not yet proved that HbA1c lowering could significantly reduce the risk of heart attacks, strokes or mortality (Gerstein et al., 2008; UK Prospective Diabetes Study Group, 1998b). Glycaemic control among DM2 patients should be assessed together with blood pressure and dyslipidaemia which have a marked influence on the risk for cardiovascular complications and death as demonstrated in epidemiological studies (Adler et al., 2000; Turner et al., 1998; Wei et al., 1998). A significant reduction in the risk complications and death of DM 2 patients with treatment of blood pressure and dyslipidaemia has been proved in clinical trials (Gaede et al., 2008; Tatti et al., 1998; Turner et al., 1998). The gap between observed and recommended levels of HbA1c and blood pressure values is a reality in several countries (Berthold, 2008; Charpentier et al., 2003; Goudswaard et al., 2004; Saydah et al., 2004a). It seems that common knowledge of the benefits of good glycaemic control and reduction of cardiovascular risk factors, gained from clinical trials, can not be easily converted into routine practice (Spann et al., 2006).

There is little evidence about whether disease oriented intermediate end-points (i.e. surrogate or substitute outcome measures) like HbA1c, micro-albuminuria, and creatinin result in decrease of a patient-oriented outcome like morbidity or mortality. Intermediate endpoints do not describe direct clinical benefit to the patient, as patient-oriented outcome like morbidity and mortality do (Shaughnessy and Slawson, 2003). The UKPDS metformin and tight blood pressure control studies were the only trials where the patient-oriented outcome, i.e. reduction of the risk of the incidence of diabetic complications and mortality among DM2 patients was achieved (Adler et al., 2000; UK Prospective Diabetes Study Group, 1998a, b, c). Althouhg tight glycemic control reduces the need for photocoagulation it has no effect on vision loss (UK Prospective Diabetes Study Group, 1998b). However, proven association between an intermediate and a patient-oriented outcome is essential for drawing appropriate therapeutic conclusions (Donnan et al., 2006; Lehto et al., 1996; Turner et al., 1998; Wei et al., 1998). Evidence concerning the effect of an intervention on intermediate outcomes usually comes first, followed later by influence on patient-oriented outcome. This process may take years. Therefore, intermediate outcomes are widely used and valid (Donabedian, 2005).

In our study, quality of life was used as a patient-reported outcome and HbA1c, blood pressure, cholesterol and body mass index were used as proxy for clinical outcome. The targets and recommendations from the Estonian DM2 guidelines 2000 used in the current study are presented in Table 1.

Table 1. Extract from the recommendations of the Estonia type 2 diabetes guidelines 2000.

Schedule for clinical monitoring of type 2 diabetes patients	
Blood pressure	Every visit
Managing with diabetes	In every 3 months
Weight	In every 3 months
Glycosylated hemoglobin	In 3 every months
Serum creatinin	Annually
Urinary protein	Annually
Urinary albumin	Annually
Lipids	Annually
Eye exam	Annually
Foot exam	Annually
Checking symptoms/complications	Annually
Smoking habit	Annually

Targets of blood glucose, blood lipid, and blood pressure control in DM2 patients:		Oral glucose lowering drugs are suggested to start when:	
HbA1c	< 6.5%	HbA1c	> 6.5%
Blood pressure	140/85 mmHg	or	
Total cholesterol	< 4.8 mmol/l	Fasting venous plasma glucose	> 6.0 mmol/l

4.3.2. Clinical practice guidelines – a standard for patient care and quality

Clinical practice guidelines are systematically developed statements to assist the decisions of the practitioner and the patient about appropriate healthcare for specific clinical circumstances (Field, 1990). Developments and innovations in health care research promise more effective and safe patient care but major problems appear in implementing innovations into routine practice. It is expected that clinical practice guidelines improve quality of healthcare, reduce inappropriate variations between providers and predispose dissemination of the concept of evidence-based medicine in daily practice. Policymakers and stakeholders see guidelines as a tool for making healthcare more consistent and efficient. Thus, professional and policy interests in clinical guidelines are linked to three separate issues: first, the demand on professional quality in healthcare; second, rapidly expanding knowledge base that makes it difficult for clinicians to be acquainted with primary research; and third, use of limited resources more effectively (Marshall, 2003).

There is long tradition of CPG development in Europe, Australia and North America. During three decades the most advanced countries in Europe in this area have been Finland, The Netherlands, the United Kingdom, and Sweden

where hundreds of guidelines have been produced; principles of systematic development and updating process have been launched (Woolf et al., 1999).

CPG have numerous benefits to health care providers, to patients and to the health care system but awareness of their possible limitations should also be considered (Woolf et al., 1999). CPG are often regarded as an equivalent of quality in provided care but relatively less attention has been paid to development of quality indicators. Quality indicators can be developed by a group of experts relying on readily available information, and focusing on published evidence from randomised controlled trials (RCT). Most frequently, development of quality indicators has been based on the content of CPG (Marshall, 2003). Sill, there is a problem of absence of international agreement on what these quality indicators should be, and what is required to measure on the assessing provided DM2 care. In an analysis of 125 guidelines for DM2 from five European countries 35 different indicators were found in five diabetes management topics: control of glycaemia, early detection of glycaemic complications, treatment of glycaemic complications, cardiovascular diseases and quality of life (Wens et al., 2007). Comparison of the DM2 CPG of different countries revealed variation in recommendations but this was largely consistent with international consensus (Burgers et al., 2002).

4.3.3. Evidence of effectiveness of clinical practice guidelines and quality initiatives

There is no clear evidence that guidelines may change practice behaviour. Different studies have drawn contradictory conclusions about quality improvement as a result of guideline implementation. Usually, positive effects of guidelines intervention studies demonstrate an increase in the performance of different tasks but this does not transform into patient-oriented outcome (Campbell et al., 2005). According to one study, introduction of guidelines to primary care providers with an educational programme did not result in better performance or patient outcome (Perria et al., 2007). In another study, multifaceted implementation of locally adapted guidelines changed the process measures but did not result in better patient outcome in short term, nor did this change the cardiovascular risk of DM2 patients (van Bruggen et al., 2008). In a systematic review (Vinicor et al., 1987) assessing the effectiveness of CPG adoption on patient outcomes, only one RCT was carried out in primary care (Worrall et al., 1997a). Despite the statistically significant decrease of inter-mediate clinical outcomes – level of fasting blood glycose (FBG), HbA1c and blood pressure (BP) – their clinical significance remained unclear (Vinicor et al., 1987), especially as the timing of doctors' education coincided with patient intervention. The other 19 trials in the review assessed the effect of guidelines regarding different topics and different health care settings and specialities.

Different interventions have been promoted for quality improvement of diabetes care. As recommendations in CPG are often similar or coinciding with quality improvement interventions, it is difficult to evaluate them separately. None of the activities have had a clear advantage in improving diabetes care. Nevertheless, multifaceted professional interventions (Litzelman et al., 1993) and organizational interventions that facilitate a structured and regular review of patients (de Sonnaville et al., 1997) might be effective in improvement of DM2 patients' outcome and the process of care (Renders et al., 2001; Renders, 2003). Complex interventions involving patient education and enhancement of the role of the nurse showed the superiority of diabetes care over regular care.

Usually, interventions in a study setting do not last long and the time for the effect to appear is too short. The long tradition of the Swedish National Diabetes Register allows to assess management of the DM2 patients' risk factors according to the CPG. The data of 30, 000 patients have been followed for four years. Improvements in glycaemic and blood pressure control are evident. The mean of HbA1c value has not changed markedly (decrease from 7.5% to 7.3%). However, the proportion of patients having HbA1c≤7.5% has statistically significantly increased, from 66% to 71%, and the proportion of patients having blood pressure ≤140/85 mmHg has increased from 32% to 42% (Gudbjornsdottir et al., 2003). Generalization of the data is somewhat limited as only 15% of Swedish health care centres report to the registry. The results of an observational study from the USA, based on the follow-up of DM2 patients during 1990–2000, demonstrate that mean HbA1c level has not changed (decrease from 7.8% to 7.7%) but the proportion of patients having lower HbA1c values has increased (Saaddine et al., 2006). A similar tendency of the patients' shift towards lower values can be seen for total cholesterol and LDL-cholesterol. Neither the mean HbA1c value nor the proportions of patients with different blood pressure values changed during 10 years. These examples illustrate observational research where the effect can be seen but causality remains uncertain. Whether CPG have an effect on the above changes remains unclear. Yet through evaluation changes, it is easier to see the differences and long term effects of provided care in general. Also it is important to know intermediate outcomes to prognosticate their long term effects in the future.

4.3.4. Factors influencing physicians decisions to follow guidelines

After development of guidelines they are usually approved by a professional association or a credible body, after which they can be disseminated among practitioners. Possible barriers at the providers' level can be classified as follows: knowledge (lack of awareness or lack of familiarity), attitudes (lack of agreement, lack of self-efficacy, lack of outcome expectancy or the inertia of previous practice) and behaviour (external barriers) (Cabana et al., 1999).

Assuming that the process of CPG development, approval and dissemination has been performed with maximal effort to make CPG usable, the key points affecting implementation are the providers' knowledge, attitude and behaviour. They play a major role before guideline recommendations transform into daily practice and will work in favour of the patient or health care outcome (Davis and Taylor-Vaisey, 1997) (Figure 1). The other essential factors are external barriers which can modify attitude.
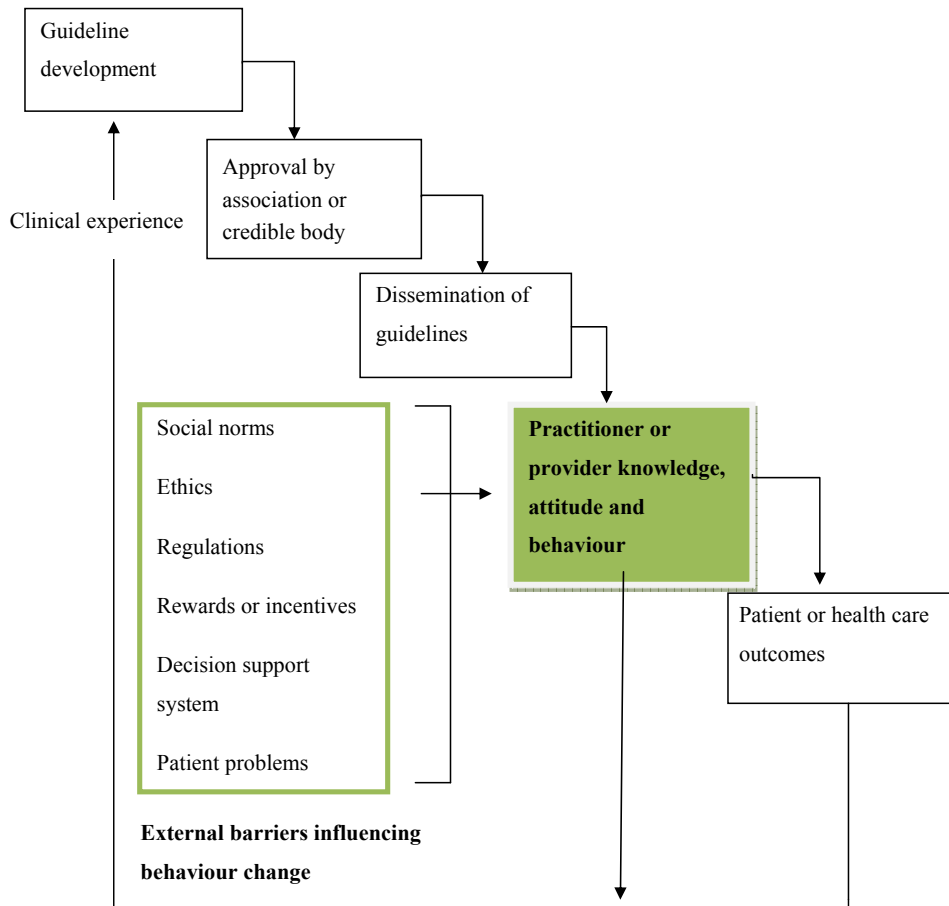

Figure 1. Framework of the process from guideline development to patient outcome (adapted from Davis and Taylor-Vaisey).

4.3.4.1. Physicians knowledge of guidelines

Knowledge of guidelines can be treated separately, considering specifically "awareness" and "familiarity". Awareness means the knowledge of existence of CPG, which does not yet guarantee being familiar with the context (Cabana et al., 1999; Davis and Taylor-Vaisey, 1997). In a review on barriers to doctors' adherence to practice guidelines, lack of awareness as a possible problem was assessed in 46 studies in primary care and specialist settings (Cabana et al., 1999). More than half the respondents of all studies had problems with awareness as well as with familiarity. Most of the studies were carried out in the USA and doctors from different settings were inquired. None of the studies within the review assessed doctors' knowledge of DM2 guidelines specifically. In other studies, awareness and familiarity have been very variable, from approval reported by the majority of Israeli FDs to significant ignorant attitude toward CPG in Germany. More than eighty percent of the Israeli FDs were aware of the DM2 CPG while one third of the US FDs were aware of three different CPG and 40% reported using CPG (Vinker et al., 2000; Wolff et al., 1998). Fifty-five percent of German doctors reported using the guidelines but one third had an ignorant attitude towards them (Butzlaff et al., 2006). In the above study the FDs and the specialists were inquired together and opinions were not gathered about particular guidelines but about guidelines generally. Familiarity with guidelines can be acquired through reading and studying the content. A Canadian study showed that the most common source of information was talking to colleagues or consultants, while guidelines as a source of information ranked 7th and 50% of the respondents never used them or used them at least once a year (Hayward et al., 1997). Are opinions of colleagues a reliable source of gaining new knowledge? Relying on the results of RCTs and meta-analyses would be more appropriate for making clinical decisions. However, Italian physicians have not integrated use of the data of RCTs and meta-analyses in their practice because of insufficient skills to read them, language barriers and absence of internet access, while interest in recent evidence was high (De Vito et al., 2009). As CPG are thought to summarize recent evidence making it readily available and compact, use of guidelines should be promoted among care providers.

Doctors' familiarity can be assessed by inquiring about the content of guidelines, using case vignettes or assessing performance directly in patient files. Assessment of guidelines usage with RCT is rather complicated, especially in the case of chronic diseases as guideline interventions are more complex and it is difficult to create experimental conditions. More attention has been paid to guideline development and implementation than to barriers involving the providers' own perspective (Rutten et al., 2009). According to the framework, before practice guidelines could have an effect on patient outcomes, it should first come across physician knowledge, then attitude and finally behaviour.

4.3.4.2. External barriers influencing provider behaviour in adherence to guidelines

Health care providers themselves are of the opinion that the process of implementation of diabetes guidelines is mainly addressed to contextual factors: what kind of social norms and patient problems there are; whether there exist regulations, incentives or decision-support systems (Larme and Pugh, 2001). It is obvious that physician perceptions cannot be assessed separately from such contextual factors as society, regulations and patient.

Physician personal characteristics as age, experience, and gender may influence their actual behaviour. Although the DM2 patients of female doctors tend to have more risk factors, more of their patients reach clinical target values and are prescribed hypertension treatment compared to male doctors (Berthold, 2008). Physicians with a practice length of 10 years or less who managed less patients were more likely to make practice choices for patients with hypertension in accordance with guidelines (Doroodchi et al., 2008). On the contrary, in another study older physicians were more competent to follow CPG recommendations but were less likely to recommend weight management compared to younger physicians (Christian et al., 2006). A UK study with an adequate sample size of DM2 patients assessed measures of the process of delivering diabetes care (Khunti et al., 2001). Lower compliance with provision of care was higher in practices with a large proportion of attending patients and in practices in deprived areas. FD perceptions of restrictions in provision of DM2 care were not assessed in the above study. It is not possible to change above barriers with any intervention. It is more reasonable to identify the factors restricting physician adherence to guidelines, which are modifiable.

A review by Cabana presents a framework of probable physician barriers to following of guidelines, which might not be generalisable but can provide an outline for future research (Cabana et al., 1999). In a review of studies 76, none of the surveys focused particularly on DM2 CPG. A comprehensive analysis of the use of multiple methods for detection of factors affecting quality of care of diabetes patients was carried out in the UK (Khunti, 1999). Thirty-seven percent of the factors were practice-related and the proportion of organisational factors was the same, while one quarter of the factors were patient related. As many of these issues are specific for a health care system, they should be studied in a particular context.

The body involved in guideline development has an important meaning in terms of adaptation of CPG. According to several authors, it is evident that guidelines developed within governmental or health insurance plans have been less trusted over time (Butzlaff et al., 2006; Hayward et al., 1997). Several systematic reviews have been performed to find out strategies which could be effective in changing health care professionals' behaviour towards better and evidence based practice (Bero et al., 1998; Davis and Taylor-Vaisey, 1997; Grimshaw et al., 2004; Grol and Grimshaw, 2003; O'Brien et al., 2007;

Weingarten et al., 2002). Analysis has shown that didactic teaching, classical lectures, traditional CME, mailings, and CPG have little or no effect on improvement of provided care. At the same time, educational outreach visits, reminder system and multiple interventions have shown the most consistent effectiveness in quality improvement.

As physician decisions about guidelines and quality regulations are of great importance in a chain from guideline development to patient outcome (Figure 1), this is an issue for further research. If clinicians already know the information contained in guidelines, specific barriers beyond the knowledge, which hinder behaviour change, should be taken into account. The aim of several studies has been to find out the awareness, knowledge and attitude of CPG on different diseases and prevention programmes, but only a few have focused on DM2 CPG. When assessing quality of care in reference to the guidelines, physician knowledge is one aspect to be evaluated. To initiate further quality improvement strategies, it is essential to know how doctors take care of DM2 patients, how knowledge transforms into patient care and what the potential external barriers are which hinder management of DM2 in primary care. Therefore, a study assessing the doctor knowledge of DM2 guidelines and external barriers to adopting them into practice was undertaken in Estonia.

5. AIMS OF THE STUDY

The aim of the present study was to assess type 2 diabetes care in family practice. The specific objectives of the study were:

1. To assess patient obstacles in adherence to type 2 diabetes management in Estonia and to compare them with corresponding findings in other European countries (Papers I, II)

2. To find out the factors associated with diabetes patients' quality of life – patient-reported outcome (Paper III).

3. To analyse how well the clinical outcomes of type 2 diabetes patients meet the requirements of clinical practice guidelines (Paper IV).

4. To assess the correspondence of family doctor knowledge and self-reported care of type 2 diabetes patients to the recommendations of clinical practice guidelines (Papers V, VI).

5. To find out the barriers contributing to the family doctor non-adherence to type 2 diabetes guidelines (Paper VII).

6. SUBJECTS AND METHODS

Three studies were conducted in order to assess DM2 care in family practice and the impact of health care and patient related factors on the meeting of clinical and patient-reported outcomes (Figure 2).

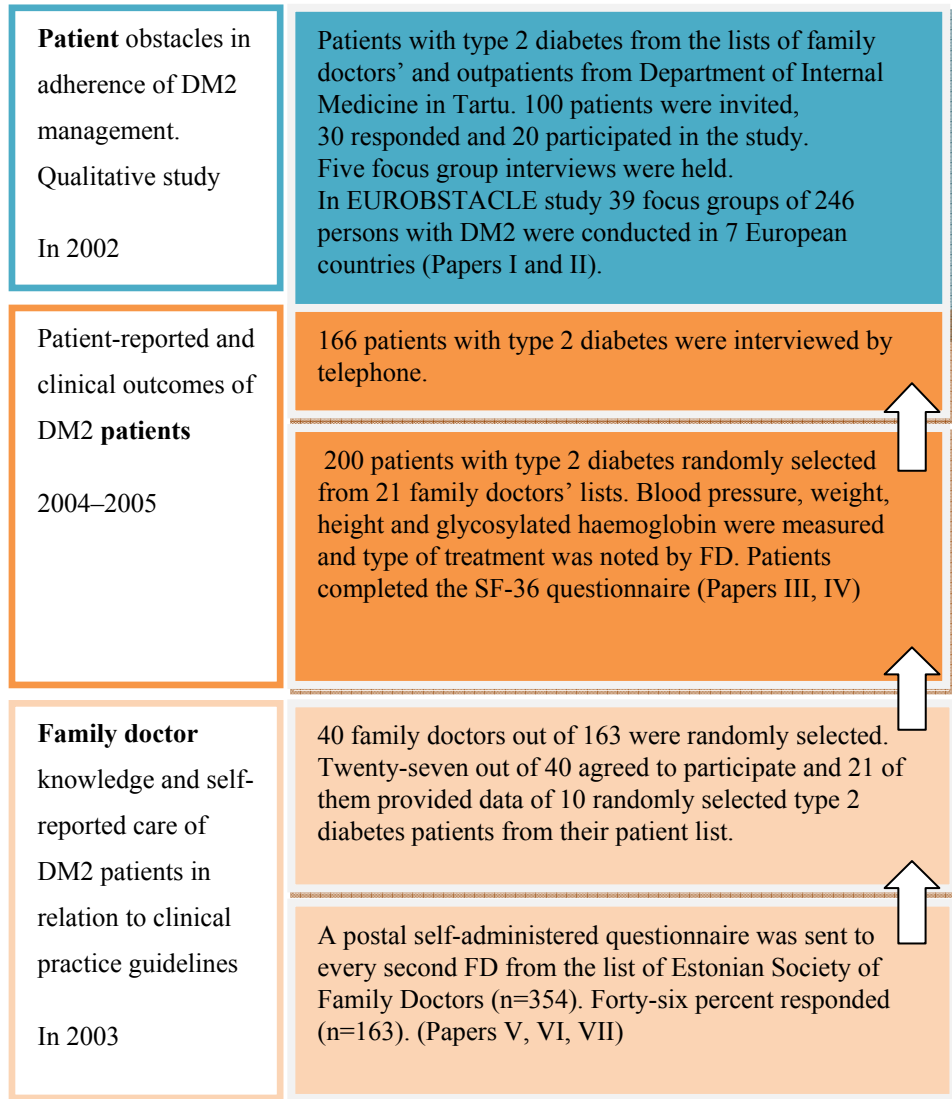|	
Patient obstacles in adherence of DM2 management. Qualitative study In 2002	Patients with type 2 diabetes from the lists of family doctors' and outpatients from Department of Internal Medicine in Tartu. 100 patients were invited, 30 responded and 20 participated in the study. Five focus group interviews were held. In EUROBSTACLE study 39 focus groups of 246 persons with DM2 were conducted in 7 European countries (Papers I and II).
Patient-reported and clinical outcomes of DM2 **patients** 2004–2005	166 patients with type 2 diabetes were interviewed by telephone.
	200 patients with type 2 diabetes randomly selected from 21 family doctors' lists. Blood pressure, weight, height and glycosylated haemoglobin were measured and type of treatment was noted by FD. Patients completed the SF-36 questionnaire (Papers III, IV)
Family doctor knowledge and self-reported care of DM2 patients in relation to clinical practice guidelines In 2003	40 family doctors out of 163 were randomly selected. Twenty-seven out of 40 agreed to participate and 21 of them provided data of 10 randomly selected type 2 diabetes patients from their patient list.
	A postal self-administered questionnaire was sent to every second FD from the list of Estonian Society of Family Doctors (n=354). Forty-six percent responded (n=163). (Papers V, VI, VII)

Figure 2. Main characteristics (subjects and methods) of the studies.

6.1. Assessment of patients in type 2 diabetes care

6.1.1. Patient obstacles in adherence to type 2 diabetes management (I, II)

To assess the DM2 patients' obstacles in adherence to type 2 diabetes management, a collaborative qualitative study (EUROBSTACLE) was carried out in six European countries (Croatia, Estonia, France, The Netherlands, Slovenia and the UK). The first qualitative study using focus groups was conducted in Flanders (Belgium) to find out the health beliefs of persons with type 2 diabetes in relation to their illness, their communication with caregivers, and the problems encountered in adhering to treatment regimens. Possible explanatory models of adherence were developed relating to knowledge of the illness, body awareness and doctor-patient relationship (E Vermeire, 2003). In order to find the differences and the similarities of obstacles to type 2 diabetes management, collaborative study in different European countries were conducted.

6.1.1.1. Study participants and data collection in the qualitative study

The same approach, qualitative study based on a grounded theory serving as methodology, and focus group interviews for data collection, was used in each country.

In Estonia DM2 patients were recruited from the family doctors' lists of Tartu and from among the patients of the Clinic of Internal Medicine of Tartu University Hospital. The inclusion criteria for the patients were: outpatient status, diagnosis of type 2 diabetes mellitus, any age, both genders and also all types of treatment. An invitation letter was sent to 100 patients of whom 30 responded and 21 agreed to be interviewed. The reasons for refusal of participation were problems with travelling due to old age or diabetes complications affecting movement. Of the recruited patients 18 were from family doctors practices and 3 were from specialist care. Five focus groups, formed of patients willing to participate, were conducted; each group was convened once. Nine patients of 21 were male, patients' mean age was 66 years (range 48–79) and their average diabetes duration was12 years (range 1–22).

Group interviews were carried out to obtain comprehensive answers using open questions. The task was common for all interviewees and group interaction allowed to gather more information than would have been possible by interviewing persons separately. Four to six persons participated in group discussions. Conducting the interview, the moderator acted in an encouraging way, supporting interaction between the participants, but remained non-directive while trying to collect as much data as possible. Discussions lasted one to one and half hours. The interviews were taperecorded and transcribed.

The questions discussed in the groups were:
1. How did you experience the diagnosis of diabetes? In what way did diabetes change your life?
2. Diabetes is a chronic illness treated by diet, lifestyle changes, oral medication or insulin. How did you experience the treatment?
3. Probably, your doctor chose the treatment regime for you. How do you feel about that?
4. Do you modify your treatment from time to time? How do you feel about this? Do you tell anyone about this decision?

Altogether 39 focus groups of 246 persons with type 2 diabetes were conducted in seven European countries and health beliefs and the problems encountered in adhering to treatment regimens were assessed.

6.1.1.2. Data analysis in the qualitative study

At the primary level of interpretation, data were analysed according to a grounded theory (Creswell, 1998; Glaser and Strauss, 1967). The aim was to inductively generate conceptual categories and interactions between emerging categories based on a single case or experience according to the research question. Thus data analysis was the circle of induction and deduction, where hypotheses emerging in the process of induction were tested by deductive reasoning. The prerequisite for inductive-deductive data handling was simultaneous running of the process of data collection, coding and analysis. The process of coding contained three steps: open coding, axial coding (inductive approach) and selective coding (deductive approach). These steps cannot be strictly separated as they represent different ways of interpreting the text. When performing open coding, constant comparison of words, phrases and sentences from the text, related to the research question was made. Thereafter codes were grouped into categories and emerging categories were collocated by the axial coding process followed by deductive connection with all related preliminary codes. The last step in selective coding, the most abstracted, revealed the main content of the study.

Analysis of the data of the EUROBSTACLE from all countries confirmed that a simple aggregation of data would be insufficient to embrace the depth and variety of findings. The objective was not simply to aggregate the findings in a summary list of themes emerging from primary analysis, but to seek deeper insight and to reach a conceptual development richer than individual studies. For this purpose, meta-ethnography was used (Noblit and Hare, 1988). This offered an opportunity to carry out a comparative analysis of qualitative findings from different settings and enabled the researchers to handle the data in a cumulative and synthetic way. The stepwise programme that guided the researcher to find similarities in a series of qualitative studies (reciprocal translation), to detect differences (refutation) or to reflect on totality (a problem,

an organisation or a culture), thus reaching a synthesis (lines of argument synthesis), was followed.

First-order interpretation, using a grounded theory (Creswell, 1998; Glaser and Strauss, 1967), to derive themes in the native language, was performed in each country and was related to the participants' everyday understanding represented by specific and representative text fragments. The themes derived from each study were entered into the table based on the key themes identified in the initial Flanders study (E Vermeire, 2003). In second-order interpretation this was discussed by the researchers taking account of the context of the first-order interpretation until agreement was reached on how far the concepts relating to the themes could, in fact, be translated from one study into another, and whether this led to richer explanations. This process required returning repeatedly to the original data from each country to either verify, contradict, or enrich interpretations: it was an axial process of coding and re-coding in the context of the different studies guided by the research questions. Third-order interpretation expressed the synthesis of previous interpretations using forms and metaphors.

6.1.2. Patient-reported and clinical outcomes of type 2 diabetes (III, IV)

6.1.2.1. Study participants

The study was conducted in 2004–2005. Out of 40 randomly selected FDs who were engaged in the study described in papers V, VI, VII, twenty-one provided a coded list of his or her patients with DM2, from which ten randomly selected patients were enrolled by the researchers. The main arguments that the FDs presented when motivating the refusal to participate in the study were lack of time, small number of patients with diabetes in their list and inability to draw up a list of diabetes patients due to paper-based patient records.

All patients with DM2 were considered eligible irrespective of age, duration of diabetes and treatment. After selection the FDs contacted the patients, and in case of agreement the patients were invited for a practice visit, or were visited at home, where they signed an informed consent. Two hundred patients completed the SF-36 questionnaire at the doctors' office and the clinical data of the patients were collected. After the patients' HbA1c results were obtained, two researchers conducted a telephone interview. Data from the telephone interview was obtained from 166 patients. Of the recruited 200 patients 34 were not interviewed due to contact failure, death or change of residence. The gender, place of residence, mean HbA1c and age of lost patients corresponded to the respective data of 166 patients who participated in the whole study. The data of the 17 patients who refused to participate in the study were not available.

The mean age of the respondents was 64.7 years (±11.1). Sixty-one percent of (n=200) the patients were women and the distribution of the patients according to the place of residence was equal. The mean duration of type 2 diabetes was 7.5 years (median 5 years). The average number of practice visits per year was 6 (95% CI 5 – 6).

6.1.2.2. Survey on quality of life

During the practice visit, the patients completed the short form 36 health survey (SF-36) (Hays and Morales, 2001; Ware, 1993) and gave the completed form to the doctor who returned it to the investigators. The SF-36 data were scored according to the methods suggested in the SF-36 Health Survey: Manual and Interpretation Guide (Ware, 1993). The eight domains used to assess patient health status in this analysis were: Physical Functioning, Role-Physical, Bodily Pain, General Health, Vitality, Role-Emotional, Social Functioning, and Mental Health. Raw scale scores were transformed to 0–100 scales, in which higher scores consistently represent better health status in all measured dimensions. The variables used in multivariate regression analysis were patient age, gender, smoking status, awareness of the disease, BMI, disease duration, treatment type, mean HbA1c, and blood pressure.

6.1.2.3. Telephone interview

The structured questionnaire used in the study had been compiled by our research team and piloted earlier. The items of the questionnaire were patient and disease characteristics as gender, age, place of residence and duration of diabetes. The patients were asked about how they followed the diet recommended for type 2 diabetes and took recommended medication, whether they had made changes in the recommended treatment regimen, whether they possessed a device for self-monitoring of blood glycose (SMBG) and performed blood glycose measurements and how they identified their smoking status. Some questions needed a yes/no response, for other 3–4 questions options for answers were provided. The number of visits to the FD office during the year was inquired as well. Those issues were used as a proxy for self management behaviour. The patients were asked about their HbA1c (or "average three-month glycose test") and those aware of the test were asked to recall its recent value. Patients were asked about their knowledge of the risk factors and complications of diabetes. The questions were very simple and had multiple choices, for example, "Do you know what kind of complications diabetes type 2 has?" If the patient had at least 75% of the answers right, he/she was coded as being "aware" of the nature of the disease.

6.1.2.4. Clinical data of patients with type 2 diabetes

The FDs took a blood sample from each patient to determine HbA1c, measured each patient's height, weight, and blood pressure, and listed each patient's medications for treating type 2 diabetes. The HbA1c and blood pressure were assessed against the criteria in the Estonian DM2 Management Guidelines (2000) which were adapted from the European Diabetes Policy Group 1999 (IDF, 1999), where the outcome measure of adequate glycaemic control for patients was HbA1c≤6.5% (IDF, 1999), total cholesterol as ≤4.8mmo/l, and well controlled blood pressure was defined as ≤140/85 mm/Hg. The above level of HbA1c was set as the target for adequate glycaemic control in statistical analysis. Subjects with BMI>25 kg/m^2 were considered overweight and subjects with BMI>27kg/m^2 were considered to have an additional risk factor for cardiovascular complications. As the group with BMI below 25 kg/m^2 was very small, BMI 27 kg/m^2 was used as a limit for grouping independent variable. All measurements of objective data were performed during the visit to the FD except for level of total cholesterol which we were unable to measure and used the patient self-reported value.

Multinomial regression analysis was performed to find out the factors associated with adequate glycaemic control (HbA1c≤6.5%).

6.1.3. Clinical outcome of patients with type 2 diabetes depending on family doctors characteristics and knowledge of guidelines

Patients' clinical outcomes were compared depending on whether his or her FD followed the recommendations in the diabetes CPG. The FDs characteristics are described in paper V. Patients' mean HbA1c was assessed considering whether the FDs had DM2 CPG at their disposal, whether they used it or not, and whether they started diabetes treatment with medication at the FBG level <7 mmol/l or ≥7 mmol/. Also comparison of patients' outcome was done according to the FD background characteristics: having graduated from the university with new curricula after 1990, having less or more than 2000 patients in their list, the practice nurse having participated or not in diabetes training courses in the past 3 years. The difference in the means of HbA1c, SBP and DBP between the groups was calculated.

6.2. Assessment of the family doctors' providing type 2 diabetes care

6.2.1. Study participants

A postal survey using a self-administered questionnaire was conducted in 2003. Every second doctor (n=354) from the list of the Estonian Society of Family Doctors received a questionnaire. A second mailing with a reminder letter and an additional questionnaire were sent to those who had not responded during three weeks after the initial mailing. Forty-three percent (n=163) of the FDs responded to the questionnaire. The questionnaire had been compiled by a research team and had been piloted before using it in the study.

Independent variables included year of graduation from the medical faculty of the university, year of specialisation as a family doctor, practice type and location, practice size and number of diabetes patients. Additionally, the FDs were asked if their nurse had received special training in diabetes care. To inquire about specialist accessibility, the FDs were asked about the possibility to consult an endocrinologist, the distance to the nearest endocrinologist and the opportunity to consult an endocrinologist by phone.

Practice type and previous speciality of FD as the background characteristic of the nonrespondents in our sample corresponded to those of the members of the Estonian Family Medicine Society but a difference was found in practice location. There were less FDs from rural than from urban areas among the respondents (19% vs. 37%).

The mean size of the patient list was 1830 ± 407 and the length of average ($\pm$ SD) working experience was 22 ± 7.0 years. Regarding their previous speciality, the majority of the respondents (67%) had been district doctors for adults, one fifth (22%) had been former paediatricians and 6% had been doctors of other specialities. Five percent of the respondents had become family doctors through residency training. Fifty-three percent of the doctors worked in solo practices and the rest worked in group practices.

6.2.2. Family doctor knowledge of type 2 diabetes guidelines (V, VI)

To the questions about the availability of the DM2 guidelines, their use in daily practice and estimated applicability a yes/no response was required.

The FDs were asked to report the level of blood glucose at which they usually started treatment with medications if lifestyle changes had been ineffective, and the level at which they were content with treatment outcome. In DM2 guidelines, HbAc1 is suggested for assessment of glucose control and equivalent target levels of fasting plasma glucose levels are provided. In the

current study fasting plasma glucose levels (FBG) were sought as being a more widely used indicator at that time.

In the next section the FDs were asked about the frequency of performing the following tests and examinations prescribed in the guidelines: asking about symptoms/complications, checking of the patients' coping with diabetes, smoking habit, blood pressure, weight/BMI, foot exam, eye exam, HbAc1, lipids (LDL, HDL, and TG), urinary protein, urinary albumin, serum creatinin. The response options were "once a month", "at least once in three months", "at least annually", "rarely", and "I do not consider it necessary".

Suggestions of the frequency of the tests and examinations in the Estonian diabetes type 2 guidelines are presented in Table 1. The score for adherence to the guidelines was calculated for each physician depending on how many guideline recommendations of the 12 tests and examinations were timely performed according to their self-assessment report.

6.2.3. Factors contributing to non-adherence to guidelines (VII)

In this part of the questionnaire the FDs were asked to assess whether they regarded the listed patient- and health care system- related factors as problems or not in management of patients with type 2 diabetes according to the guidelines (on the Likert scale ranging from 1 = this is never a problem to 4 = this is a problem very often). The patient-related factors were: patient's low awareness of diabetes and its complications, lack of motivation to change the lifestyle, lack of interest in own health, non-adherence to the therapeutic regimen, irregular medication use, and financial problems. Lack of evidential guidelines, lack of time, lack of practice financing, no special training for nurses, lack of feedback from specialists, lack of specialist support, and lack of educational materials for patients were the health care – related factors.

6.3. Statistics

All quantitative data were analysed using the statistical package SPSS (Statistical Package for the Social Science) 10.0 for Windows.

In the study on meeting targets in type 2 diabetes care and factors of adequate glycaemic control and quality of life, the standard t-test was used for comparison of differences in the means. The paired samples t-test and the Spearman correlation coefficient were employed to compare differences in self-reported and measured HbA1c. To evaluate the statistical significance of differences between the groups, the Chi-square test was used in all performed studies. For comparison, the patients were dichotomised into groups according to the diabetes control HbA1c values of ≤6.5% and >6.5%.

Multinomial logistic forward stepwise regression analysis was used to predict adequate glycaemic control on the basis of the variables that had proved significant in Chi-square analysis.

Associations between the patient characteristics and the self-reported quality of life of the patients were analysed using nonparametric tests (Mann-Whitney U test or Kruskal-Wallis test). Factors influencing the health of the patients with type 2 diabetes were analysed using logistic regression analysis.

In the study of patient- and health care system – related factors contributing to non-adherence to the guidelines a multivariate logistic regression model was used to predict whether the FDs' background factors or their self-reported knowledge of the factors originating from the guidelines determined their assessment of the listed patient- and health care-related issues as problematic.

6.4. Ethics

All study protocols were approved by the Ethics Review Committee on Human Research of the University of Tartu. Written informed consent was obtained from the patients for the interviews and for using their clinical data. No patients withdrew his or her informed consent during the study.

7. RESULTS

7.1. Patient obstacles in adherence to type 2 diabetes management (Papers I, II)

The major themes that the qualitative study of the patient perspective in adherence to diabetes treatment revealed were information and knowledge of DM2, adherence to treatment, relation to health care professionals and disease course (Table 2). Patients found that the information shared by doctors was insufficient and sometimes conflicting. When visiting different doctors they received different explanations for the disease, which they found confusing. Also patients had difficulties explaining changes in course of the disease. As they did not perceive any difference in whether they adhered to the treatment regimen or not, they indulged cheating. Also in social situations and in the company of family, it was overwhelming to follow a diet. Patients did not feel responsibility for the control of the disease, and as DM2 is a chronic lifelong condition, they found it difficult to be motivated in coping with the treatment regimen. Several patients initiated the issue of folk medicine for treatment of diabetes, sometimes with the hope to be cured. In doctor-patient relationship physicians tended to be critical, discouraging patients to ask questions. Sometimes patients felt that too few tests were proposed by doctors. Also physicians tended to be in a hurry, and there was lack of time for patients to ask more detailed questions, especially in case they had several complaints during consultation. Patient attitude to diabetes can be fatalistic, indifferent and, in comparison with attitude to other diseases, not so serious.

Analysis of 39 focus groups with 246 participants in seven European countries consisted in the development of second- and third-order interpretations from first-order interpretation. Key themes and second-order interpretations are presented in Paper II, Table 2. Course of diabetes, information, person and context, and relationship with the health-care provider were the common key themes of the obstacles that patients perceived in adherence to DM2 management in every country. The only exception was the theme body awareness which was revealed only from studies conducted in Belgium and the Netherlands. As people learn how their body reacts to the medication or different food, they develop their own ways to manage diabetes. This is patient initiative and it can change the relationship between patient and provider. In none of the use of folk medicine was noted, but was reported repeatedly by Estonian focus groups. Also patients in Estonia had difficulties expressing their emotions and feelings. So to the first question "How did you experience the diagnosis of diabetes?" mainly the symptoms or signs of the disease were described but not the emotional aspects that the diagnosis of diabetes might involve. As all EUROBSTACLE studies were similar to the

Table 2. First-order interpretation of the qualitative data of DM 2 diabetes patients

Theme	Subtheme	Typical quotation
Knowledge	Insufficient knowledge of the disease course, complications and treatment objectives	*"...I cannot do anything about the complications"* *"...the information is scarce, I have been obtaining it little by little"; "... doctors do not tell you anything, blood sugar is high and that's it".*
	Conflicting information from different sources	
Adherence to treatment	Patients' low responsibility	*"The illness is affected by the society..."* *"My problems are in the hands of God..."*
	Adherence or non-adherence is not perceptible	*"I do not pay that much attention to it (disease), I do not feel anything special."*
	Treatment is long lasting, difficult to cope	*"I do not keep the diet and eat whatever happens to be available"* *"Sometimes I do not take medication for weeks"*
	Folk medicine is important	
Relationship with health care professionals	Trustworthy	*"They (doctors) are quite understanding"*
	Fear	*"Is it really that bad, if the sugar goes over 10, I never have the guts to ask my doctor about that."*
	Criticism	*„ I am astonished why any investigations haven't been done, I am at certain age already. No one proposes, you just have to ask all the time.* *"I have so many diseases that it takes all 20 minutes to complain, no time is left for diabetes"*
Confronting the disease	Fatalistic	*"No one can live forever, it does not matter if you die of diabetes or of some other cause, you die anyway."*
	Diabetes is not as serious as other diseases	*"...prostate frustrates me much more,....one may come after operation with a bottle in one's pocket, maybe I cannot urinate at all..."*
	Confusing	*"Sometimes I am threatened that I need to start insulin injections. I used to take 5 tablets a day. I can't say I have deceived recently, but it is 11 [blood glucose level in mmol/l] again, with 5 tablets! "*

initial Flanders study (E Vermeire, 2003), a line of argument could then be developed, as third-order interpretation, based on second-order interpretation as the constituent part. The key themes resulting from third-order interpretation were: course of diabetes, information, person and context, body awareness and relationship with healthcare provider.

Obstacles to adherence are common for different countries and seem to be less related to the issues of the health-care system and more to patient knowledge of diabetes, beliefs, attitudes and relationship with healthcare professionals. The results of the Estonian focus group analysis are comparable to general third-order interpretation (Table 3).

Table 3. Themes of second-order interpretation in Estonia in comparison with synthesis, including the key themes and the third-order interpretation of data from seven countries

Key concepts EUROBSTACLE	Second-order interpretation ESTONIA	Third-order interpretation EUROBSTACLE
Course of diabetes	It is not a life threatening disease	Diabetes is a „problem" until there are complications, then becoming a "disease"
Information	It is better not to talk about diabetes. Those who are indifferent or even neglectful perhaps need more information than others	Non-adherence is to a large extent determined by lack or un-transparent information
Person and context	Health beliefs and feelings are usually not expressed	Coping with diabetes depends on social support, personal attitude towards a healthy life-style and health beliefs
Health care provider	It is the physician's role to decide about treatment. Not enough technical investigations, more referrals desired. Limited consultation time	Does not assess health beliefs, does not tailor recommended treatment
Body awareness	It was not a theme in Estonian data analysis	Imperceptible treatment effects. Self- regulation is keeping in touch with the body, to see how it functions with or without the recommended treatment regimen

7.2. Patient-reported and clinical outcomes of type 2 diabetes (Papers III, IV)

7.2.1. Quality of life of type 2 diabetes patients

According to scores for quality of life of DM2 patients, only emotional wellbeing and social functioning had somewhat higher scores while general health and role-physical had the lowest scores (Paper III, Table 1). Patients who were aware of DM2 disease and its complications scored constantly lower on all SF-36 scales compared with those who were not aware of these issues (Paper III, Table 2). Older people had lower scores on all scales except for emotional wellbeing, which was comparable in all age groups. Scores for physical and emotional functioning were lower for women than for men.

Predictors of quality of life
    Twenty-four percent of the patients with DM2 were aware of the disease and its complications. If the variables used in multivariate regression analysis were patient age, gender, smoking status, awareness of the disease, BMI, disease duration, treatment type, mean HbA1c, blood pressure, it appeared that quality of life was most significantly affected by the extent of the patient awareness of the complications and risk factors of diabetes, as well as by age, BMI, and also duration of the disease (Paper III, Table 3). Better awareness decreased assessments in all eight scores of quality of life. Older age was associated with more negative assessments in physical functioning, role-physical, role-emotional, social functioning and pain scores. Also higher BMI, and longer duration of diabetes all decreased the quality of life scores.

7.2.2. Clinical outcomes of type 2 diabetes care

Thirty-nine percent of the patients met the target 6.5% of the HbA1c test set in DM2 guidelines (Paper IV, Figure 1) and in half of them it was below 7%. Among the other targets of DM2 guidelines, systolic blood pressure was in a normal range in every third patient and diastolic blood pressure was normal for half the patients. Self-reported cholesterol level was below 4.8 mmol/l in 4% of the patients whereas 25% percent (n=42) were able to report the recent value of the test. The mean of cholesterol test was 5.95 mmol/l (SD±1.4). Six percent of the patients had normal weight defined as BMI 25 kg/m^2 and ninety-nine percent of the patients had BMI over 27 kg/m^2.

Table 4. Data of the Estonian patients with DM2 meeting the clinical targets recommended in guidelines in comparison with data from the other countries.

Country	Mean HbA1c%	Proportion of patients meeting target of HbA1	Mean SBP/DBP mmHg	Proportion of patients meeting targets	
				SBP or SBP/DBP (mmHg)	DBP (mmHg)
Estonia [Rätsep 2008]	7.5	<6.5–39% < 7–50%	149/86	SBP<140 37%	DBP < 85 51%
UK [(Bebb, 2005)]	7.5	<7.5–49%	146/80	NA	NA
USA [(Spann et al., 2006)]	7.6	<7–41%	NA	<135/85 35 %	NA
The Netherlands [(Goudswaard et al., 2004)]	7.1	<6.5–58%	148/84	NA	NA
Germany [(Berthold, 2008)]	7.3	<6.5–26% <7–45%	143/83	SBP<140 37%	DBP < 90 68%
France [(Charpentier et al., 2003)]	7.6	<7–27%	140/80	<140/80 29%	NA
Italy [(Comaschi et al., 2005)]	7.6	<7–24%	140/82	SBP <130 26%	DBP <85 33%
Australia [(MacIsaac et al., 2008)]	7.3	<6.5–50% <7–33%	NA	NA	NA

NA – not available

7.2.3. Factors contributing to adequate glycaemic control

Fifty-two percent of the interviewed patients (87/166) were aware of the HbA1c test and 36% (31/87) knew a recent value of the test. The mean of the self-reported HbA1c value (7.6% SD±2.5) and the mean of the measured value (7.5% SD±1.8) yielded good correlation (Spearman correlation coefficient 0.73 p=0.001). A SMBG device was used by a quarter of the patients (24%). According to multinomial regression analysis the factors significantly associated with adequate HbA1c (HbA1c≤6.5%) were not having a self-monitoring device, patient awareness of HbA1c test and duration of diabetes less than 5 years (Paper IV, Table 3). Whether the patient was able to recall a recent value of HbA1 was not an important factor in this model. With the exception of SMBG, the other patient-reported self-management activities as following the diet recommended for diabetes, taking medications as suggested, making changes to the treatment regimen, frequency of practice visits during the past year and smoking status were not related to adequate glycaemic control. The odds to have inadequate glycaemic control (HbA1c>6.5%) was higher for patients treated with additional insulin compared to patients receiving nonpharmacological treatment or patients taking only oral medication, however, this association lost its significance in the regression model (Table 5).

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Table 5. Type of diabetes treatment predicting inadequate glycaemic control (HbA1c>6.5%) in binary regression analysis

Treatment type of patients with DM2	B – coefficient	OR (95% CI)
Nonpharmacological treatment	Reference	
Oral medication	1.04	2.8 (1.2–6.7)
Oral medication and insulin	1.76	5.8 (1.8–18.4)

7.2.4. Clinical outcomes of patients depending on family doctor knowledge of guidelines

Whether the FDs had guidelines at their disposal, or whether they reported using them or not did not influence mean HbA1c, SBP or DBP for different groups. Neither the time of the FDs graduation from the university, number of patients in their list nor the decision to start pharmacological treatment at higher values of FBG differentiated the mean values of patients' HbA1c, SBP and DBP for different groups.

7.3. Family doctors providing type 2 diabetes care (Papers V, VI, VII)

Seventy-six percent of the respondents stated that guidelines were available while 24% reported that they were not. Eighty-three percent of the doctors considered guidelines applicable and 79% reported using them in daily practice. The availability and use of guidelines were not related to working area, practice type and size, previous status before specialization as an FD, waiting time or distance to an endocrinologist.

7.3.1. Correspondence of family doctor knowledge and self-reported care of type 2 diabetes patients to clinical practice guidelines

On average, the FDs tended to start treatment with medication at higher FBG levels than the levels recommended in guidelines (Paper V, Table 2 and Figure 1). The mean level of FBG at which the FDs decided to start treatment was 7.2 (SD±1.3) mmol/l, ranging from 5.5 to 15.0 mmol/l, while the relevant level in guidelines was 6.0 mmo/l. Most of the FDs indicated a higher value for a decision about pharmacological treatment than that recommended in CPG. Five percent of the FDs made a treatment decision in accordance with DM2 CPG.

Out of the 12 tests and examinations included in DM2 guidelines which should be performed during a year the FDs' the self-reported performance

varied from overuse to underuse (Paper VI, Figures 2 and 3). According to the FD statements on laboratory tests, lipids, urinary protein and albumin were measured more often than recommended and HbA1c was measured less often than recommended in CPG. Blood pressure measurement at every visit (99%), referral to annual eye exam (72%) and checking patients' coping with diabetes (69%) were the patient examinations that showed the best concordance with DM2 CPG. Patient weight management was most often postponed (54%) by the FDs (Paper VI, Table 1).

According to the score of adherence, none of the FDs performed all required tests and examinations on time. At least half the tests and examinations listed in guidelines were performed on time by 52% of the FDs. The respondents' behaviour in performing the tests and examinations did not depend on whether guidelines were available to them, or whether they had used them. Nor was there any difference in the FD behaviour regarding reported adherence to guidelines in terms of background characteristics and specialist accessibility.

7.3.2. Factors contributing to non-adherence to type 2 diabetes clinical practice guidelines

The patient related factors that the FDs regarded as obstacles to complying with the recommendations of the CPG were low awareness of diabetes and its complications (70%), lack of motivation to change the lifestyle (70%) and non-adherence to the medical regimen (52%).

Regarding the health care system-related factors, about half the respondents (55%) thought that lack of special educational material for patients as well as lack of special education for nurses (40%) were the most important problems in management of DM2 patients according to guidelines. Patient-related issues as being a problem "often" or "very often" were reported in 96% of the cases and health care system-related factors were reported in 79% of the cases ($p <$ 0.0001).

The results from the multivariate logistic regression model revealing the associations of the FDs' background data and some items related to the knowledge of DM2 CPG with their assessment of problems in providing diabetes care are presented in Paper VII, Table 2. The FDs with a higher number of diabetes patients in their list (OR 1.02; 95% CI 1.01–1.04) were more likely of the opinion that patient awareness of diabetes and its complications is problematic, while the FDs tending to start treatment with medication at higher levels of FBG (OR 0.17; 95% CI 0.04–0.73) were less likely of the opinion that patient awareness is problematic. Insufficient special training of nurses (OR 5.30; 95% CI 1.66–16.92) and lack of feedback from specialists (OR 2.86; 95% CI 1.16–7.03) were mostly problems for FDs who had previously worked as district doctors for adults.

8. DISCUSSION

This is the first study in Estonia where type 2 diabetes care was assessed in family practice from the perspective of patients and doctors. The results demonstrate that patients were confronted with several modifiable and non-modifiable issues when coping with diabetes treatment. Patient clinical outcomes and quality of life remained below the expected results. FD self-reported care of patients with DM2 showed considerable variability in comparison to the CPG standard and did not depend on availability of CPG.

Patient perspective of obstacles in adherence to type 2 diabetes treatment and outcomes of diabetes care.

The major themes that emerged from the qualitative analysis of DM2 patient obstacles to adherence to DM2 treatment were course of diabetes, information, person and context, relationship with health-care provider and body awareness. As the majority of the patients were from primary care the issues related to health care professionals mainly reflect collaboration with FD.

Focus group discussion can be used to understand people's beliefs, opinions and attitudes, especially to find out how understanding can vary in the process of interaction with other people regarding a topic of interest while questionnaires or individual interviews would not reach the in-depth of the investigated issue (Pope and Mays, 1995).

As our data of qualitative analysis show, the perception of insufficient knowledge of DM2 patients was obvious. Even more worrying is the situation with patients whose insufficient knowledge was seen as being due to wrong beliefs and attitudes, as was the case with the theme "confronting the disease" in the Estonian study and with the theme "course of diabetes" in EUROBSTACLE. Patients themselves were unaware of their inconsistent knowledge. Our study does not allow to specify the amount of information delivered to the patients but it is clearly not sufficient, as was also reported by the patients. Knowledge is the core factor that the patient can use building self-efficacy, belief in his or her ability and capacity to manage diabetes (Williams and Bond, 2002). Without sufficient knowledge it is difficult for patients to consider the value of outcome expectancy and the benefits of their participation in diabetes management.

Beliefs of personal efficacy play a central role in personal change. Patient opinions show that they often do not believe they can produce desired effects with their actions. Whatever other factors may serve as guides and motivators, they are rooted in the core belief that one has the power to produce desired changes by one's actions. As it emerged from our data, patients preferably referred their disease related responsibility to someone or something else: the god, fate, doctors or folk medicine.

Another important aspect is how patients perceive potential facilitators that help cope with diabetes is described under the theme "person and context". In

our study patients' expectations about social support were not met either in relation to health care professionals or to important others as family, social and work context. The theme "health care provider" reflects how professionals can be supportive and trustworthy but also criticising, judging, losing interest, or not having enough time. Doctors have little understanding or acceptance of the difficulties that patients experience with diabetes. This produces a sense of frustration and patients feel left on their own. However, a study of Estonian FDs' consultation style showed that FDs supported patients with psychological problems even more than patients expected (Tahepold et al., 2003). Some studies have shown that psychosocial interventions promoting patients' self-efficacy have a positive effect on patients' outcomes (Williams and Bond, 2002) but their long term effectiveness has not been proved; there are only a few such studies and their samples are relatively small and unrepresentative (Adili, 2006). However, patient-provider relationship and patient-centeredness can have an impact on disease outcomes. From FD perspective patients should be understood holistically: their physical, emotional, and social concerns, and the realities of the world in which they live (Ferrer et al., 2005). Physicians' comprehensive "whole-person" knowledge of patients and patients' trust in their physician show association with outcomes of care (Safran et al., 1998). For start, simply asking patients how they feel about their illness, how it affects their lives, not only focusing on the disease, results in increased trust and adherence (Fiscella et al., 2004). Lack of provider's proper preparation for person's facilitation to better collaboration, i.e. person's considerable potential to contribute to own health, by adapting professional advice optimally to their life circumstances, is underutilised.

To generate particular attitude and behaviour changes related to certain decisions about health, one should have enough information of the issue to weigh outcome expectations against costs and benefits for different health habits. If health goals have been set by people, also perceived facilitators should outweigh the impediments to gaining the desired goal.

The obstacles that emerged in the core meanings in Estonian patient interviews coincide with the corresponding patients' perceptions in seven other European countries despite the fact that their health care systems vary substantially. The major issues that were shared between the themes were information about the disease, course of diabetes and relationship with health care provider. Estonian interviews did not reveal the aspects of body awareness, i.e. patients' use of self-realization to make decisions about treatment. Nor were the patients able to express their emotions and feelings, which might be related to the relatively introvert nature of Estonian people. The differentiating feature of our patients was wide use of various folk medicine drugs for treatment of diabetes. This might involve the issue of responsibility but might also demonstrate mistrust in traditional medicine or fear for potential harm.

Quality of life – patient-reported outcome

Our qualitative study revealed inadequacy of awareness and knowledge, as well as the problems confronted by patients regarding diabetes. How DM2 patients evaluated their quality of life was not known earlier in Estonia. The mean scores of SF-36 in different domains demonstrated lower values when compared with corresponding values for Estonian population (Lai et al., 2001). Assessment of the patient–reported outcome of type 2 diabetes patients using the SF-36 questionnaire revealed association of patient awareness of the disease with different scales of quality of life. Although only one quarter of the patients were aware of diabetes and its complications, it had a remarkable influence on their assessment of quality of life: better awareness of DM2 and its complications associated with the risk to have lower evaluations for all variables of quality of life. Our results contradict with those from studies on the psychosocial aspects of diabetes where it was found that patients with extensive knowledge and better understanding of their disease evaluate their quality of life higher (Anderson et al., 2000; Watkins et al., 2000). However, results similar to those of our study were reported for patients with hypertension (Li et al., 2005). The association that better awareness of the disease leads to lower evaluations in quality of life might have deeper reasons. Patients who receive information about the disease from different sources might lack the skills to cope with it. Also medical professionals merely share information with patients but are not ready to deliver self-management skills leading to patient self-efficacy.

Our results demonstrate that obesity affected negatively assessments of physical functioning, role functioning physical and role functioning emotional aspects. Obesity as a predictor of negative assessments of quality of life was found in several other studies (Redekop et al., 2002; Rejeski et al., 2006). Interventions improving weight have a positive effect on patients' physical health, which might improve their emotional and social wellbeing as well (Dixon and O'Brien, 2002; Zhang et al., 2007). Thus weight management should be an important part of a treatment programme. This is a modifiable risk factor, which does not only have an effect on clinical outcomes and the disease course but influences also significantly quality of life. However, as seen in our FDs study, weight assessment was the issue which FDs observed the least according to guidelines.

Clinical outcomes

Less than half the patients reached the recommended target of HbA1c<6.5%. The results are far different from those recommended in CPG but are in line with several other studies from different countries providing data of diabetes care in regular primary and specialist care settings (Charpentier et al., 2003; Comaschi et al., 2005; Goudswaard et al., 2004; Maney et al., 2007; MacIsaac et al, 2008; Saydah et al., 2004b; Spann et al., 2006). The most problematic issue in our study was cholesterol control although it was the test that the FDs reported doing even more often than needed. It seems that after the test was

done, specific actions to modify risk factors were not undertaken. Thus it is evident that the clinical outcomes important for reduction of diabetes complications are treated unequally.

The HbA1c and blood pressure values were objective clinical data collected in a family practice centre while the result of the cholesterol test was self-reported by the patients. The self-reported HbA1c value and the measured value were in good correlation, and patients who were aware of the values knew them correctly.

Quite often doctors receive messages to focus on HbA1c, in an attempt to reduce the populations' HbA1c even lower, sometimes distracting attention from other factors (O'Connor, 2003). The American Diabetes Association DM2 guidelines recommend <7% as the target for HbA1c while in European guidelines the recommended HbA1c value is below 6.5%. Re-evaluation of suggestions of DM2 guidelines has been undertaken in the light of recent evidence that more aggressive approach to DM2 therapy could lead to better outcome in terms of reduced mortality, while in other cases intensive therapy has demonstrated no reduction in macrovascular complications (Duckworth et al., 2009; Patel et al., 2008) or has even increased mortality (Gerstein et al., 2008; McAlister et al., 2007). At the same time, the recent Steno 2 study emphasizes the importance of intensified, target-driven therapy involving combination therapy of all risk factors with behaviour modification, which can reduce cardiovascular complications and mortality, which proves the need for complexity of treatment (Gaede et al., 2008). Glycaemic control is an important component of diabetes care but it needs individualised targets; also in clinical practice it should not be a drawn out of the context of DM2 care and cardiovascular risk factor modification.

The majority of FDs in our study perceived patient factors as a barrier in following guideline recommendations, which is in line with the opinions of doctors from other studies (Doroodchi et al., 2008; Wens et al., 2005). Moreover, FDs feel frustrated not achieving the targets set in guidelines while continuously being faced with patients' non adherence to DM2 management (Larme and Pugh, 2001; Wens et al., 2005). In the present study, out of the numerous patient and disease related factors, chance to have better glycaemic control was higher for patients who were aware of the HbA1c test and had disease duration less than 5 years. Half the DM2 patients in our study were aware of the HbA1c test; more than one third knew the exact value of their HbA1c. This result is somewhat better compared to findings from other studies conducted among DM2 patients where they were often not able to recall their test result or remembered it incorrectly (Harwell et al., 2002; Heisler et al., 2005). In our study hyperglycaemia was not associated with patient self-management behaviour. Nor did we identify any factors predicting better patient knowledge. The same tendency is seen in studies where patients who know their HbA1c value have been found to understand diabetes care better, but this does not result in better self-management behaviour (Harwell et al., 2002;

Wasserman et al., 2001). Yet it is known that more frequent measurement and immediate feedback could result in better glycaemic control (Cagliero et al., 1999; Larsen et al., 1990). In those studies the patient knowledge of HbA1c was not assessed. It is probable that by doing more tests and providing feedback, doctors make more adjustments in the treatment regimen. There might be more issues influencing patient knowledge. It seems that it is reasonable to pay attention to the HbA1c test, to measure it with appropriate frequency, to discuss the results with the patient and to make appropriate adjustments in therapy in collaboration with the patient; however, one test should not be drawn out of the whole context of therapy. Blood pressure, lipid control and weight control are of equal clinical importance and are more familiar to patients.

The results of DM2 patient outcomes could be generalised for DM2 management in Estonian family medicine as both the doctors and the patients were selected through randomisation. To collect the data of DM2 patients in Estonia is possible only by contacting their FDs as there is no diabetes register. Patient involvement requires obtaining of informed consent prior to data collection.

FD knowledge of CPG and self-reported care of type 2 diabetes patients

Assessment of knowledge and attitude with cross-sectional methodology is widely used as RCT is rather difficult to perform in this area. It is particularly complicated to carry out a study in the case of chronic diseases because guideline interventions are highly complex and it is difficult to create experimental conditions.

Concordance of patients' clinical outcomes with the goals set in guidelines was not achieved although they are comparable to outcomes reported from other countries. The availability of DM2 guidelines for Estonian FDs was very high. More than three quarters of the FDs have DM2 CPG at their disposal and most of them use guidelines in daily practice; however, actual familiarity with the content of the guidelines was very variable. It is less clear whether improvement of doctors' knowledge of the content of guidelines would result in better patient outcomes. In different countries and in different health care settings the awareness of guidelines varies to a great extent. While most FDs of Israel and the United Kingdom found DM2 guidelines helpful, in the USA and Canada only about one fourth of FDs have GPG at their disposal and even fewer reported using them (Hayward et al., 1997; Khunti et al., 2000; Vinker et al., 2000; Wolfe et al., 2004). The vast majority of the few US physicians who were aware of CPG stated that they had changed their practice owing to guidelines. In a recent study from Germany doctors showed little enthusiasm to guidelines: half the doctors reported using guidelines but as many as one third of them reported their ignorance of CPG preferring to treat patients using the knowledge of individual needs and patient's possibilities instead (Butzlaff et al., 2006). In different countries hundreds of guidelines are available for doctors while the US and Canada Medical Associations occupy the leading position with 1200–1500

CPG. In Estonia, there are currently about 30 official guidelines available. It seems that the more guidelines are available, the less doctors are aware of their existence and even less are familiar with their content.

Despite the high availability and reported use of CPG, the variability of FD self-reported activities related to DM2 guidelines was relatively high. In most cases diabetes treatment was started at higher levels of FBG than those recommended in guidelines and the suggested tests and examinations were misused. This result is similar to that from another study evaluating glycaemic control (Belfiglio et al., 2001). Still, doctors' opinion plays a role in influencing behaviour as shown in a long-term follow-up study where physician's belief in more aggressive management strategies can result in better clinical outcomes (Franciosi et al., 2005).

We found that awareness of guidelines did not differ according to age, practice type or physician characteristics. Thus there did not emerge any specific groups which might need more attention in guideline adaptation. Some studies have shown that younger doctors evaluate guidelines more highly (Doroodchi et al., 2008; Wolff et al., 1998) and larger practices were more likely to have CPG (Khunti et al., 2000). It has been reported in many studies that the attitudes of FDs toward CPG depend on a variety of circumstances, including cultural and legal factors. Lack of compliance with guidelines may indicate deficiency in physician knowledge, implementation problems, specific attributes of guidelines, lack of belief in guidelines, or problems with patient compliance (Grol et al., 1998; Lawler and Viviani, 1997). FD knowledge of CPG and patients' poor compliance as perceived by doctors were in concordance with the corresponding findings of our study. However, if doctors use peers' opinion for decision making and there is no time or skills to read and analyse the literature to make evidence based decisions, CPG remain a more reliable source of updating knowledge (De Vito et al., 2009; Hayward et al., 1997). CPG are a source for evidence based knowledge, usually presenting standard of care, and they should be incorporated in quality development system in health care. On the other hand, using CPG as a quality measurement tool, one should bear in mind that there exists no perfect or standard patient (Boyd et al., 2005). Within a primary care setting, in particular, patients influence clinical agendas through participatory decision-making; patient preferences are as worthy of consideration as clinical ones and vital to explaining outcomes. Thus the main principle should be that CPG complement rather than substitute for physician judgment.

Barriers in adherence to CPG

Assessing the barriers that the FDs perceived when using CPG in the current study, the majority of problems were associated with patient related issues as low awareness of diabetes and its complications, lack of motivation to change lifestyle and non-adherence to the medical regimen. These findings were in line with studies from the UK and Belgium (Agarwal et al., 2002; Brown et al.,

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2002; Wens et al., 2005). As patients' insufficient knowledge and responsibility were also revealed from the study of patient focus groups, it is evident that doctors' assumptions about patient problems corresponded to those that patients face in living with diabetes. The FDs knew their patients well and it might be that meeting patients who are ignorant, uninterested in disease management and have low responsibility makes doctors to show less initiative on their part. Yet it has continuously been demonstrated that patient – FD relationship aspects foster self-efficacy, empowerment and adherence of patients in a family practice setting (Ciechanowski et al., 2001; Maddigan et al., 2005). With better communication and feedback from healthcare providers, individuals may feel better equipped to manage their diabetes, be more motivated to follow recommendations when their input is considered and have clearer management goals. Open communication between patients and providers may offer greater opportunity for recognition of barriers to behaviour change and the opportunity to work together to address those barriers. In the current study the FDs who started treatment at higher levels of FBG were less often of the opinion that patients have low awareness and low motivation compared to those who started treatment earlier. This may demonstrate FDs' unwillingness to see patient problems more deeply. Doctors who see patient's motivation problems in changing lifestyle, undertake the initiative to start pharmacological treatment at lower levels of FBG. Both patients and providers must be active participants in implementation of quality diabetes management, which means that patients are in charge of managing their diabetes, but clinicians are important advisors who inquire about patients' problems and provide assistance and support. Thus, providers have an important role that is best accomplished in a patient-provider or patient-health team partnership. FDs need education on developing skills of how to become a facilitator and not burn out under the frustration of unmet goals (Funnell and Anderson, 2004; Heisler and Resnicow, 2008).

Assessing the barriers of doctors' adherence to CPG, the health care system-related problems that the Estonian FDs pointed out were lack of educational materials for diabetes patients. Patient educational materials have been used for a long time in other countries but have not been available in Estonian (Funnell, 2009). Hence lack of educational material has not been presented as barrier elsewhere while the need for educated nurses and lack of finances seems to be a wider problem (Larme and Pugh, 2001; Puder and Keller, 2003).

Our findings illustrate the dynamic interplay of patient, physician and systemic factors in management of patients with DM2; therefore, the whole patient care should be extended to multiple clinical domains providing continuous and coordinated care. In fact, no method is probably superior in improving quality of diabetes care but, considering the evidence of specific problems and barriers in particular settings, actions for improvement can be planned (Smith, 2000). It is hoped that the data of the current study can be employed for further developments in DM2 management in family practice.

9. CONCLUSIONS

1. The major themes that persons with DM2 perceived in managing their disease were imperceptible course of diabetes; nontransparent or insufficient information; person and context, i.e. coping with the disease in different situations of life; and relationship with healthcare provider. In most cases the opinions of DM2 patients were similar in all EUROBSTACLE studies; however, the opinions of Estonian DM2 patients differed in the use of folk medicine and did not bring out the theme "body awareness".

2. Mean scores of emotional wellbeing and social functioning of patients with type 2 diabetes were somewhat higher while general health and role-physical showed the lowest scores. Better awareness of diabetes, older age and obesity and were negatively associated with scales of quality of life. Better awareness of diabetes was the factor negatively associated with all eight scales of quality of life. Obesity is a risk factor which could be modified to improve patients' wellbeing.

3. Type 2 diabetes patients' clinical outcomes did not meet the requirements set in guidelines but were comparable with the results of DM2 patients' management worldwide. More than third (39%) of the patients had HbA1c below 6.5% – the target recommended in CPG. Thirty-seven percent of the patients reached the target of systolic blood pressure 140 mmHg and diastolic blood pressure was in accordance with the values set in guidelines in half the patients. Blood cholesterol and weight remained the least followed risk factors of DM2 patients. Diabetes glycaemic control (HbA1c below 6.5%) was better in patients who were aware of the HbA1c test whereas diabetes duration more than 5 years had a negative impact on glycaemic control.

4. DM2 clinical practice guidelines were available and used in daily practice by most FDs. However, the correspondence of self-reported behaviour to the guidelines was extremely variable. More than half the FDs decided to start pharmacological treatment later than suggested in guidelines. In the follow-up of diabetes patients, most FDs did the cholesterol test and urinalysis more often than recommended in guidelines. At the same time, an important indicator of glycaemic control, HbA1c, was checked too seldom.

5. Measuring the issues restricting the FDs' adherence to guidelines, patient related factors were pointed out more often than healthcare-related factors. The FDs considered that patients' low awareness of diabetes and its complications, lack of motivation to change lifestyle, and non-adherence to the medical regimen were the most important patient related factors limiting FD adherence to CPG. Lack of special educational materials for patients, lack of special training for nurses and lack of financing were the health care system-related factors restricting most often FD adherence to guidelines.

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SUMMARY IN ESTONIAN

Teist tüüpi diabeedi käsitlus peremeditsiinis

Teist tüüpi diabeedi (DM2) levimus maailmas näitab kasvutendentsi. Haiguse ja selle tüsistuste tõttu suurenevad märkimisväärselt tervishoiukulutused. Diabeedist tingitud suremuse kasv on põhjustatud kardiovaskulaarsetest tüsistustest. Enne tervishoiusüsteemi ümberkorraldusi 1990ndate alguses tegelesid teist tüüpi diabeedi haigetega peamiselt endokrinoloogid, käesoleval ajal on enamik patsiente perearsti jälgimisel. 2000. aastal valmis Eesti Perearstide Seltsi ja Eesti Endokrinoloogide Seltsi koostöös esimene teist tüüpi diabeedi ravijuhend perearstidele.

Teist tüüpi diabeedi ravi nõuab patsiendilt suurt pühendumist: pidev toitumise planeerimine ja jälgimine, liigse kehakaalu vähendamine, regulaarne liikumine, veresuhkru enesekontroll, oskus jälgida ja vältida tüsistuste tekkimist ning vastavalt vajadusele mitme ravimi tarvitamine. Selline igapäevaelu kohandamine haigusega võib mõjutada oluliselt haige elukvaliteeti. Haigus on krooniline ja võib kulgeda mõnda aega sümptomitevabalt, seetõttu on raviga soostumisega probleeme neljandikul kuni pooltel patsientidest. Raviga soostumust on uuritud viimase 30 aasta jooksul, kuid selgeid tegureid, mis ennustaksid ravirežiimist mittekinnipidamist, ei ole leitud. Enamasti ei ole uuringutes arvesse võetud patsientide arvamusi, arusaamist oma tervisest ja haigusest ning hinnanguid neile. Samuti on vähe asjakohaseid uuringuid. Eelkõige sõltub ravimi tarvitamine või elumuudatuste tegemine sellest, kuidas patsient tunnetab haigust ja mõistab selle olemust. Patsiendi arvamuse uurimiseks sobivad kvalitatiivsed meetodid, mida on kasutatud meditsiiniuuringutes laialdaselt viimase kümnendi jooksul. Diabeedihaigetel ei ole selliseid uuringuid veel ulatuslikult tehtud. Enne käesolevat uurimustööd ei olnud teada teist tüüpi diabeediga patsientide arvamused oma haiguse ja raviga toimetuleku ning selle kohta, kas diabeediga patsiendi tunnetatud probleemid haigusega toimetulekul sõltuvad riikide tervishoiusüsteemist ja kultuurilisest eripärast.

Epidemioloogilistest uuringutest on selgunud, et diabeedist tingitud tüsistuste ja suremuse risk on oluliselt suurem hüperglükeemia, düslipideemia ja hüpertensiooni olemasolul. Agressiivse raviga on võimalik haiguse tüsistuste tekkimist vähendada. Vaatamata laialdastele ravivõimalustele ei ole patsientide kardiovaskulaarsete tüsistuste puhuste kliiniliste näitajate tulemused vastavuses ravijuhendites soovitatuga. Ravi hinnatakse lühi- ja pikaajalise eesmärgi saavutamise näitajate alusel. Pikaajaliseks ravi eesmärgiks on vähendada diabeedist tingitud tüsistusi ja suremust. Lühiajalisteks eesmärkideks on tavaliselt tüsistuste tekkimisega kaudselt seotud kliinilised näitajad. Patsiendi seisukohalt ei pruugi kliiniliste näitajate muutus tähendada kvalitatiivset erinevust tema tervise seisundis. Seetõttu kasutatakse haiguse ja raviga seotud mõjude hindamiseks patsiendi elukvaliteedi küsimustikke. Milline on Eesti esmatasandil

jälgitavate teist tüüpi diabeedi haigete elukvaliteet ja kuivõrd kliinilised tulemused vastavad ravijuhendi soovitustele, ei olnud enne käesolevat uurimistööd teada.

Ravijuhendite peamisteks eesmärkideks on tõenduspõhise ravi juurutamine praktikas, kuluefektiivsete ravimeetodite kasutamine, raviviisides piirkonniti suurte erinevuste vältimine, et tagada kvaliteetsem tervishoiuteenuste osutamine ja patsientide paremad tervisenäitajad. Ravijuhendite järgimine võib sõltuda mitmetest teguritest. Eelkõige sellest, milliste printsiipide alusel on ravijuhendid koostatud, kuidas neid on sihtgrupile jaotatud ja tutvustatud. Enne kui rakendada patsiendi jälgimiseks ravijuhendi soovitusi, peab olema teada arstide suhtumine. Kas nad on juhendi olemasolust teadlikud, tunnevad sisu, millised hoiakud on neil ravijuhendite suhtes ning kas on juhendi kasutamist takistavaid väliseid mõjureid? Eesti perearstide teadlikkust teist tüüpi diabeedi ravijuhendist ning ravijuhendi kasutamist mõjutavaid tegureid ei ole varem uuritud.
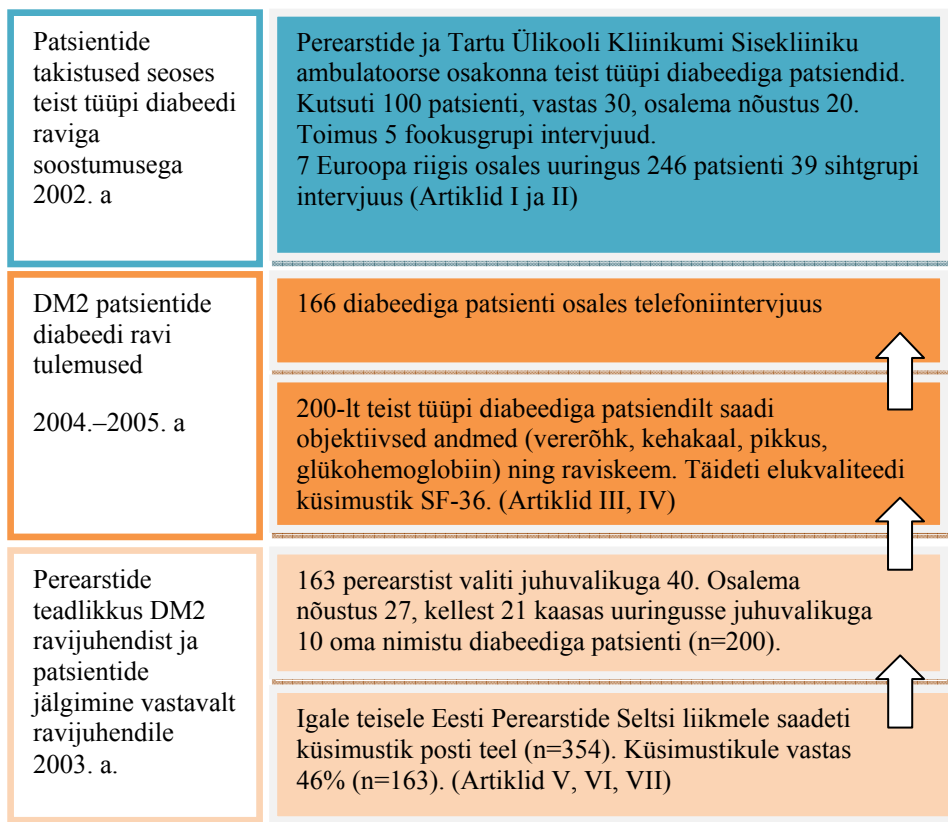
Uurimistöö eesmärgid

1. Hinnata, milliseid takistusi esineb teist tüüpi diabeediga patsientidel seoses raviga soostumisega Eestis, ning võrrelda neid teiste Euroopa riikide patsientide uurimise tulemustega.
2. Leida tegureid, mis mõjutavad teist tüüpi diabeediga patsientide elukvaliteeti kui patsiendikeskset ravitulemust.
3. Analüüsida teist tüüpi diabeediga patsientide kliiniliste tulemuste vastavust teist tüüpi diabeedi ravijuhendi soovitustele.
4. Hinnata perearstide teadlikkust teist tüüpi diabeedi ravijuhendist ja seda, kuivõrd patsiente jälgitakse vastavalt ravijuhendile.
5. Leida takistavaid tegureid, mis mõjutavad arstide poolt teist tüüpi diabeedi ravijuhendist kinnipidamist.

Uuritavad ja meetodid

Uuringusse kaasatud patsientide ja arstide andmed on esitatud joonisel 1.

Teist tüüpi diabeediga patsientide raviga soostumisega seotud takistuste hindamiseks korraldati 2002. aastal Tartus kvalitatiivne uuring põhistatud teooria meetodil. Andmete kogumiseks kasutati fookusgrupi intervjuud. Grupivestlust juhtis moderaator ning patsiente innustati rääkima etteantud teemadel võimalikult palju nende jaoks tähtsatest kogemustest, hinnangutest, teadmistest seoses haigusega, suhtlemisel arstide ja õdedega ning raviga soostumise probleemidest. Intervjuu tekste analüüsiti põhistatud teooria meetodil, kodeerides teksti etapiviisil, seda pidevalt algtekstiga võrreldes. Niiviisi tekkisid kategooriad, mis omakorda koondusid abstraktseteks temaatilisteks gruppideks.

Patsientide takistused seoses teist tüüpi diabeedi raviga soostumusega 2002. a	Perearstide ja Tartu Ülikooli Kliinikumi Sisekliiniku ambulatoorse osakonna teist tüüpi diabeediga patsiendid. Kutsuti 100 patsienti, vastas 30, osalema nõustus 20. Toimus 5 fookusgrupi intervjuud. 7 Euroopa riigis osales uuringus 246 patsienti 39 sihtgrupi intervjuus (Artiklid I ja II)
DM2 patsientide diabeedi ravi tulemused 2004.–2005. a	166 diabeediga patsienti osales telefoniintervjuus
	200-lt teist tüüpi diabeediga patsiendilt saadi objektiivsed andmed (vererõhk, kehakaal, pikkus, glükohemoglobiin) ning raviskeem. Täideti elukvaliteedi küsimustik SF-36. (Artiklid III, IV)
Perearstide teadlikkus DM2 ravijuhendist ja patsientide jälgimine vastavalt ravijuhendile 2003. a.	163 perearstist valiti juhuvalikuga 40. Osalema nõustus 27, kellest 21 kaasas uuringusse juhuvalikuga 10 oma nimistu diabeediga patsienti (n=200).
	Igale teisele Eesti Perearstide Seltsi liikmele saadeti küsimustik posti teel (n=354). Küsimustikule vastas 46% (n=163). (Artiklid V, VI, VII)

Joonis 1. Teist tüüpi diabeedi uuringusse kaasatud patsiendid ja perearstid.

2004.–2005. aastal kogu Eestis korraldatud uuringus hinnati perearstide poolt jälgitud teist tüüpi diabeediga patsientide kliiniliste näitajate vastavust 2000. aasta ravijuhendile. Juhuvaliku teel saadud perearstide diabeedihaigete nime-kirjadest valiti juhuvalikuga 10 DM2ga patsienti. 200 patsiendilt koguti objek-tiivsed kiinilised andmed ning patsiendid täitsid elukvaliteedi küsimustiku SF-36. Hiljem tehti telefoniintervjuu, küsitleti diabeediga toimetuleku, enese-jälgimise ja haigusteadlikkuse kohta. Telefoniküsitlusele vastas 166 patsienti. 34 patsienti ei olnud telefoniintervjuuks kättesaadavad. Hinnati patsiendi glüko-hemoglobiini, kolesterooli, vererõhu ja kehakaalu vastavust ravijuhendis soovi-tatud eesmärkväärtustele.

Perearstide teadlikkust 2000. aasta teist tüüpi diabeedi ravijuhendist hinnati küsitlusuuringu põhjal. Posti teel saadetud küsimustikus taheti esmalt andmeid ravijuhendite olemasolu ja kasutatavuse kohta. Lisaks esitati küsimusi, mille kaudu sooviti hinnata, kas diabeedihaige ravi ja jälgimine vastab ravijuhendi soovitustele. Küsimustikus esitati väiteid võimalike ravijuhendite kasutamist takistavate tegurite kohta. Saadi andmed perearstide eelneva koolituse ja

praksise kohta. Samade perearstide patsiente uuriti 2004.–2005. aastal elukvaliteedi ja diabeedi kliiniliste näitajate suhtes.

Uurimistöö peamised tulemused

1. Kvalitatiivse uuringu tulemusena tõid patsiendid esile, et diabeet on haigus, mille kulg ei ole väheste sümptomite tõttu tuntav. Seetõttu on raske hinnata ravi järgimisest saadavat kasu. Diabeeti ei suhtutud kui raskesse haigusesse, vastutus delegeeritakse endalt ära ning pigem lepitakse saatusega. Diabeediga patsiendid tõid esile haigust puudutava informatsiooni vähesuse ja vastuolulisuse ning ilmnes, et patsientide teadmised olid ebapiisavad. Inimesel on haiguse tõttu keeruline kohaneda igapäevaelus ettetulevate olukordadega suhetes perekonna ja töökaaslastega. Arstiga suhtlemisel tuntakse toetuse olemasolu, kuid on raske leppida arsti kritiseeriva suhtumisega ja arsti ajapuudusega. Sama metoodikaga korraldatud patsientide kvalitatiivsetes uuringutes seitsmes Euroopa riigis jõuti sarnaste tulemusteni. Siiski, Eesti patsientide intervjuude analüüsil ei kerkinud üles teemat „Teadlikkus oma kehast", kus inimene, katsetades erisuguseid ravi- või toitumisrežiime, hindab, kuidas nende keha sellele reageerib. Eesti patsiendid erinesid selle poolest, et kasutasid diabeedi ravimiseks laialdaselt mitmesuguseid rahvameditsiini võtteid.

2. Diabeedihaigete keskmised hinnangud oma elukvaliteedile olid kõige madalamad järgmistes valdkondades: üldine terviseseisund (35±18 punkti 100st), kehalised piirangud igapäevaelus (38±42), emotsionaalsed piirangud igapäevaelus (42±45). Kõrgeimate keskmise punktide arvuga olid hinnangutelt vaimne heaolu (62±20) ja sotsiaalne suhtlus (61±28). Logistilisel regressioonanalüüsil ilmnes, et parem teadlikkus haigusest ja selle tüsistustest mõjutas negatiivselt kõiki elukvaliteedi skaalasid: kehalist seisundit, kehalisi ja emotsionaalseid piiranguid igapäevaelus, energiat/kurnatust, vaimset heaolu, sotsiaalset suhtlust ja üldist tervist. Vanuse suurenemisega halvenesid hinnangud kehalise seisundi, igapäevaelu kehaliste piirangute, igapäevaelu emotsionaalsete piirangute, sotsiaalse suhtluse ja üldise tervise skaaladel. Ülekaalulised hindasid negatiivsemalt kehalist seisundit, kehalisi piiranguid ja emotsionaalset toimetulekut igapäevaelus. Diabeedi kestus üle 5 aasta oli mudelis oluline hinnanguid negatiivses suunas mõjutav tegur.

3. 39% patsientidest vastas glükohemoglobiini näit ravijuhendis soovitatule (HbA1c<6,5%) ning pooltel patsientidel oli HbA1c alla 7%. Süstoolne vererõhk oli ravijuhendile vastav 37% patsientidest ning diastoolne rõhk pooltel (51%) juhtudel. Normaalne kehamassiindeks (alla 25 kg/m^2) oli 6% patsientidest. Ülekaalulisus (kehamassiindeks üle 27 kg/m^2) suurendas 88% patsientidest kardiovaskulaarsete tüsistuste tekkimise riski. Kolesteroolisisaldus vastas soovitatule (4,8 mmol/l) 4% juhtudest. Glükohemoglobiini eesmärkväärtuse saavutamise tõenäosus on suurem patsientidel, kes on teadlikud HbA1c analüüsist, kellel diabeet on kestnud alla 5 aasta ning kellel ei ole glükomeetrit.

4. 76 % perearstidest oli teist tüüpi diabeedi ravijuhend kättesaadav ning nendest 83% leidis, et juhend on igapäevatöös kasutatav ning 79% ka kasutas juhendit. Juhendis oli soovitatud alustada hüperglükeemia medikamentoosse raviga, kui patsiendi glükoos paastuplasmas on üle 6,0 mmol/l. Samas aga alustas üle poole perearstidest (61%) medikamentoosse raviga, kui glükoos paastuplasmas oli üle 6,9 mmol/l. Ravijuhendis soovitatud uuringutest teeks 80% perearstidest kolesterooli analüüsi ja 50% perearstidest uriini analüüsi sagedamini kui ravijuhendis soovitatud. Samas, 85% perearstidest teeks ravijuhendis soovitatust harvem glükohemoglobiini analüüsi ja 55% mõõdaks soovitatust harvem patsiendi kehakaalu. Ravijuhendis ettenähtud analüüsidest, nõustamistest ja läbivaatustest teeks 52% perearstidest ravijuhendis soovitatud sageduse kohaselt ära vähemalt pooled.

5. 96% juhtudest hindasid perearstid, et "sageli" ja "väga sageli" takistavad ravijuhendi jälgimist patsiendist tingitud probleemid, samas olid tervishoiusüsteemist tingitud takistused "sageli" ja "väga sageli" probleemiks 79% juhtudest ($p < 0,0001$). Kõige enam hindasid perearstid "sagedaseks" ja "väga sagedaseks" ravijuhendi järgimist takistavaks teguriks patsiendi vähest teadlikkust oma haigusest ja selle tüsistustest (70%), patsiendi nõrka motiveeritust muuta oma eluviisi (70%) ning patsientide ravi mittejärgimist (52%). Tervishoiusüsteemipoolsed takistused, mis olid perearstidel „sageli" ja "väga sageli" probleemiks ravijuhendite soovituste rakendamisel, olid patsientidele mõeldud haigust puudutavate õpetavate materjalide vähesus (55%), õdede puudulik diabeedikoolitus (40%) ja vähene finantseerimine (35%).

Järeldused

1. Diabeediga patsiendid tõid haigusega toimetulekust rääkides esile järgmised peamised teemad: tunnetamatu diabeedi kulg, ebaselge või puudulik informatsioon, isik ja haigus s.t haigusega toimetulek erinevates olukordades, ning suhted arsti või õega. Kõikides EUROBSTACLE uuringutes olid enamiku diabeediga patsientide toimetuleku probleemid suuresti sarnased. Eesti patsiendid eristusid rahvameditsiini võtete olulise osa poolest diabeedi ravis, mida ei maininud ühegi teise Euroopa riigi patsiendid ning Eesti patsientide intervjuusid analüüsides ei kerkinud üles teemat "Teadlikkus oma kehast".

2. Diabeediga patsientide keskmised hinnangud vaimsele heaolule ja sotsiaalsele suhtlusele olid mõnevõrra kõrgemad, võrreldes hinnangutega üldtervislikule seisundile ja igapäevaelu kehalistele piirangutele, mille keskmised olid kõige madalamad. Elukvaliteedi skaalasid mõjutas negatiivselt patsiendi parem teadlikkus haigusest ja selle tüsistustest, kõrgem iga, suurem kehakaal ning haiguse pikem kestus. Parem teadlikkus diabeedist ja selle tüsistustest mõjutas negatiivselt hinnanguid kõigil kaheksal elukvaliteedi skaalal. Ülekaalulisus on riskitegur, mida mõjutades saaks patsientide elukvaliteeti parandada.

3. Teist tüüpi diabeediga patsientide kliinilised tulemused ei vastanud ravijuhendis soovitatule, kuid on võrreldavad teistes maades saavutatuga. Ravijuhendis soovitatud glükohemoglobiini taseme alla 6,5% oli saavutanud vaid pisut üle kolmandiku patsientidest (39%). 37% patsientidest vastasid süstoolse vererõhu ja pooltel diastoolse vererõhu väärtused ravijuhendis soovitatule. Patsientide vere kolesteroolisisaldust ja kehakaalu kui riskitegureid jälgiti halvemini. Glükohemoglobiini sisaldus alla 6,5% oli suurema tõenäosusega patsientidel, kes olid glükohemoglobiini analüüsist paremini teadlikud, kuid haiguse kestus üle 5 aasta halvendas tulemust.
4. Enamik perearste leidis, et teist tüüpi diabeedi ravijuhend on neile hästi kättesaadav ja leiab igapäevatöös kasutust. Arstide käitumine vastavuses DM2 ravijuhendiga oli väga varieeruv. Medikamentoosset ravi alustas üle poolte perearstidest ravijuhendis soovitatust hiljem. Diabeedihaige jälgimisel määras enamik arste kolesterooli ja uriini analüüse oluliselt sagedamini, kui ravijuhendis soovitatud, oluliselt harvem aga määratakse glükohemoglobiini, mis on tähtis diabeedihaige veresuhkru taseme jälgimiseks.
5. Hinnates ravijuhendi kasutamist kõige enam takistavaid tegureid, nimetab enamik perearste patsiendist tingitud tegureid. Tervishoiusüsteemist tingitud tegureid mainitakse oluliselt harvem. Peamisteks patsiendist tingitud ravijuhendi järgimist takistavateks teguriteks peetakse haigete madalat teadlikkust diabeedi tüsistustest, puuduvat motiveeritust muuta eluviise ning halba raviga soostumust. Enim tuntakse puudust patsientidele mõeldud infomaterjalidest ning pereõdede täienduskoolitusest diabeedihaigetega tegelemiseks.

ACKNOWLEDGEMENTS

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CURRICULUM VITAE

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Education

2005–2009	University of Tartu, doctoral program in medicine
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1975–1987	3. Secondary School, Rakvere

Employment history

Since 2002	University of Tartu, Department of Polyclinic and Family Medicine, teaching assistant
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2003–2006	University of Tartu, Department of Polyclinic and Family Medicine, researcher
1997–1999	Ropka Primary Health Care Centre, doctor

Special courses

2009	Evidence Based Drug Selection, World Health Organization, Estonian State Agency of Medicine, Estonia
2007	Learning and Teaching About Patient Empowerment in General Practice. European Academy of Teachers in General Practice (EURACT), University of Ljubljana, Slovenia
2006	Community Orientation in Primary Care. European General Practice Research Network (EGPRN), Kavala, Greece
2006	Research into Medical Education. European General Practice Research Network (EGPRN), Copenhagen, Denmark
2004	3 days of Qualitative research in Health Care. University of Antwerp, Belgium
2004	Course for trainers in Family Medicine. EURACT, Poland

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Administrative work

Member of the expert group developing "Type 2 diabetes guideline".
Member of the group of Society of Family Doctors and Health Insurance Fund developing quality improvement strategies for family doctors

Member of the group developing "Diagnostic and treatment algorithms for family doctors on common community infections".
Member of the group of Estonian Ministry of Social Affairs and World Health Organization on development of the document "Quality assurance of health services in Estonia".

Osalemine seltsides ja ühendustes

Society of Family Doctors of Estonia
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Scientific work

Type 2 diabetes care in family practice has been the main area of scientific work. Patients' perspectives in adherence to type 2 diabetes treatment were assessed. Also diabetes patients' quality of life and clinical outcome concordance with requirements of diabetes clinical practice guideline requirements were analysed. Family doctors knowledge and behaviour in accordance of diabetes guideline was evaluated. Five publications have been published in peer-reviewed journals, one submitted for publication, and 9 theses presented at the international conferences.

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2002 – Tartu Ülikooli polikliiniku ja peremeditsiini õppetool, assistent
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Erialane enesetäiendus

2009 Evidence Based Drug Selection. Maailma Terviseorganisatsioon, Ravimiamet, Eesti
2007 Learning and Teaching About Patient Empowerment in General Practice. European Academy of Teachers in General Practice (EURACT), Ljubljana Ülikool, Sloveenia
2006 Community Orientation in Primary Care. EGPRN, Kavala, Kreeka
2006 Research into Medical Education. European General Practice Research Network (EGPRN), Copenhagen, Taani
2004 3 days of Qualitative research in Health Care. Antwerpeni Ülikool, Belgia
2004 Course for trainers in Family Medicine. EURACT, Poola

Administratiivtöö

Eesti 2. tüüpi diabeedi juhendi koostamise töögrupi liige.

Eesti Perearstide Seltsi ja Haigekassa töögrupi liige, mis tegeleb perearstide haiguste ennetamise, krooniliste haiguste jälgimise ja ravitöö tulemuslikkuse printsiipide väljatöötamise ja määruste ettevalmistamisega.

Eesti Haigekassa poolt aktsepteeritud "Sagedasemate haiglaväliste infektsioonide diagnostika ja ravi algoritmid perearstidele" koostamise töögrupi liige.

Eesti Sotsiaalministeeriumi ja Maailma Terviseorganisatsiooni tellimusel valminud dokumendi "Tervishoiuteenuste kvaliteedi tagamine Eestis" töögrupi liige.

Osalemine seltsides ja ühendustes

Eesti Perearstide Selts
Primary Care Diabetes Europe
EURACT (European Academy of Teachers in General Practice)

Teadustöö

Peamiseks teadustöö valdkonnaks on olnud 2. tüüpi diabeedi käsitlus peremeditsiinis. Hinnatud on patsientide diabeedi ravi järgimisega seotud küsimusi, patsientide elukvaliteeti ja kliiniliste näitajate vastavust ravijuhendi soovitustele ning perearstide teadlikkust teist tüüpi diabeedi ravijuhendist. Ilmunud on 5 artiklit eelretsenseeritavates ajakirjades, 1 artikkel on saadetud avaldamiseks. Rahvusvahelistel konverentsidel on esitatud 9 teesid.

DISSERTATIONES MEDICINAE
UNIVERSITATIS TARTUENSIS

1. **Heidi-Ingrid Maaroos.** The natural course of gastric ulcer in connection with chronic gastritis and *Helicobacter pylori*. Tartu, 1991.
2. **Mihkel Zilmer.** Na-pump in normal and tumorous brain tissues: Structural, functional and tumorigenesis aspects. Tartu, 1991.
3. **Eero Vasar.** Role of cholecystokinin receptors in the regulation of behaviour and in the action of haloperidol and diazepam. Tartu, 1992.
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5. **Ants Peetsalu.** Vagotomy in duodenal ulcer disease: A study of gastric acidity, serum pepsinogen I, gastric mucosal histology and *Helicobacter pylori*. Tartu, 1992.
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