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Time and motion study on family physicians' and nurses' time utilization during face-to-face visits of patients with type 2 diabetes mellitus: a case study on Järveotsa family practice

Master's thesis

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TALLINNA TEHNIKAÜLIKOOL
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Aja ja tegevuste vaatlusuuring perearstide ja -õdede ajakasutuse uurimiseks teise tüübi diabeediga patsientide visiitidel Järveotsa perearstikeskuse näitel

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Author’s declaration of originality

I hereby certify that I am the sole author of this thesis. All the used materials, references to the literature and the work of others have been referred to. This thesis has not been presented for examination anywhere else.

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Abstract

The study investigates how general practitioners (GPs) and nurses manage their time during face-to-face consultations with patients diagnosed with type 2 diabetes. Employing a mixed-method approach combining time and motion study and semi-structured interviews, this research aims to identify the most time-consuming activities, inefficiencies and recommend improvements towards more patient-centered care. The study provides insights into the alignment of current practices with the Chronic Care Model, highlighting challenges and opportunities in managing type 2 diabetes in primary care settings.

This thesis is written in English and is 53 pages long, including 6 chapters, 5 figures and 2 tables.

Annotatsioon

Aja ja tegevuste vaatlusuuring perearstide ja -õdede ajakasutuse uurimiseks teise tüübi diabeediga patsientide visiitidel Järveotsa perearstikeskuse näitel

Käesolev magistritöö uurib perearstide ja õdede ajakasutust 2. tüüpi diabeediga patsientide visiitidel. Uurimus kasutab aja ja tegevuste vaatlusuuringut ning poolstruktureeritud intervjuusid, et tuvastada kõige ajakulukamad tegevused, ebatõhusused ja pakkuda välja soovitusi patsiendikesksema esmatasandi arstiabi poole liikumiseks. Töö annab ülevaate praeguste praktikate kooskõlast kroonilise ravi mudeliga (Chronic Care Model), tuues välja väljakutseid ja võimalusi 2. tüüpi diabeedi haldamisel esmatasandi tervishoius.

Lõputöö on kirjutatud inglise keeles ning sisaldab teksti 53 leheküljel, 6 peatükki, 5 joonist, 2 tabelit.

List of abbreviations and terms

CCM	Chronic Care Model
EHIF	Estonian Health Insurance Fund
ePAK	e-Perearstikeskus
GP	General practitioner
PCMH	Patient-Centered Medical Home
T2D	Type 2 diabetes
TMS	Time and Motion Study

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1 Introduction

There is a global rise in the prevalence of diabetes mellitus, making the disease burden a major public health priority. The latest estimates state that 425 million people globally were living with diabetes in 2017, which is expected to rise to 629 million by 2045. [1] Based on Estonian Diabetes Association's information, there are over 70 000 diagnosed diabetes cases in Estonia and it is estimated that there are roughly as many undiagnosed cases [2]. The rise is driven by the increasing levels of obesity and unhealthy behaviours like poor diet and physical inactivity [1].

There are two main types of diabetes mellitus – type 1 and type 2. Type 1 diabetes, also known as insulin dependent diabetes mellitus, is a chronic autoimmune disease caused by pancreatic insufficiency of insulin production. This type is mostly prevalent in children and adolescents, making up 5%-10% of all diabetes cases. [1] Out of the 70 000 diagnosed diabetes cases in Estonia, 60 000 - 65 000 are cases of type 2 diabetes (T2D). The cause for T2D is a weakening of the effect of insulin (insulin resistance), a disorder of insulin secretion, or both. [2] Type 2 diabetes is mainly lifestyle-related, develops over time, and has more ways to manage the disease [1].

In Estonia every family physician has a patient list of 1200-2000, or 2001–2400 patients if general medical care is provided by at least one medically qualified person alongside the family physician [3] As diabetes is a chronic condition that requires ongoing management and care, the number of cases on the rise places a considerable workload on the general practitioners' (GP) offices with increasing numbers of patients requiring regular appointments, check-ups and follow-ups [1].

The effective management of type 2 diabetes requires a multidisciplinary approach that involves healthcare professionals, patients, and their families. The cornerstone for improving care delivery for chronically ill patients has been the Wagner's Chronic Care Model. [4] Family physicians and nurses play a crucial role in the care of patients with type 2 diabetes. [5] As T2D is mainly lifestyle-related, then in addition to regular check-

ups, the medical professionals also need to devote time for lifestyle counselling and empowering self-management. To effectively deliver health care services, family physicians rely heavily on their time management skills. To adapt to patients' needs, enhance the health outcomes and move towards cost savings in the long term, it is important to shift toward a more patient-centered approach. [6]

1.1 Aim of the research

This study evaluates Järveotsa GP practice's work processes regarding patients with type 2 diabetes using time and motion study and semi-structured interviews. The aim of this research is to contribute to the understanding of time utilization in work processes of GPs and nurses regarding patients with type 2 diabetes. Analysing this can help identify activities that take up a disproportionate amount of time while generating little value towards the goals of a family physician's work set in the treatment guide for T2D. The use of time and motion study and semi-structured interviews will provide a comprehensive evaluation of these work processes, and the findings of the study will provide recommendations for possible implications for the development of interventions to improve the care of patients with type 2 diabetes and move towards more patient-centered care.

1.2 Research questions

Based on the research objectives, the study is aimed to answer the following questions:

1. What are the different steps in the care management process for patients with type 2 diabetes?

2. How is the time divided between different activities during face-to-face regular visits and what are the most time-consuming tasks? How much time is spent having eye-contact with the patient?

3. Do the opinions of family physicians coincide with the results of the time and motion study results regarding the time expenditure and utilization?

4. Are the current processes in place in Järveotsa GP practice in line with the Chronic Care Model?

5. What are the opportunities for moving towards a more patient-centered approach regarding type 2 diabetes care?

2 Theoretical background

This thesis will use the Chronic Care Model (CCM) with a focus on patient-centered care and the Estonian guidelines for type 2 diabetes management as a theoretical framework. CCM provides a comprehensive approach to managing chronic conditions, emphasizing collaborative and patient-centered care, self-management, and evidence-based interventions. It also highlights the importance of the healthcare system's organization and support to ensure effective chronic care delivery.

2.1 Chronic Care Model

The Chronic Care Model is a framework for improving the care and management of patients with chronic conditions, such as diabetes, heart disease, and asthma. Developed by Edward Wagner and colleagues in the 1990s, the model is based on the idea that the healthcare system is not designed to provide the ongoing, coordinated care that patients with chronic conditions need to manage their conditions effectively. [7]

The author chose CCM as the model has been in use for almost 30 years and is widely recognized. Whilst the nuances of meaning for the key elements of the model have changed in time, the conceptual level of the model still holds. As the CCM was presented in the 1990s, then it has also been widely researched and it has been noted as one of the most comprehensive, powerful and scientifically grounded blueprints for new care that health services research has produced [4].

The Chronic Care Model focuses on six key elements that are interrelated and necessary for effective chronic disease management:

1. Self-Management Support: Empowering patients to take an active role in managing their condition through education, skills training, and support.

2. Delivery System Design: Reorganizing the delivery of care to be rather proactive than reactive, promote patient-centred care, coordinated team-based care, and enhanced communication between healthcare providers and patients.

3. Decision Support: Providing healthcare providers with the information and tools they need to make evidence-based decisions about patient care.

4. Clinical Information Systems: Using electronic health records and other registries that can provide population-based and patient-specific support to the care team.

5. Organization of Health Care: Ensuring that the healthcare system supports the delivery of high-quality, patient-centered chronic disease care, such as quality improvement programs and payment models that incentivize improved patient outcomes.

6. Community Resources and Policies: Identifying or developing resources to support patients in managing their conditions, such as transportation services, healthy food options, and housing assistance. [8] [5]

The Chronic Care Model has been widely adopted and implemented in healthcare organizations across the world, and research has demonstrated its effectiveness in improving patient outcomes, reducing the cumulative incidence of diabetes-related complications, healthcare costs, and enhancing the overall quality of care for patients with chronic conditions [9].

2.1.1 Previous research using the Chronic Care Model

The Chronic Care Model has been a cornerstone for improving care delivery for chronically ill patients since it was developed. Ever since, the model has been researched and new models have been developed to target the specific weaknesses of the Wagner's CCM. The research has indicated that there is limited understanding of the impact of established CCM on disease management, especially in diverse populations and healthcare settings. Many health systems still prioritize the treatment of individual disorders rather than taking a holistic approach for comorbid patients. Existing care models and treatment guidelines often lack specific instructions on how to prioritize the management of one condition e.g. diabetes relative to other comorbidities and the functional status of patients. [10]

A systematic review on the effectiveness of the CCM for adults with type 2 diabetes was carried out in 2022, which showed that CCM interventions in comparison to usual

care in primary care significantly improved the blood sugar and blood pressure levels. This was explained by better self-management as patients who actively self-monitor their levels, gain better control of their condition. Furthermore, the study highlighted that a greater number of CCM elements applied, result in greater benefits. [11]

2.2 Guidelines for type 2 diabetes management in Estonia

The Estonian guidelines for type 2 diabetes management are a set of recommendations published by Estonian Health Insurance Fund. They were developed by a working group consisting of representatives from the Estonian Society of Endocrinology, University of Tartu, Estonian Society of Family Physicians, Estonian Society of Nurses, and the Estonian Diabetes Association to guide healthcare providers in the management of patients with type 2 diabetes. The guidelines are based on the best available evidence and aim to optimize patient outcomes by providing a comprehensive approach to diabetes management. [11]

The guidelines cover various aspects of diabetes care, including prediabetes, handling primary diagnosis, treatment recommendations goals, self-management, and follow-ups. Some of the key recommendations include:

1. Lifestyle interventions: Refer patients with prediabetes or primary diagnosis of T2D to an intensive lifestyle intervention program. If patients with primary diagnosis of T2D have glycohemoglobin levels over 7,5% (58 mmol/mol) or will not start with an intensive lifestyle intervention program, should be put on pharmacotherapy.

2. Glycaemic targets: Set a goal to keep patient's glycohemoglobin levels under 7% (53 mmol/mol). The guidelines also recommend individualized glycaemic targets based on patient characteristics, such as other treatment, comorbidities, and duration of diabetes.

3. Medication management: The guidelines provide recommendations on the use of different classes of medications, including metformin, sulfonylureas, dipeptidyl peptidase-4 inhibitors, sodium-glucose cotransporter-2 inhibitors, and insulin.

4. Self-monitoring: Patients with T2D who are not receiving insulin treatment should not regularly check themselves with glucometer, rather on need basis like a change in the treatment plan or before a GP visit. Patients receiving insulin treatment should check themselves with glucometer, the frequency is dependent on their treatment regimen. [11]

In addition to these recommendations, the guideline also provides practical recommendations that are based on the work group members' clinical experience. These also include non-medical suggestions such as evaluating patient's motivation and results twice a year, educating patients on glycaemic self-monitoring and correcting their insulin amounts [11].

Overall, the Estonian guidelines for type 2 diabetes management emphasize a patient-centered approach to diabetes care and recommend a multidisciplinary team approach to diabetes management, involving healthcare providers from various specialties, including endocrinology, primary care, and nursing. The guidelines also highlight the importance of patient education and self-management support in achieving optimal diabetes management outcomes.

2.3 Patient-centered care

Innovation in health care is often conflated with achieving patient-centered care, however it is important to understand that not all improvements to the system are patient-centered. Patient-centered solutions strengthen the patient-clinician relationship, help patients have a better understanding of their health, promote relevant communication, and facilitate patients' involvement in their own care. [12] In the realm of patient-centered care it's essential to recognize and honour the experiences, and insights of patients. It entails delivering care that centres around and reveres the values, needs, and preferences of patients by actively involving the patient in the care journey. This necessitates healthcare providers and professionals to involve patients and their families genuinely and meaningfully in the care process. [13]

A Patient-Centered Medical Home (PCMH) is a model of primary care that emphasizes a patient-centered approach to healthcare. It is designed to provide comprehensive, coordinated, and accessible care to patients, with the goal of improving the quality,

efficiency, and effectiveness of healthcare delivery. The PCMH model transforms the traditional primary care practice into a patient-centered system by implementing key principles and features, which include the coordination and integration of care, quality and safety, whole person orientation, personal physician, physician-directed medical practice, enhanced access, and payment. [6]

2.3.1 Patient-centered care in type 2 diabetes management

Diabetes is a well-documented high-cost prevalent chronic illness which' care has long been aligned with the key principles of both the CCM and PCHM. The main keys being self-management, team-based care and patient empowerment. While some traditional high-quality GP practices may already have many of the attributes and tools of a Medical Home established, an integral component of PCMH activities is the active encouragement of patient self-management involving lifestyle counselling, emotional support and teaching problem solving skills, which can be incorporated into team-based care. Considering the elevated prevalence of depression in diabetes patients, medical homes can develop standardized screening protocols for the identification and treatment of depression, incorporating behavioural health professionals into the Medical Home team for a comprehensive approach. [6]

Options for tailored, attainable and adjustable diet and physical activity goal setting programs have been tested as a preventative measure to reduce diabetes risk. Some pilot studies have shown promising results where even if the program did not increase weight loss, glycaemic improvements were noted. [14] There have also been studies comparing telehealth-based versus in-person diet and physical activity interventions for T2D patients with obesity. The latest available study was published in 2023 and it shows that telehealth solutions offered comparable results in weight loss and blood glucose level reduction with fewer appointments and resources. [15]

Recurrent foot infections and tissue damage resulting in diabetic foot ulcers (DFU) are commonly prevalent in patients with type 2 diabetes. The primary treatment for DFUs involves extensive debridement and advanced wound management. In more severe cases orthopaedic surgery is considered if the wound becomes painful and hard to control. A revascularization surgery can be used to help promote blood circulation and reduce the risk of amputation. However, controlling and monitoring blood glucose levels is crucial for the success of these treatments. A multidisciplinary team (MDT)

approach actively involving the patient's caregiving family members has been highlighted in recent studies for improving clinical outcomes of DFU treatment. [14]

2.4 Previous studies on family physicians' time utilization

In recent years several studies have been conducted to investigate family physicians' time utilization and identify areas of improvement regarding their work processes, particularly in relation to managing patients with chronic conditions such as type 2 diabetes.

Young et. al (2018) found that physicians spent more time during a patient visit on the electronic health record (EHR), then they did on face-to-face communication with the patient. However, the study showed that the face-to-face time with the patients hasn't decreased from the time that EHRs were introduced, rather the workload of physicians has increased. [15] The study also highlighted a difference between the US and UK, referring to a study conducted by Hayward et. al (2015), which shows vastly opposite results – physicians spend twice as long communicating with patients face-to-face as they do on working with EHR. Furthermore, the entire patient visit in the UK takes less time than what the physicians in the US spend on EHR per visit. [16]

The current study is a further development of a pilot study conducted by Männil (2020) on using the time and motion study method to investigate Estonian family physicians' time utilization during face-to-face patient visits. The study confirmed that TMS is a suitable method to study Estonian GPs' time utilization. The results showed that the most time-consuming task was counselling and teaching, which took up 25% of the visit time. [17] Regarding patients with T2D, whose condition is highly affected by lifestyle and may therefore need even more counselling or education on self-monitoring, this task can take up even more time.

3 Materials and methods

This study employs a mixed-methods design, combining time and motion study and semi-structured interviews. A convenience sample of GPs who manage patients with type 2 diabetes was recruited from Järveotsa GP practice. The time and motion study was conducted over a period of one week, during which the researcher observed and documented the work processes involved in managing patients with type 2 diabetes. The semi-structured interviews were conducted after the time and motion study was completed and explored the perspectives of the GPs regarding their work processes.

3.1 Study site

The author chose Järveotsa GP practice to be the study site as Järveotsa GP practice is also a teaching practice and an internship site for nursing students. Therefore, the nurses and GPs are more open to working with students, taking part in research programs and they are less distracted by an observer in the room during a visit. Järveotsa family practice has 2 branches, together in which work 7 family physicians and 17 family nurses who take care of over 13 400 patients.

3.1.1 Chronic care management in Järveotsa GP practice

Järveotsa GP practice has mapped out their current process for handling patients with chronic conditions (Appendix 7). Their process map includes 5 stakeholders: the patient, family nurse, family physician, specialist doctor and Estonian Health Insurance Fund (EHIF). This process map shows the flow of processes that is takes for a patient with a chronic condition to reach continuous following of a treatment plan in Estonian health care system. There are 3 different starting points for this process:

1. Initiated by a patient - the first appearance of health problems.
2. Initiated by a patient - need for extending a prescription.
3. Initiated by the EHIF – Preparing a list of risk patients that the family nurses shall check. [18]

The specific part of the process that this study investigates has been marked on Figure 1. The red circles mark a face-to-face visit with a nurse or a GP. The previous steps on the

map show that the patients have already had their analysis taken and they are now invited to a visit in the GP practice to discuss the results and have an annual regular face-to-face check-up specific for patients with type 2 diabetes.

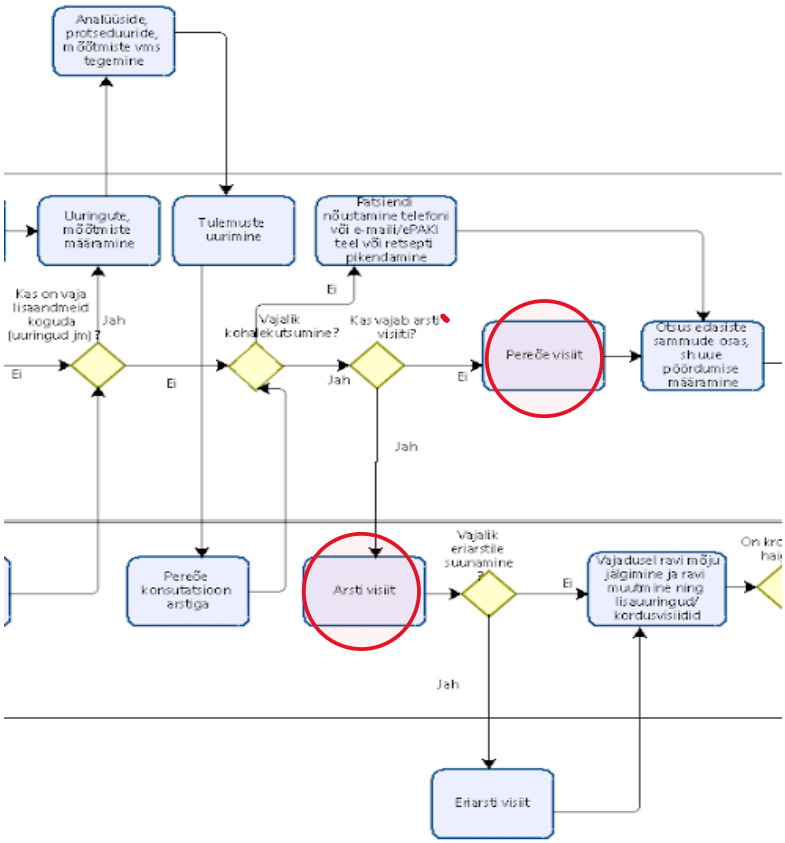

Figure 1 Fraction of Järveotsa GP practice's process for managing patients with chronic conditions.

What is different regarding the processes of managing patients with chronic conditions in the Estonian health care system, compared to many other countries, is that from 2015, the family nurses can also prescribe a limited number of medicines to patients. Allowing this has made extending prescriptions a faster process for the patient and taken some workload off from the family physicians. [19] This also aligns with the CCM's focus on reorganization of the delivery of care and making it more team based.

The management of patients with chronic conditions is in constant development. The development of e-solutions in the health care sector brings new opportunities like for example remote monitoring, asymmetric communication between medical staff and

patients, and patients' self-monitoring. Järveotsa Family Practice aims to improve the process are focusin on two of the CCM key elements – self-management support and delivery system design. The plans include the implementation of e-Perearstikeskus (ePAK), which is an online solution for Estonian family practices that offers a secure communication channel for GPs, nurses and patients. Patients can use the platform for booking face-to-face or online visits with their GP, to ask questions from their doctor, open and close a sick leave, extend their prescriptions, and keep a health diary [20]. The main features that Järveotsa family practice wants to add to the process of their management of patients with chronic conditions include the patients being able to book appointments, extend prescriptions and add the information of their self-monitoring to the platform [18].

3.2 Direct time and motion observations

The basis for this research is a time and motion study (TMS), which was carried out through direct observations on 18 face-to-face visits of patients with T2D at both Järveotsa GP practice branches. 13 observations took place in the Õismäe branch, and 5 observations took place in the Sõle branch.

Time and motion study is a systematic method for analysing work processes and identifying opportunities for improvement in terms of efficiency and productivity. The method involves observing and recording the time it takes for workers to perform specific tasks and the motions involved in those tasks. The method has been used in healthcare to study the inefficiencies and costs in healthcare delivery as well as the quality of care. However, there are numerous ways to conduct a time and motion study. For example, instead of direct observations, it is also possible to use self-reporting. However, self-reporting is not a suitable method for face-to-face patient visits as it would create too many distractions for the healthcare worker. In this study setting, the patient had to have full attention of the physician. TMS of computer-based tasks could be carried out using information from the software provider's database, by analysing the timestamps of the recorded activities. This type of records were not available for the current study.

The TMS in this research paper was performed in accordance with the STAMP checklist (Appendix 5) developed by Zheng et al. [21] The STAMP checklist adds

structure, comprehensiveness, and a focus on continuous improvement to time and motion studies. The author chose to follow the STAMP checklist, which outlines a minimum set of 29 data and information elements to make the study comparable to the only previous TMS carried out on the Estonian healthcare system by Männil in 2019 [17].

3.2.1 Recruitment of family physicians and nurses

The current study was carried out in collaboration with Järveotsa GP practice. The manager of the GP practice contacted the potential participants and identified the family physicians and nurses, that had appointments made for patients with T2D during the week of direct observations. Prior to the observation, the author provided the participants with details about the study, including its goals and expectations. Participating GPs and nurses filled out an informed consent form (Appendix 2).

A confidentiality agreement was signed between the author of the study and Järveotsa GP practice to ensure that information used in the study would not be shared with third parties or used improperly. All patients were provided with an acknowledgement sheet containing information about the setup of the study. Patients were required to fill out an informed consent form (Appendix 3) before entering the GP office. The patients had the opportunity to refuse to let the author stay in the physician's office during the visit at any point. No personally identifiable information was recorded or analysed during the study; however, the consent of the Ethics Committee was attained due to the author of the study having access to patients' personal data.

3.2.2 Data collection

Before conducting the on-site observations, the author used the CCM, STAMP checklist and consulted with an experienced family physician in the GP practice to map out the specific steps during the face-to-face patient visits of patients with T2D. The family physicians and nurses were observed as they carried out their daily work processes regarding the management of patients with T2D and time spent on each task was recorded to identify areas of improvement.

The observations were carried out in both Järveotsa GP practice's branches during the week of 10.-14. April. The author spent 2 days in the Õismäe branch and 1 day in the Sõle branch. The dates on which the author visited which branch were chosen based on

the number of regular annual check-up appointments made for patients with T2D. No visits were scheduled specifically for the purpose of the current study, but the author conducted the observation during the time of the year, when Järveotsa GP practice generally reaches out to patients with T2D.

The observations were carried out for several family physicians and nurses during the same day, as the author followed the schedule of appointments made precisely by patients with T2D. The author was placed in an unintrusive location in the physician's office to not make the patients feel uncomfortable, while still being able to observe the activities of the physician.

3.2.3 Data analysis

The data collected from the direct observations was processed and analysed using Excel to identify patterns and trends in the time spent on administrative tasks, patient consultations, and other diabetes-related duties within the GP practice. Descriptive statistics about the time-utilization of the family physicians and nurses during the visits of patients with T2D are provided. Average, minimum, and maximum values are shown for visit times as well as the distribution in percentages of tasks involving computer usage versus non-computer tasks during face-to-face visits of patients with type 2 diabetes.

3.3 Semi-structured interviews

The semi-structured interviews were conducted to gain insight into how family physicians and nurses manage their time and patient care, and the potential impact of e-solutions on these processes. Semi-structured interviews allow for open-ended questions that enable participants to express their thought and opinions freely while also providing structure to the interview process.

3.3.1 Data collection

The focus of the interviews was to understand the family physicians' and nurses' workload, their thoughts on the current processes regarding the management of patients with T2D and their satisfaction with the related e-solutions. All together 5 interviews were conducted. The interviewees included two family physicians and 3 nurses

(including a nursing manager). Two interviews were carried out face-to-face in the study site and three interviews were carried out over Zoom.

The semi-structured interviews were based on an interview guide (Appendix 4) that included open-ended questions related to the research questions. The interview guide was developed based on the only previous TMS carried out in Estonian to investigate the family physicians' time utilization by Männil in 2020 that also used semi-structured interviews [17]. The structure of the interview as well as majority of the questions were kept consistent to be able to compare the results of the two studies. However, some questions were further specified to focus on patients with type 2 diabetes.

The interview guide was piloted with one family physician to ensure that the questions are clear, relevant and appropriate for the research objectives. The interviews were audio-recorded. The recordings were used to later transcribe the interviews with the help of the Estonian speech recognition and transcription editing service developed in Tallinn University of Technology's speech technology lab [22]. The audio files were cut before transcribing, so that no personal identifiers were transcribed to maintain participants' confidentiality. The data from the transcriptions was extracted manually and the extracted data was collected into an Excel sheet.

3.3.2 Data analysis

The author chose to use thematic analysis for the analysis of the semi-structured interview responses as it enables comprehensive exploration of data, effectively identifying patterns and themes that highlight similarities and differences in participants' experiences while being relatively straightforward compared to methods like grounded theory or discourse analysis. It is a versatile enough method to include data from different sources such as interviews, observations, and textual documents. [22]

The thematic analysis was conducted in line with the guidelines proposed by Braun and Clarke, involving six key stages:

- Familiarization with the data: Initially, the author immersed themselves in the data by repeatedly reading the transcripts, noting down initial ideas and impressions.

- Generating initial codes: The second stage involved generating concise, preliminary codes from the data. This coding was done manually, with each code representing a basic idea or concept mentioned by the participants.

- Searching for themes: Codes were then grouped based on potential themes they formed. This stage involved a careful and iterative process of examining how different codes may combine to form overarching themes relevant to the research questions.

- Reviewing themes: The identified themes were reviewed and refined. This step involved checking if the themes worked in relation to the coded extracts and the entire data set, ensuring coherence and consistency.

- Defining and naming themes: Each theme was clearly defined and named, capturing the essence of the data it represents. This process involved a detailed analysis of each theme and understanding how it relates to the broader research questions.

- Producing the report: The final step entailed writing the analysis, weaving together the thematic narrative with data extracts. This analysis contextualizes the findings within the existing literature, theoretical framework and relates back to the research questions. [22]

To ensure the rigor and reliability of the thematic analysis, member checking and triangulation strategies were employed. Participants were given opportunities to review the analysis summary to verify the accuracy and resonance of the findings with their experiences and where possible, themes were confirmed and cross-referenced with data from other sources (e.g., observational notes, literature).

4 Results

The results of the study will provide insights into the work processes of GPs regarding patients with type 2 diabetes. The time and motion study will provide quantitative data on the amount of time spent on different activities related to the care of patients with type 2 diabetes, and the semi-structured interviews will provide qualitative data on the experiences and perspectives of the GPs. The findings of the study will be analysed and presented thematically.

4.1 Results of the time and motion study

In the analysis of time spent on visits, a distinction was made between activities involving computer usage and those without. For activities with computer usage, a total of approximately 186.4 minutes was spent across all visits. The activity consuming the most time was entering data, taking up 65.8 minutes in total. Comparatively, activities without computer usage accounted for a higher total duration of around 227.0 minutes. The longest duration was observed in counselling, totalling 64.02 minutes, including both lifestyle counselling and counselling regarding the medications and treatment plan. It's also worth noting that there were more distinct activities without computer usage (72) compared to those with computer usage (65).

The time it takes to conduct different steps in the face-to-face visit’s checklist varies from patient to patient, therefore the time spent on the computer versus time spent having eye-contact with a patient also vastly varies. Furthermore, the nurses’ and GPs’ familiarity with the technology and the consistent utilization of the same systems over the years enable healthcare professionals to maintain substantial eye contact while recording patient information.

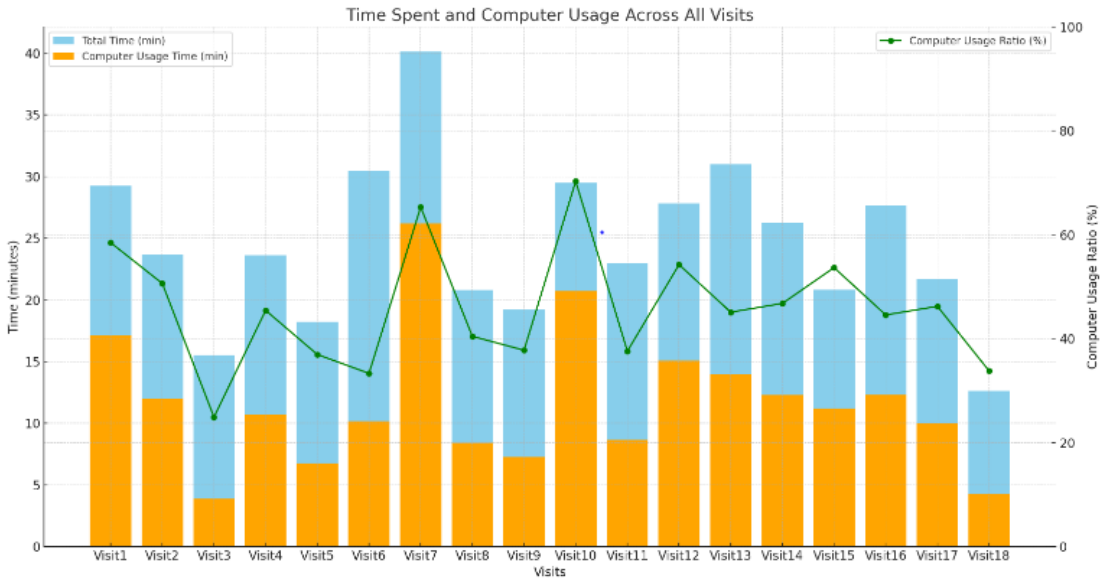

Figure 2 Time Spent and Computer Usage Across All Visits, the Author

The bars in Figure 2 represent the total time spent (in blue) and the time spent using a computer (in orange) for each visit, measured in minutes. The green line with markers indicates the proportion of time spent using a computer, expressed as a percentage of the total time, with the y-axis scaled from 0% to 100%. The shortest visit lasted for 12 minutes and 37 seconds, while the longest lasted for 38 minutes and 40 seconds as it included an exceptional cardiogram which took 11 minutes and 38 seconds. The computer usage ratio shows considerable variability across visits, ranging from below 20% to nearly 80% in some instances.

The total time spent on activities involving computer usage constitutes approximately 45.09% of the total time spent on all activities. This percentage indicates that nearly half of the time was dedicated to computer-related tasks across the visits.

Figure 3 shows the top 5 activities which involved using the computer, focusing on those that consumed the most time. This visualization provides a clearer view of the specific activities where computer usage was most prominent, with each bar representing the total time spent on that activity across all visits.

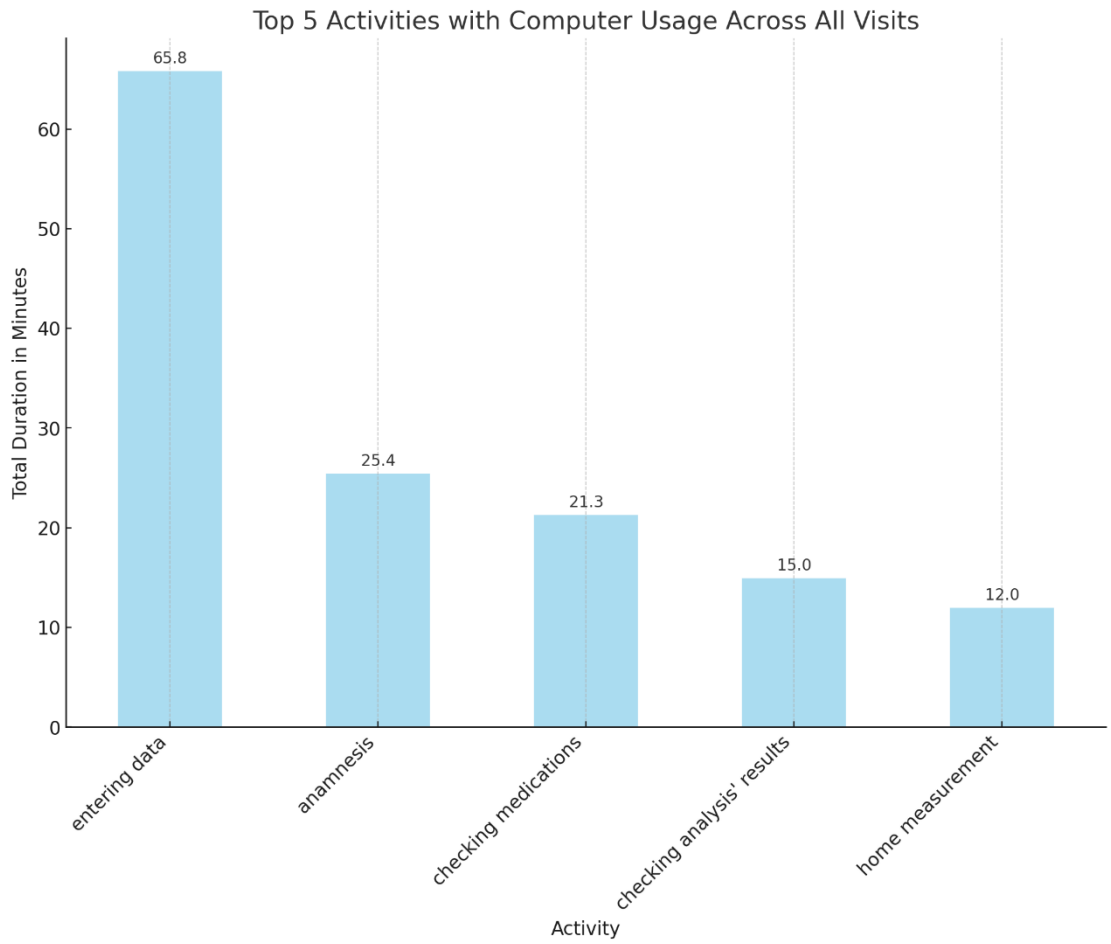

Figure 3 Top 5 time-consuming activities with computer usage across all visits, the Author

As previously noted, then the most time-consuming activity involving a computer was entering data. Second most time-consuming activity was checking the patient's anamnesis, which took 25.4 minutes across all visits. However, it is noteworthy that some nurses and GPs had already checked their patients' anamnesis in the morning before the face-to-face visits, which sped up this activity during some visits, while others went through the anamnesis with the patient already in the cabinet. This is also reflected in Table 1 showing the descriptive statistics for the top 5 activities with computer usage, where it is visible that in some visits, there was no time spent on checking the patient's anamnesis, while the maximum time spent on the activity was 4.77 minutes.

Table 1 Descriptive statistics for top 5 activities with computer usage, the Author

Activity	Mean (minutes)	Std Dev (minutes)	Min (minutes)	Max (minutes)
entering data	3.66	2.33	1.10	10.73
anamnesis	1.41	1.43	0.00	4.77
checking medications	1.32	1.78	0.00	5.47
checking the results of previous analysis	0.86	1.52	0.00	5.85
home measurement	0.66	0.98	0.00	3.92

As most of the patients had already gotten their analysis taken before coming to the visit, then another time-consuming step was firstly checking the results of previous analysis and then discussing the results with the patient. During this the nurses and GPs oftentimes turned their screen to the patients to show them the historic results of their analysis.

Checking medications was the third most time-consuming task involving computer usage, with a maximum of 5.47 minutes spent on it during a visit. The minimum being 0 does not mean that medications were not checked during the visit, rather it means that there were no changes in the medications, the discussion regarding medications was held while having eye-contact with the patient and if needed the prescription was extended (which was recorded as a separate activity). Visits where checking medications using the computer took longer, involved cases where the patients had comorbidities like for example hypertension and the nurses and GPs had to check whether all prescriptions are still accurate and that the patient is taking the medications correctly.

To get a better understanding of time allocation regarding patient centered activities, all recorded activities were grouped into 5 categories – consultation, physical examination, medication review, documentation and other. Consultation category included all activities regarding counselling, treatment plan discussion, checking the anamnesis, checking, and discussing the results of analysis and patient's concerns. Physical examination included all "hands-on" activities like taking weight, height, waist measurements, measuring heart rate, blood sugar, blood pressure, checking eyes, feet,

and throat. Medication review included checking and extending prescriptions as well as checking medication usage. If the patient needed additional counselling regarding medications, then this was tracked as a separate activity and included in the consultation category. Documentation category included entering data for all other categories as well as check-list activities like asking the patient information about smoking, alcohol usage, urination, digestion, water intake, allergies, sleep, living conditions and physical activity. The other category was used for one off case specific activities, like an exceptional cardiogram, nurse leaving the room to bring a cup for urine example, creating referral letters, checking one patient's previous x-rays, and discussing a sick leave.

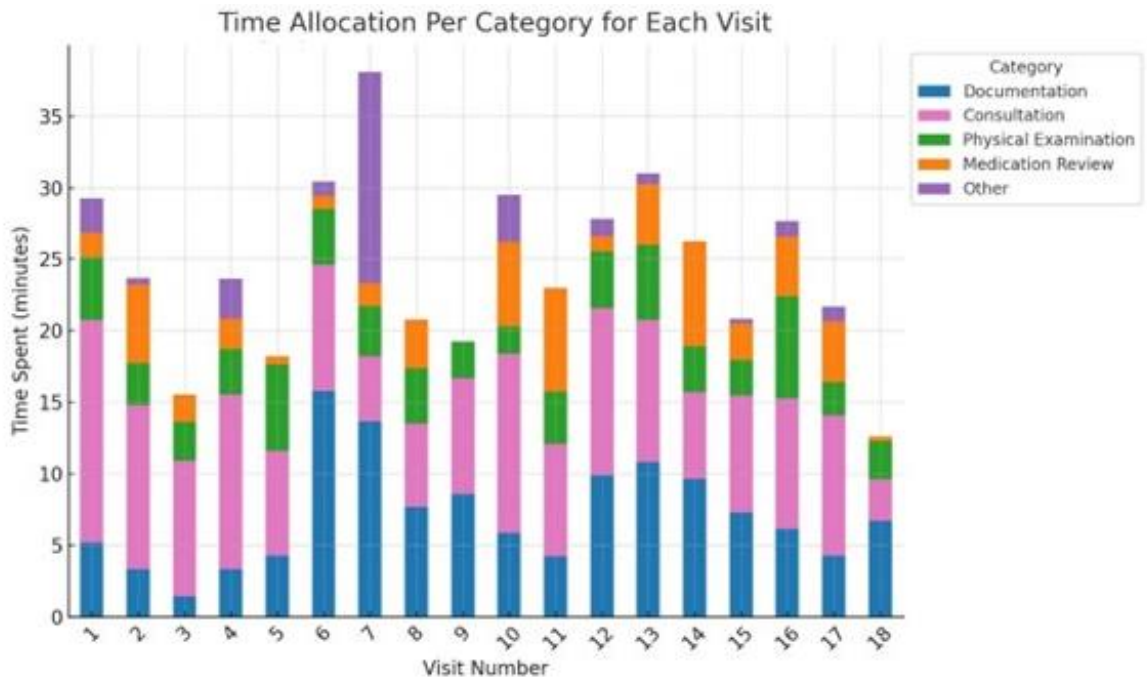

Figure 4 Time allocation per category for each visit, the Author

Figure 4 shows the time allocation per category for each visit, where it is visible that documentation and consultation made up the majority of all the visits. Visit number 7 has an unusually large part allocated to the other category as it included the exceptional cardiogram. To bring out differences in time allocated to the different categories across visits, then Figure 5 shows the average duration of each category across visits and Table 2 brings out the descriptive statistics of each category.

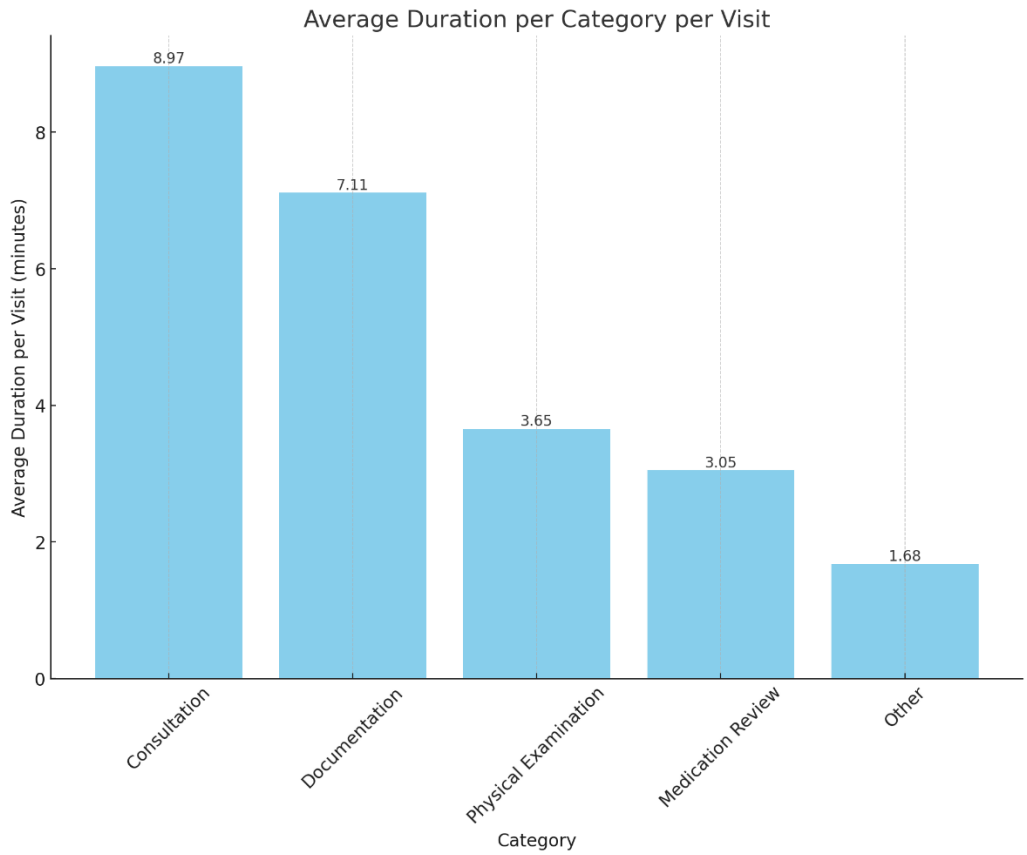

Figure 5 Average duration per category per visit, the Author

Table 2 Descriptive statistics for activity categories, the Author

Category	Mean (minutes)	Std Dev (minutes)	Min (minutes)	Max (minutes)	Percentage of Total (%)
Consultation	8.97	2.23	0.93	17.52	36.74
Documentation	7.11	3.76	1.42	15.77	29.15
Medication Review	3.05	2.33	0.00	7.32	12.49
Physical Examination	3.65	1.36	1.90	7.15	14.98
Other	1.62	3.44	0.00	14.77	6.64

Even though the most time-consuming activity was entering data, then from Table 2 it is visible that the category which took up the most time during the visits was consultation. This shows that even though computer-based activities took up almost half of the visit times, then the focus during the visits was still on patient-centered activities.

4.2 Results of the semi-structured interviews

The current workload in the GP practice is notably demanding. One GP said that as there are over 1900 patients in her patient list, then to do her job well and be thorough in her work, eight hours a day a day is simply not enough, meaning that she either has to work overtime or make sacrifices in the quality of her work. Out of the five interviewed medical professionals, one was working part-time - 4 days a week instead of 5. She mentioned that as the workload is so demanding, then even the part-time position often feels like a full-time position instead. The most time-consuming tasks depend on the day as tasks are allocated on rotation basis, however specifically documentation was mentioned in each interview.

The main key challenges regarding type 2 diabetes care that were brought out were patient education, consistent medication adherence and patients not making lifestyle changes. One interviewee brought out that it feels like patients are hoping that medication will fix all their issues without them having to make any additional effort.

Regarding the face-to-face visits of patients with T2D, there is a prevailing sentiment that the 30-minute appointment allocation is sufficient for patients with an established history of diabetes. However, if it's a new patient, then collecting all the necessary information about the patient's diet and lifestyle, educating the patient about the disease and medications may extend the duration of the appointment. Two interviewees suggested that the duration of a visit of a new patient with diabetes should be extended to approximately an hour. This would allow for more time to thoroughly go through a treatment plan with the patient, which involves discussing the current blood pressure, blood sugar, weight, lifestyle and making specific future goals for these indicators as well as marking down the steps on how to reach these goals.

While all procedural steps of the regular check-ups are deemed essential, some nurses occasionally skip some lifestyle related questions, particularly in cases involving long-standing patients. As one nurse brought out as an example, then it does not make sense to ask about alcohol usage from a patient who they already know very well and who has been sober for their whole life.

The nurses and GPs found that the extension of the time allocated for the face-to-face visits in the recent years has alleviated time constraints. It was also noted that as they

have used the same programs for a long time and are familiar with the technology, then they manage to keep regular eye-contact while making notes. Some nurses preferred to record notes after the visit if the patient had no complaints and only make the essential notes during the visit. However, one interviewee said: “Having an undisturbed face-to-face conversation result in a much better connection with a patient and is more effective. At the same time, I know I have to write down everything that’s important and if I don’t do it right away, I might forget something. I must choose whether I write up my notes afterwards to establish a better connection with the patient or try to make notes during the conversation to not miss any information.”

The nurses and GPs all had positive opinions concerning the electronic solutions integrated into their daily workflow. The most useful feature that was brought out was the patients' ability to request prescription extensions online. Prospective developments that the nurses brought out include automating this process, allowing the system to autonomously assess whether a prescription can be extended without manual nurse intervention. It was also noted that, although digital solutions alleviate overall workloads, certain patients occasionally overutilize e-Perearstikeskus for minor inquiries.

Currently, Järveotsa GP practice employs Perearst 3 software, which the GPs and nurses find generally user-friendly. Nevertheless, specific recommendations for improvement were made. Notably, the accessibility and coherence of patient history and epicrisis within the software interface have posed challenges and may cause some important information to be missed. As a result, some nurses resort to the use of data viewer in the national Health Portal. One recommendation was that the patient’s allergies should be made more visible – “Allergies can be mentioned in the notes section, but there is a lot of information. Allergies should be visible straight away in big and red as it has previously caused some issues.” Additionally, the absence of data visualization tools for patient lab analysis results was noted by two interviewees.

Considering the imperative role of self-management counselling in the care of T2D patients, many of whom are elderly and less adept with digital technologies, nurses and GPs frequently resort to writing additional instructions on paper. It has been suggested that a valuable feature would involve the generation of a document within Perearst 3, derived from the patient's treatment plan and lab analysis results. This document would

encompass instructions on how to take their medication and diabetes self-management and could then be easily printed out and given to the patient.

5 Discussion

The study contributes to the understanding of the processes of care management for Type 2 Diabetes within the Estonian healthcare system. By examining the care processes in relation to the Chronic Care Model and patient-centered care principles, we gain insights into the current state of T2D management. The study employed a mixed-methods approach, combining a time and motion study with semi-structured interviews. Encompassing both quantitative and qualitative aspects was crucial in addressing the complex dynamics of T2D management.

The time and motion study was conducted over a week, 10.-14. April 2023 at Järveotsa GP practice through direct observations of 18 face-to-face visits. The preparatory activities for the TMS included acquiring the approval of the ethics committee, preparing the documents, background research, selection of a suitable TMS method, alignment of the study with the STAMP checklist, consultation with a GP to compile the main activity list, pilot test and recruiting study participants. The TMS provided quantitative data on the time allocation for various activities in patient care. This approach was instrumental in understanding the practical aspects of care delivery, particularly the allocation of time spent on administrative tasks and tasks that were carried out using a computer, versus time spent having face-to-face interactions with the patient and patient-centered activities.

The data was inserted into an Excel spreadsheet which included three columns – timestamps, activity, and computer usage. The timestamps were entered by using a stopwatch, activities were noted down during the patient's visit and the time spent on computer versus having eye-contact with the patient during different activities was observed. The Excel software was sufficient for the study as it was easy to operate and allowed for a lot of flexibility regarding adding comments and multitasking, which can be a limitation of other software meant specifically for TMS that are available free of charge like WorkStudy+.

The activity list for the study was compiled through a consultation with a GP and a test observation. As the software used for the TMS allowed for flexibility, then the list of activities was expanded if an action occurred that was previously not in the list (like for example an exceptional cardiogram). However, as these actions were mainly one off

and specific to a patient, not connected to them having T2D, then these were classified as “other” activities in the data analysis. There is an internal checklist of actions for the regular face-to-face visits of patients with T2D in Järveotsa GP practice, which helped to finalise the activity list, make it relevant and cover all the most important activities as well as compare the activities with the national guidelines.

The results of the TMS with 18 direct observations of face-to-dace visits of patients with T2D showed that the visit duration as well as the ratio of computer usage and time distribution across different activities varied vastly. The differences came from some of the patients having other health concerns in addition to T2D as well as the patient’s personality – some patients were very straight forward with their answers to the GP’s questions, others elaborate. The difference in time spent on counselling the patient was greatly affected by how aware the patient was of the characteristics and self-management of T2D.

The total time across 18 visits, that was spent on computer-based activities constituted 45.09% of the total time spent on all activities, meaning that 54.91% of the time was spent on activities involving active eye contact with the patient. These percentages indicate that nearly half of the time was dedicated to computer-related tasks across the visits. The only previous TMS carried out in Estonia on the GPs and nurses time utilization was conducted in 2019 by Männil, who found that on average 37% of the visit was spent on computer-based tasks and 63% on non-computer tasks. The most time-consuming task in both studies was counselling, taking up 25% of the visit time in the 2019 study and 36.74% in the current study. [17] The differences in these studies may come from the fact that Männil’s study was not focused on patients with a specific diagnosis. As the observed visits in this study were regular yearly check-ups of patients with T2D, then a large proportion of time during the visits was focused on following a checklist of things that need to be done. Therefore, the visits include more routine questions from the GP’s or nurses’ side, instead of trying to figure out the patient’s concerns explaining the higher results for computer-usage in this study. What is also noteworthy is that the average duration of the visit in Männil’s study was 14.48 minutes [17], whereas the average duration of the visit in this study was 24.24 minutes. This shows that even though the ratio of time spent on counselling was only 11.74% higher in the current study, then the actual average time spent on it during the visit is more than double – 3.12 minutes in 2019 versus 8.97 minutes in the current study. This aligns well

with the ideas from the Chronic Care Model, guidelines for T2D management and the idea of patient-centered care which all emphasise the importance of educating patients and lifestyle counselling.

The semi-structured interviews, on the other hand, offered qualitative insights into the experiences and perspectives of GPs managing T2D. These interviews were pivotal in revealing the subjective dimensions of care management, including the challenges faced by healthcare providers and their perceptions of the efficacy of current practices. All together 5 interviews were conducted. Two interviewees were GPs and 3 nurses (including a nursing manager). Two interviews were carried out face-to-face in the study site and three interviews were carried out over Zoom. There were no big differences in carrying out the interview face-to-face or over Zoom, however one interview conducted over Zoom did encounter some internet connection issues making the interview longer and transcription more manual due to the lower quality of the audio. Using semi-structured interviews fit the purpose of the study, as it was possible to gather detailed information while still having the flexibility to explore topics in more depth based on the responses of the interviewee. This was especially useful in the later stages of the interview, where the different e-solutions and recommendations were discussed.

While the interviews showed that the nurses and GPs were generally positively minded regarding the different e-solutions used in the GP practice, then the workload that comes from them can be very time consuming. As one nurse mentioned, then offering a quick and convenient channel of communication to the patients can result in patients overutilizing the channel with minor inquires. This raises a concern regarding intertwining further patient-centered digital solutions into the management of patients with T2D as the interviews clearly showed that the nurses and GPs are already managing a very high workload. It also highlights an important takeaway, the Chronic Care Model and the patient-centered approach increase the need for more medical staff and readiness to cope with the additional workload.

5.1 Answers to research questions

The first research question asked what the different steps in the care management process for patients with type 2 diabetes are**.** The study focused only on a specific part

of the whole care management process, looking into the regular annual face-to-face visits of patients with T2D. This part in the process involved a range of steps that could be divided into five main categories – consultation, documentation, medication review, physical examination and other. This finding emerged from the time and motion study, which provided detailed insights into the allocation of time across these various categories as well as the specific tasks within these categories.

The second research question asked how the time between different activities during face-to-face regular visits is divided, and what the most time-consuming tasks are. The quantitative data from the time and motion study highlighted that computer-based activities, consumed a substantial portion of healthcare providers' time, 45.09%. The most time-consuming activity being data entry. This distribution of time indicates a potential misalignment with the ideals of patient-centered care, where more direct interaction with patients is typically prioritized. However, the most time-consuming non-computer task was counselling, which is especially important in the patient-centered approach for T2D patients who need more lifestyle counselling or teaching regarding taking insulin and measuring their glucose levels at home. Even more, when considering both - counselling while having eye-contact with the patient and consulting the patient while making notes on the computer, then it accounted for 36.74% of the whole time measured in the study, making it the most time-consuming category of activities.

The third research question asked whether the opinions of family physicians coincide with the results of the time and motion study regarding the time expenditure and utilization. In general, the GPs and nurses found that the time allocated to face-to-face visits was sufficient, which was also confirmed by the TMS as there was only one visit that exceeded the time meant for a visit by more than a minute and that was due to an exceptional cardiogram. The interviews also highlighted that as the GPs and nurses have used the same programs for a long time and are familiar with the technology, then they manage to keep regular eye-contact while making notes, which was also visible during the direct observations. That can also be seen from the fact that when separating activities based on computer usage, the most time-consuming activity was data-entry, but when disregarding the computer usage factor, then counselling and consultation was most time-consuming instead.

The fourth research question asked whether the current processes in place in Järveotsa GP practice are in line with the CCM. It appears that the current processes at Järveotsa GP practice reflect some aspects of the Chronic Care Model, particularly in terms of providing regular care for chronic conditions like type 2 diabetes. However, the challenges in managing time effectively, especially with regards to balancing administrative tasks and patient-centered care, suggest that there may be areas where the practice could further align with the CCM's emphasis on efficient, proactive, and patient-focused care. The study's insights point to opportunities for improving alignment with the CCM by enhancing patient engagement through better data visualisation tools, more interactive treatment plans and streamlining administrative processes. This also ties in with the last research question, which asked what the opportunities for moving towards a more patient-centered approach regarding T2D care are. Other opportunities could involve enhancing training for GPs and nurses in patient-centered care approaches, optimizing administrative processes to free up more time for patient care, and integrating digital health tools for efficient management.

5.2 Limitations of the study

The study was limited to a single GP practice in Tallinn, which means that it may not be representative of other settings. The results of the study may differ in other GP practices. The specific context of the study (Järveotsa GP practice) might also limit the generalizability of the findings to other healthcare settings or geographic regions.

The 18 observations as a sample size were too small to obtain statistically significant study results regarding the time utilization across specific activities, however it was sufficient to see the general time allocation trends when activities were grouped into categories.

5.3 Suggestions for future research

Future research could extend the study to multiple GP practices and conduct the study in different regions of the country. Similar research could also be conducted on patients with different diagnosis. This could be beneficial for the policy makers, the Health Insurance Fund, and the managers of GP practices to know how much time needs to be allocated for patients with different diagnosis. This knowledge could help shape the

primary care system to better fit the specific needs of the patients and make time allocation more efficient. This could also influence resource allocation between different GP practices based on the patient list and their diagnosis.

With the target group being software developers, future research endeavours could aim to delve deeper into exploring the options for the integration of technological solutions to streamline administrative tasks. This could be done by conducting longitudinal studies or intervention trials to assess the efficacy of proposed changes in practice. Additionally, incorporating the patient perspective on T2D care could offer valuable insights, contributing to a more comprehensive, patient-centered and effective care model.

6 Summary

This research set out to explore the care management for Type 2 Diabetes in Estonia, with a specific focus on time allocation, the alignment with the Chronic Care Model and the principles of patient-centered care. Through a mixed-methods approach, combining a time and motion study with semi-structured interviews, the research provided a comprehensive view of the current practices in T2D management.

The findings from the study highlight several key aspects. Firstly, the division of time between various tasks during patient visits revealed a significant portion of time spent on computer-based tasks, which is higher than in previous studies without diagnosis specification. Secondly, the semi-structured interviews with family physicians and nurses offered valuable perspectives on the challenges and opportunities in T2D care. While there is an evident awareness of the need for patient-centered approaches, practical constraints, such as time limitations and administrative burdens, impede their full implementation.

The study's insights point to opportunities for improving alignment with the CCM by enhancing patient engagement through better data visualisation tools, more interactive treatment plans and streamlining administrative processes. This suggests that while most of the elements of the CCM are in place, there is room for enhancement to fully embrace its principles.

The research questions posed at the outset of this study have been addressed, providing a clearer understanding of the state of T2D management in Estonia and offering insights for healthcare providers as well as other stakeholders in the healthcare system. The recommendations proposed, including enhancing patient engagement, optimizing time allocation, and integrating digital health tools, are aimed at moving towards a more patient-centered care model with the goal of improving patient outcomes and the quality of care in T2D management.

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Appendix 2 –Informed consent form for GPs and nurses

Perearsti, pereõe teavitusleht

- Uuringu läbiviija viibimise aluseks patsiendi visiidil ning perearsti või õega intervjuu läbi viimiseks on TalTech E-tervise eriala magistritöö jaoks **andmete kogumine perearstide ja õdede tööprotsesside kohta** teise tüübi diabeedi diagnoosiga patsiendi visiidil.
- Visiidi käigus registreerib uuringu läbiviija perearsti tööprotsesse (näiteks arvutis dokumenteerimine, saatekirja koostamine, anamneesi küsimine jm). **Registreeritavad ja mõõdetavad andmed ei sisalda mingil määral patsiendi, arsti ega õe isikuandmeid.**
- Andmete kaitseks on Järveotsa perearstikeskus ja uuringu läbiviija allkirjastanud konfidentsiaalsuslepingu.
- Konfidentsiaalsuslepingu kohaselt tagab uuringu läbiviija visiidil andmete kogumise ajal teatavaks saanud andmete igakülgse kaitse, kaitstes neid mittesihipärase kasutamise ning kolmandate isikute valdusesse sattumise eest. Andmete all mõistetakse delikaatseid isikuandmeid ja muid perearstikeskuse tööd puudutavaid andmeid.
- Uuritaval on igal hetkel õigus keelduda tema visiidi ajal uuringu teostamisest. Uuritav võib keelduda intervjuu küsimustele vastamisest. Uuringus osalemine on vabatahtlik. Keeldumiseks pöörduda uuringu läbiviija poole.

Nõusolek

Mind, ……....., on informeeritud ülalmainitud uuringust ja ma olen teadlik läbiviidava uurimistöö eesmärgist ja uuringu metoodikast.
Kinnitan oma nõusolekut uuringus osalemiseks.
Tean, et isikuandmeid uurimistöös ei kasutata.

Tean, et uuringu käigus tekkivate küsimuste kohta annab mulle täiendavat informatsiooni uuringu läbiviija ja Järveotsa perearstikeskuse juhataja.

Uuritava allkiri: .....

Kuupäev, kuu, aasta .....

Uuritavale informatsiooni andnud isiku nimi .....

Uuritavale informatsiooni andnud isiku allkiri .....

Kuupäev, kuu, aasta .....

Appendix 3 – Informed consent form for patients

Patsiendi teavitusleht

- Uuringu läbiviija viibimise aluseks perearst-patsient visiidil on TalTech E-tervise eriala magistritöö jaoks **andmete kogumine perearstide ja õdede tööprotsesside kohta** patsiendi visiidil.
- Visiidi käigus registreerib uuringu läbiviija perearsti tööprotsesse (näiteks arvutis dokumenteerimine, saatekirja koostamine, anamneesi küsimine jm). **Registreeritavad ja mõõdetavad andmed ei sisalda mingil määral patsiendi isikuandmeid.**
- Andmete kaitseks on perearst ja uuringu läbiviija allkirjastanud konfidentsiaalsuslepingu.
- Konfidentsiaalsuslepingu kohaselt tagab uuringu läbiviija visiidil andmete kogumise ajal teatavaks saanud andmete igakülgse kaitse, kaitstes neid mittesihipärase kasutamise ning kolmandate isikute valdusesse sattumise eest. Andmete all mõistetakse delikaatseid isikuandmeid ja muid perearstikeskuse tööd puudutavaid andmeid.
- Patsiendil on igal hetkel õigus keelduda tema visiidi ajal uuringu teostamisest. Uuringus osalemine on vabatahtlik. Keeldumiseks pöörduda perearsti, õe või uuringu läbiviija poole.

Nõusolek

Mind, ……......, on informeeritud ülalmainitud uuringust ja ma olen teadlik läbiviidava uurimistöö eesmärgist ja uuringu metoodikast.
Kinnitan oma nõusolekut uuringus osalemiseks.
Kinnitan oma nõusolekut, et uuringu läbiviija kuuleb visiidil minu isikuandmeid. Tean, et isikuandmeid uurimistöös ei kasutata.

Tean, et uuringu käigus tekkivate küsimuste kohta annab mulle täiendavat informatsiooni perearst, õde või uuringu läbiviija.

Uuritava allkiri: .....

Kuupäev, kuu, aasta .....

Uuritavale informatsiooni andnud isiku nimi .....

Uuritavale informatsiooni andnud isiku allkiri .....

Kuupäev, kuu, aasta .....

Appendix 4 – Interview guide

1. Baasandmed

1.1. Amet (perearst või õde)

1.2. Töökogemus (aastates)

1.3. Töökoormus (0.5, 1.0, ..)

2. Töökoormus

2.1. Kuidas hindate oma praegust töökoormust?

2.2. Millised tööülesanded võtavad teie igapäevatöös kõige rohkem aega?

2.3. Mis on Teie arvates teise tüübi diabeediga patsientide ravi kõige olulisemad probleemid?

3. Visiidid (teise tüübi diabeedi diagnoosiga patsientide visiidid)

3.1. Kuidas hindate visiidile kehtestatud aega - kas Teie arvates on aeg liiga lühike, et teha patsiendiga kõik vajalikud toimingud?

3.2. Nimetage tegevused ja toimingud, mis Teie arvates võtavad visiidil liiga kaua aega.

3.3. Kas on tegevusi ja toiminguid, mida oleks võimalik ära jätta või harvem läbi viia?

3.4. Kas arvate, et Teil on visiidi ajal patsiendiga piisavalt otsest kontakti?

3.5. Kas tunnete, et arvuti kasutamine visiidi ajal mõjutab Teie suhtlust patsiendiga? Kuidas?

3.6. Kas arvate, et arsti töölaual olevad e-lahendused (e-konsultatsioon, digiretsept jm) on teie töös pigem positiivse või negatiivse mõjuga - kas pikas plaanis pigem kiirendavad ja lihtsustavad protsesse või vastupidi?

3.7. Kas on tegevusi ja toiminguid, mida oleks võimalik e-kanalisse suunata, mida hetkel saab vaid füüsilisel visiidil läbi viia?

3.8. Millist perearsti tarkvara Te kasutate?

3.9. Kas ja kui rahul olete praegu kasutatava tarkvaraga?

3.10. Milliseid andmeid peaks tarkvara kuvama praegusest erinevalt/lisaks, et visiidi läbiviimine oleks tõhusam?

Appendix 5 – STAMP checklist

Area and element	Ref Code	Description
Type	INT.1	The system studied (intervention)
System genre	INT.2	Origin or lineage of the system (eg, commercial product, homegrown system, open source software)
Maturity	INT.3	Time elapsed since intervention, including the amount of time that study subjects have been exposed to the intervention
Institution type	ES.1	Type of the healthcare facility or facilities where empirical observations are conducted (eg, academic vs non-academic)
Care area	ES.2	Area of patient care services (eg, inpatient, outpatient, emergency department)
Locale	ES.3	Geographic characteristics (eg, urban vs rural)
Protocol	RD.1	Research protocol (eg, RCT, before and after, after only)
Duration	RD.2	Length of fieldwork (eg, whether all observations are completed within a month, or occur sporadically over the course of a year)
Shift distribution	RD.3	Clinical shifts observed (eg, morning, afternoon, night, if applicable)
Observation hours	RD.4	Total number of direct observation hours, in addition to how the hours are distributed across study phases or RCT study arms (if applicable)
Definition and classification	TC.1	Definition of tasks and description of all major and minor task categories
Acknowledgment of prior work	TC.2	Acknowledgment of task classification schemas previously used in the same or similar settings, and

Area and element	Ref Code	Description
		justifications if modifications are made
New development	TC.3	Development and validation of task definition and task classification, if no prior work can be leveraged
Size of field team	OBS.1	Total number of independent human observers
Training	OBS.2	Type and amount of training provided to human observers, including pre-study pilot observation sessions
Background	OBS.3	Professional background of observers (eg, residents, nurses, industrial engineering students) and their prior experiences in conducting observational studies in clinical settings
Inter-observer uniformity	OBS.4	If and how inter-observer agreements are calibrated
Continuity	OBS.5	Continuity of observers across multiple study phases (if applicable)
Assignment	OBS.6	How observers are assigned to shadow different research subjects and in particular, research subjects enrolled in different study phases or RCT study arms (if applicable)
Size	SUB.1	Number of research subjects enrolled
Recruitment and randomization	SUB.2	How research subjects are recruited (and randomized, if applicable)
Continuity	SUB.3	Continuity of subjects across multiple study phases (if applicable)
Background	SUB.4	Background information about research subjects such as clinician type and level of training (eg, residents vs attending physicians); if conditions allow, other individual characteristics such as gender, age, and computer literacy (eg, accessed using tools such as

Area and element	Ref Code	Description
		that of Cork *et al*48)
Multitasking	DR.1	If and how multi-tasking is taken into account; in particular, if only the primary task is recorded or all concurrent tasks are recorded
Non-observed periods	DR.2	If there are periods of time not covered by independent observers
Between-task transition	DR.3	If and how transition periods between consecutive tasks are handled
Collection tool	DR.4	Device and software used to collect field data, for example, the AHRQ tool,9 WOMBAT,45 and the medical work assessment tool developed by Mache *et al*49
Definition of key measures	DA.1	Key measures used in analysis and results reporting, for example, average time spent on ordering activities vs on direct patient care,7,8 TOT,47 and average continuous time that assesses workflow fragmentation and task switching frequency11
Analytical methods	DA.2	Statistical or other types of analytical methods used to analyze the data
Interruption	AD.1	A descriptor specifying if a task represents an interruption to prior tasks
Interaction	AD.2	Interpersonal interactions/communications necessary for task execution; for example, with whom and via what method (eg, in person, by telephone, via a computerized system)
Location	AD.3	The location where the activities take place (eg, in a patient ward, in a hallway, at computer workstations)

Appendix 6 – Ethics committee approval

Tartu Ülikooli inimuuringute eetika komitee

Protokolli number: 375/T-8 **koosolek: 20.03.2023**

Komitee koosseis:

Esimees	
Aime Keis	Tartu Ülikool, meditsiiniteaduste valdkond, meditsiinieetika nooremlektor
Aseesimees	
Kristi Lõuk	Tartu Ülikool, humanitaarteaduste ja kunstide valdkond, projektijuht / doktorant
Liikmed	
Diva Eensoo	Tervise Arengu Instituut, teadur
Katrin Kaarna	Tartu Ülikool, meditsiiniteaduste valdkond, kliiniliste uuringute keskuse juhataja
Malle Kuum	Tartu Ülikool, meditsiiniteaduste valdkond, farmakoloogia lektor / farmakoloogia teadur
Maire Peters	Tartu Ülikool, meditsiiniteaduste valdkond, geneetika kaasprofessor
Raivo Puhke	Tartu Ülikool, meditsiinteaduste valdkond, funktsionaalse morfoloogia lektor
Anna-Liisa Tamm	Tartu Tervishoiu Kõrgkool, füsioteraapia ja tervisekaitse osakonna juhataja
Anni Tamm	Tartu Ülikool, sotsiaalteaduste valdkond, arengu- ja koolipsühholoogia lektor / arengupsühholoogia teadur
Maarja Torga	Riigikohus, tsiviilkolleegiumi nõunik

Otsus: Kooskõlastada uurimistöö

Uurimistöö nimetus: Järveotsa perearstikeskuse perearstide ja õdede ajakasutuse ja tööprotsesside ajalise jaotuse uurimine teise tüübi diabeedi diagnoosiga patsientide visiitidel

Vastutav uurija (asutus):
Janek Metsallik (Tallinna Tehnikaülikool, E-meditsiini keskus: Tervisetehnoloogiate instituut, Raja 15 / Mäepealse, Tallinn)

Komitee poolt läbivaadatud dokumendid:

1. Uurimistöö avaldus kooskõlastuse saamiseks Tartu Ülikooli inimuuringute eetika komiteelt, 31.03.2023
2. Poolstruktureeritud intervjuu kava
3. Patsiendi informeerimise ja teadliku nõusoleku vorm, 31.03.2023
4. Arsti/pereõe informeerimise ja teadliku nõusoleku vorm, 31.03.2023
5. Uurimistöö läbiviijate CVd (J. Metsallik, M. Vainola)

Uurimistöö lõpp: 31.05.2023

Komitee esimees: Aime Keis */allkirjastatud digitaalselt/*

Komitee sekretär: Kaire Kallak */allkirjastatud digitaalselt/*

Väljastatud: */viimase digitaalallkirja kuupäev/*

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Appendix 7 -Chronic care management process in Järveotsa GP Practice