eHealth Questionnaire and Chat Tools in the General Practice

a Research on the Use of Digital Tools in Dutch General Practices and its
Impacts on Healthcare Professionals

"This thesis has been written as a study assignment under the supervision of an Utrecht University teacher. Ethical permission has been granted for this thesis project by the ethics board of the Faculty of Social and Behavioral Sciences, Utrecht University, and the thesis has been assessed by two university teachers. However, the thesis has not undergone a thorough peer-review process so conclusions and findings should be read as such."

Abstract

Background: Due to the ageing population, increasing care demands, and personnel shortages, eHealth questionnaire and chat tools are increasingly used in primary care. However, there is limited research on the impact of these tools on behaviour of healthcare professionals (HCPs).

Objective: This study aimed to examine the impacts of eHealth questionnaire and chat tools on the behaviour of primary care HCPs compared to traditional phone or in-person consultations.

Methods: This qualitative study involved eight semi-structured interviews at two general practices in the Netherlands with assistants, general practitioners, and a clinical nurse specialist. Interviews were transcribed verbatim using a digital tool and analysed using Thematic Analysis and the Capability, Opportunity, Motivation – Behaviour (COM-B) model, which explains behaviour through three conditions: capability, opportunity, and motivation. Additionally, fifty eHealth chat conversations between an assistant and patient were observed.

Results: The environmental context and work tasks (physical opportunities) are enhanced by the questionnaires and photos, enabling safer and more complete evaluations, potentially saving patients visits. This positively influences beliefs in quality care provision (reflective motivations) as HCPs are motivated by providing quality care, which in turn boosts job-satisfaction (automatic motivations). However, the lack of integration between different digital systems negatively affects physical opportunities and work efficiency (capabilities). Assessing eHealth's enhancement of capabilities was challenging due to varied outcomes and differing views on whether task-switching and typing versus speaking are beneficial. The evolving communication dynamic between HCPs and patients has altered HCP's role (social opportunities), resulting in less personal and more distant interactions. Which negatively impacts job-satisfaction as HCPs express concerns over reduced personal, non-digital patient interactions.

Conclusions: The use of eHealth questionnaires and chat tools has influenced HCP behaviour, requiring further study into these effects. Additionally, exploring the relationship between HCPs and patients, patient perspectives, and improving the integration of digital systems is necessary.

Bibliography

Introduction

Global and national healthcare face social and economic challenges arise within healthcare provision due to "double greying", characterised by an ageing population with longer lifespans (World Health Organization [WHO], 2015; Aceto, 2018). By 2040, the Netherlands anticipates a need for 25% of the workforce to be employed in healthcare (Zorginstituut Nederland, 2022), compared to the current 15% (Central Bureau voor de Statistiek [CBS], 2022). The Netherlands tries to tackle this problem by implementing policies that reinforce shifts from secondary to primary care, increasing the workload and pressure on primary care and therefore general practitioners (GPs) (Flinterman et al., 2018; Stuijver, 2022). Research by the Ministry of Health, Welfare and Sport and the National Association of General Practitioners (Landelijke Huisartsen Vereniging), indicates that over 69% of general practices report excessively high work pressure (Batenburg et al., 2018).

As a response to increasing care demands and pressures on primary care, eHealth is increasingly referred to (Aceto, 2018; Alekseeva et al., 2022; Thimbleby, 2013; Flinterman et al., 2018). Aceto et al. (2018) broadly defines eHealth as the application of Information and Communication Technologies (ICTs) in healthcare to counter challenges in quality, accessibility, and affordability (Van der Kleij et al., 2019). Common eHealth tools include computer paradigms that shift medical services to digital and remote operations (Alekseeva et al., 2022). Specifically in primary care, these tools often include questionnaires and chat systems for triage and anamnesis processes (Eldh et al., 2020; Denecke et al., 2018; Radionova et al., 2023; Zhakhina et al., 2023; Melms et al., 2021). Triage refers to determining within what time frame a patient must be seen, while the anamnesis refers to gaining knowledge of the course of the experienced health complaint and patient lifestyles (Van Dijk, 2013).

Can eHealth effectively address rising care demands and associated pressures? Proponents argue eHealth enhances patient engagement, accuracy, time efficiency, and reduces healthcare consumption overall (Zhakhina et al., 2023; Radionova et al., 2023; Gottliebsen, and Petersson, 2020). However, apprehensions persist regarding the accuracy and physician-patient relationship (Zhakhina et al., 2023; Radionova et al., 2023). Furthermore, concerns are voiced about privacy and security (Aceto et al., 2018), willingness and non-compliance of patients, and accessibility for specific patient groups (Gottliebsen and Petersson, 2020). Research of Velez-Lapao et al. (2019) highlight eHealth as an important opportunity to

address health workforce shortage, but not a solution on its own. Similarly, Thimbleby (2013) advocates in his article the importance of being driven by improving criteria behind principles, such as improving patient care or staff support, instead of being driven by the technology itself to save costs and make profit.

Correspondingly, research of Melms et al. (2023) on pre-consultation questionnaires recommends addressing a gap in research by investigating the acceptance of eHealth by doctors. Gottliebsen and Petersson (2020) recommend strict evaluation and regulation of medical triage tools, as patients are unable to judge the quality of the tools. Presumably highlighting researchers' and medical experts' responsibilities. Therefore, this study aims to examine the impact of eHealth questionnaire and chat tools designed for patient triage and anamnesis on the behaviour of HCPs in primary care. Consequently, the following research question was formulated:

Research question (RQ): "What impact does the use of an eHealth questionnaire and chat tools have on the behaviour of primary care healthcare professionals in comparison to previous working methods of spoken consultations over the phone, or in person?"

Theoretical Framework

To answer the RQ, an interdisciplinary theoretical framework explaining the components influencing behaviour was applied (Michie et al., 2011). In subsequent sections, concepts and theories from different disciplines and different levels of explanation are combined within this framework to capture the study's relevance. Additionally, the RQ is reintroduced along with supplementary sub-research questions.

COM-B Model

Examples of eHealth questionnaire and chat tools are digital communication systems in primary care (Eldh et al., 2020; Denecke et al., 2028), Symptom Checkers (SCs) for self-assessment, and preliminary self-diagnosis (Radionova et al., 2023), and pre-consultation history systems where patients self-report their medical histories through questionnaires or surveys before their scheduled appointment (Zhakhina et al., 2023; Melms et al., 2021). The implementation of these tools necessitates HCPs to adjust their habits and behaviour to accommodate changes. To assess the impact of eHealth on HCPs behaviour, the Capability, Opportunity, Motivation-Behaviour (COM-B) model is used. The COM-B model of Michie et al. (2011) provides a framework for comprehending factors influencing user engagement

(Szinay et al., 2021). It posits that changing behaviour requires alterations in capabilities, opportunities, and motivations (Richardson et al., 2021). This study, conducted retrospectively, aims to investigate whether there have been discernible changes in the capabilities, opportunities, and motivations of HCPs following the implementation of eHealth in healthcare, and how these changes are perceived by the professionals involved.

Opportunities

Opportunities consist of physical and social opportunities (Michie et al., 2011). The physical opportunities are environmental contexts such as service suitability and accessibility, and resource availability (Khayyat & Nazar, 2023). Physical opportunities can be found in the quality and safety an eHealth tool provides (Eldh et al. 2020). The systematic overview of Black et al. (2011) is concerned with the quality and safety of eHealth, recommending further evaluations on these topics. This study aims to contribute insights into the safety and quality of eHealth questionnaire and chat tools, exploring their impacts on the work environment and tasks of HCPs. A physical opportunity that perchance increases quality and safety, is the possibility for patients to upload photos within the digital communication system (Eldh et al., 2020). Results in this study are expected to correspond with research of Eldh et al. (2022), where these prompts with photos were considered to facilitate safer assessments and more accurate assessments, often saving patients a visit to the primary care centre, as well as sustain a safe environment by decreasing contagion risks. Furthermore, participants experience a relieve of minor issues on the telephone service is expected, as primary care staff now resolved these by a single message turnaround through the digital communication system. However, participants also mention that some patients use both telephone and digital communication simultaneously, occupying resources further (Eldh et al., 2020). In summary, eHealth could have environmental effects and change the work tasks of HCPs.

According to Macdonald et al. (2018), the increasing availability of internet information has reduced patients' reliance on HCPs, fostering a more collaborative interaction termed as a "partnership" or "alliance" between them. This in turn could lead to a potential role change of the HCP, which this study aims to substantiate. Another new role highlighted by respondents of Macdonald et al. (2018) is recommending websites and information due to the abundance of resources online. Heinsch et al. (2022) conducted qualitative research on HCPs' perspectives on the implementation and uptake of eHealth technologies in practice, noting that such tools empower patients to take control over their own care. Research of Kaihlanen et al. (2022) found that during the COVID-19 era vulnerable patients considered contact with

their HCP less personal and more prone to misunderstandings in the digital environment than in face-to-face services. It is expected this trend will also be experienced by HCPs in this study. Examining the social influences of eHealth among HCPs' roles, Lottonen et al. (2024) observed in their qualitative study a transfer of work tasks from physicians to nurses and from nurses to secretaries since the use of eHealth. Nevertheless, physicians point out that with eHealth they do more work tasks that previously were secretaries' work tasks, as well as other tasks that should not belong to them due to digital systems and services. Furthermore, findings of Lottonen et al. (2024) suggest eHealth and information systems have made multidisciplinary cooperation between professionals easier. From the research of Macdonald et al. (2018) and Lottonen et al. (2024), it becomes evident that social opportunities arising from eHealth could play a part in changing roles and relationships between HCP and patient, and HCP between each other.

Capabilities

Capabilities refer to the ability to adequately perform work tasks (Michie et al., 2011). Virtanen et al. (2021) defines capabilities as having the skills to perform professional tasks related to eHealth. Two types of capabilities can be distinguished, the psychological and physical capabilities (Michie et al., 2011). Examples from Szinay et al. (2021) and Khayyat and Nazar (2023) illustrate these capabilities related to eHealth, as the physical capabilities are eHealth skills, while psychological capabilities are knowledge of using eHealth. Because shifting medical services to digital and remote operations requires computational capabilities (Alekseeva et al., 2022), as well as changing requirements of skills and experience for HCPs (Radionova et al., 2023), a training should be provided to HCPs to support implementation and working with eHealth tools (Heinsch et al., 2022). This increases capabilities and therefore work efficiency. When not all HCPs possess the needed psychological and physical capabilities, qualitative research of Lottonen et al. (2024) suggests that work tasks get divided between HCPs by digital competence, in some cases resulting in a reliance on digital competent colleagues as it took less competent HCPs more time. Colleagues not having the capabilities to work with eHealth potentially creates a barrier for successful implementation of eHealth, and therefore impacts work efficiency. The study of Eldh et al. (2020) on the experience of primary care staff with a digital communication system revealed that responding via an eHealth chat tool required more time compared to telephone conversations, due to the absence of template responses. In contrast, Spreekuur.nl offers the use of templates, leading to the hypothesis that template responses are faster. These studies

consistently highlight the interplay between eHealth tools, capabilities, and work efficiency. The relation that this study aims to find is how eHealth questionnaire and chat tools influence the capabilities to work efficiently as an HCP.

Motivations

Motivations consist of automatic and reflective motivations. Reflective motivations refer to processes of conscious evaluating and planning (Michie et al., 2011), and relate to HCPs' beliefs of service value, outcomes and quality of eHealth (Khayyat & Nazar, 2023). The scoping review of Radionova et al. (2023) amplifies this, primarily due to results suggesting that physicians in primary care were open to change, as long as it helped fulfil their main goal of providing the best care to patients and kept their role central in the process. Qualitative studies of Eldh et al. (2020) and Heinsch et al. (2022), suggest that staff considered digital communications systems a good service, as patients were enabled to contact primary care at a time and place suiting them, with sufficient time to phrase their issues in a private setting. Research of Eldh et al. (2020) also points to a finding that goes against eHealth providing better quality care, as HCPs experienced prolonged chatting. There was no time limit for patients to respond within, resulting in communication extended over weeks and back-and-forth messaging with a lack of overview as a consequence. This was considered risky by primary care staff, in comparison to receiving all information in one consultation (Eldh et al., 2020). Furthermore, a poor quality was experienced as some patients lacked an understanding of the necessity for a complete anamnesis and would skip mandatory items by writing random punction marks and letters (Eldh et al. 2020). The mentioned studies show how the reflective motivations from working with eHealth directly relate to their beliefs of quality care provision.

Automatic motivations are the experienced emotions, impulses and associative learning (Michie et al., 2011). According to the scoping review of Radionova et al. (2023), influencers of the motivation are the role, work-related stress, and job-satisfaction of the HCP. There is a lack of knowledge on the perspective of HCPs on these three factors (Radionova et al., 2023). Expected is that the automatic motivations are closely related to the reflective motivations, as providing quality care should increase job-satisfaction. Respondents of the study of Macdonald et al. (2018) portrait an example for this argument, as respondent were overall enthusiastic about more informed patients and shared-decision making, as it contributes to better health outcomes. Pointing out that reflective motivations are interrelated with automatic motivations. Research of Lottonen et al (2024) pointed out that some HCPs didn't

have the motivation to learn the systems because of lower capabilities of working with eHealth. The automatic motivations from eHealth questionnaire and chat tools are being addressed by exploring its influence on the established research gap of job-satisfaction of HCPs (Radionova et al., 2023).

This study

This study aims to explain the impacts of eHealth questionnaire and chat tools on the behaviour of HCPs, using the COM-B model as a framework. The COM-B model captures behaviour in three essential conditions: opportunity, capability, and motivation (Michie et al., 2011). This approach facilitates answering the following RQ:

RQ: *"What impact does the use of an eHealth questionnaire and chat tools have on the opportunities, capabilities, motivations of primary care healthcare professionals in comparison to previous working methods of spoken consultations over the phone, or in person?"*

To comprehensively capture the meanings of opportunities, capabilities, and motivations, and to systematically address the RQ, the following sub-questions were formulated:

Sub-question 1 (SQ1): *"What impact does the use of eHealth questionnaire and chat tools have on the environmental context and work tasks (physical opportunities) of healthcare professionals in comparison to previous working methods of spoken consultations over the phone, or in person*?"

Sub-question 2 (SQ2): *"What impact does the use of eHealth questionnaire and chat tools have on the role (social opportunities) of healthcare professionals in comparison to previous working methods of spoken consultations over the phone, or in person*?"

Sub-question 3 (SQ3): *"What impact does the use of eHealth questionnaire and chat tools have on the work efficiency (capabilities) of healthcare professionals in comparison to previous working methods of spoken consultations over the phone, or in person*?"

Sub-question 4 (SQ4): *"What impact does the use of eHealth questionnaire and chat tools have on healthcare professional's beliefs of quality care provision (reflective motivations) in comparison to previous working methods of spoken consultations over the phone, or in person*?"

Sub-question 5 (SQ5): "*What impact does the use of eHealth questionnaire and chat tools have on the overall job-satisfaction (automatic motivations) of healthcare professionals in comparison to previous working methods of spoken consultations over the phone, or in person*?"

A visual representation of these RQ and SQs within the framework of the COM-B model is presented in Figure 1.

Figure 1

Visual representation of HCPs working with eHealth, compared to other working methods in the COM-B and TDF.
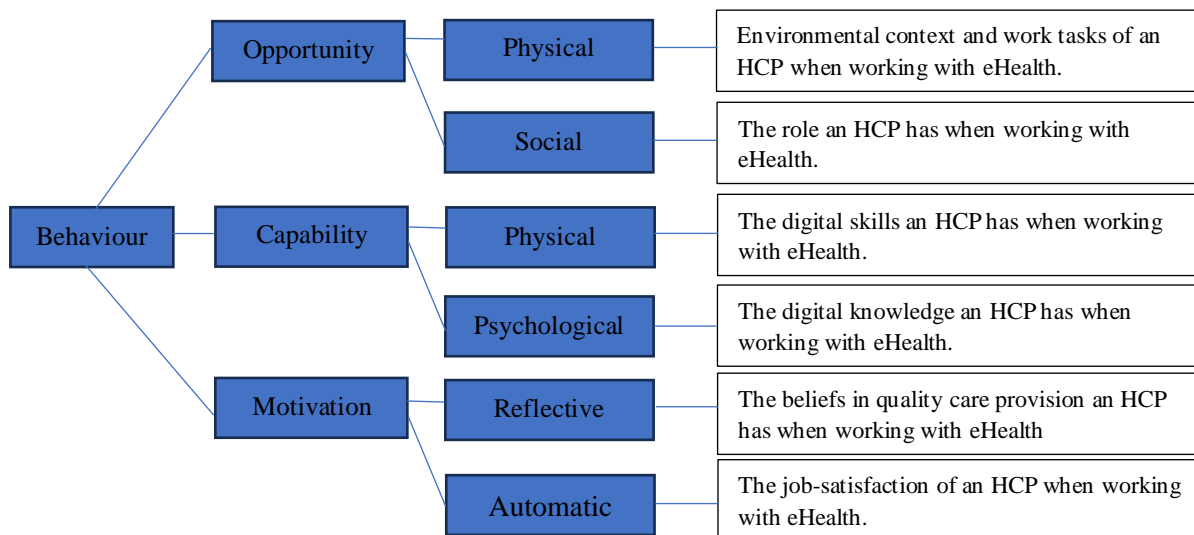
Methods

Design and Setting

A qualitative design, involving semi-structured interviews and a chat observation were considered most suitable for exploring and broadening theory on the research gap of the relationship between eHealth implementation and the behaviour of HCPs. Data were collected from two general practices using Spreekuur.nl, a questionnaire and chat tool co-created by DigiDok and Topicus. This tool is similar to pre-consultation history systems and SCs. The results section will provide further details on the functions of Spreekuur.nl. By examining two general practices working with Spreekuur.nl, this research aims to generate broadly applicable results regarding GPs' use of eHealth questionnaire and chat tools

(Bryman, 2016). Semi-structured interviews allowed for the emergence of concepts and theories, ensuring an open-minded approach (Bryman, 2016). Data-triangulation was achieved using both interviews and a chat observation. The interviews aimed to capture the capabilities, opportunities, and motivations of HCPs. The chat observations, which analysed responses from GPs, assistants, and patients, were designed to further capture the capabilities and opportunities of HCPs and to support the findings from the interviews.

Sample

Two general practices utilising Spreekuur.nl were sampled via a convenience and stratified sample. To avoid compromising the anonymity of the participants, general practices are pseudonymised as general practice A and B. Practice A has approximately 12,000 registered patients, and practice B 5,000. Participants of the interviews were GPs (n=3), a GP in training (n=1), a clinical nurse specialist (CNS) (n=1), and doctor's assistants (AS) (n=3) working at these practices. To guarantee the anonymity, participants are numbered 1 to 8. Additionally, they were given a label for their function of GP (including the GP in training), CNS, or AS. Practice B permitted an observation of patient chats within Spreekuur.nl. Using an assistant's account, a systematic sample of chats (n=50) was collected by observing them chronologically, starting with the most recent.

Conduction

The general practices were contacted via e-mail to schedule the interviews and chat observation. In general practice A, contact was coordinated by the practice manager. In general practice B, contact went through one of the GPs and an assistant. Data collection occurred through semi-structured interviews and chat observations on 9 April and 24 April 2024. The duration of the interviews was between 25 and 51 minutes. The conduction was face-to-face on location in the general practice (n=7), and via Microsoft Teams (n=1). Participants were interviewed individually by the author. For composing the interview guide, the COM-B model was used (Michie et al., 2011; Macdonald et al., 2018), and insights from relevant literature (Radionova et al., 2023; Eldh et al., 2020; Lottonen et al., 2024; Khayyat & Nazar, 2023; Heinsch et al., 2022; Virtanen et al., 2021; Alekseeva et al., 2022; Szinay et al., 2021). Therewith, the experienced capabilities, opportunities, and motivations of participants were explored regarding the effects of digitalisation on their general practice. The interview questions are provided in Appendix 1. The chat observation was conducted at location of general practice B, guided by an observation designed to focus on key aspects of the chat

conversations, which is included in Appendix 2. Practice A did not permit chat observations. Instead, the author observed an assistants working on Spreekuur.nl, asked questions, and took fieldnotes.

Analysis

Interview were recorded and transcribed verbatim using Good Tape. Transcripts were reviewed while listening to the recordings to manually correct any errors. Subsequently, the author re-read the transcripts to make notes and get familiar with the content. Thematic analysis was employed to analyse the qualitative data, using QSR NVivo 14 software. Initial codes were generated from the components of the COM-B model. Codes were then grouped into themes based on identified similarities and patterns. Themes emerged through an iterative process of constant comparison (Bryman, 2016), involving comparison within and across interviews to identify recurring patterns and connections. The author continuously refined and revised the themes to ensure accuracy and consistency in interpretation. After finalising the coding framework, themes were defined and named to capture the essence of the underlying data patterns. Each theme was supported by illustrative quotes from the interviews to provide evidence of its relevance and significance. The structured code tree can be found in Appendix 3.

Ethical Remarks

An informed consent was obtained for the interviews and can be found in Appendix 4. For the chat observations and field notes, a confidentiality agreement was signed, ensuring that the names of GPs, doctor's assistants, and patients were neither recorded nor linked to interview participants. The confidentiality agreement can be found in Appendix 5. The ethics approval was granted by Utrecht University on 4 April 2024, for the interviews, and 16 April, for the chat observations.

Data-management

The interviews transcripts were anonymised and securely stored on DigiDok's OneDrive. The key linking participants' personal information to their responses is retained solely by the author, ensuring that individual identities cannot be traced. These documents have a scheduled deletion date of 2034. Interview recordings, informed consents and the confidentiality agreements are stored on the authors' U-drive.

Positionality Statement

The author's background in occupational therapy provided knowledge of the healthcare sector, and therefore the approach to this study. This familiarity included an understanding of topics and working methods of the interviewed HCPs, for example EHR-systems. However, familiarity also introduces the risk of biases and assumptions. To mitigate this risk, the author conducted a comprehensive literature review to explore different viewpoints, and regularly discussed findings with a supervisor or peers to identify and challenge potential biases. Additionally, the author was interning at DigiDok, the co-creator of Spreekuur.nl, during the research. This involvement could introduce a positive bias toward digitalisation and the application Spreekuur.nl. To address this, all critical texts on Spreekuur.nl were meticulously coded in QSR NVivo 14 software, and the interview guideline and results were reviewed with a supervisor employed at the University of Utrecht to ensure objectivity.

Results

In this section, an explanation of Spreekuur.nl and its utilisation by the general practices will be provided. Following this, the results of the interviews, chat observations and fieldnotes will be discussed using the COM-B model.

How Does Spreekuur.nl Work?

In the eHealth questionnaire and chat tool Spreekuur.nl, patients prepare their own digital consultation. They register through their general practice's website by clicking on a link to Spreekuur.nl. Patients select a health complaint area and complete a triage questionnaire, which is manually constructed by DigiDok based on the Dutch Triage Standard (Nederlandse Triage Standaard, NTS). Optionally, patients upload a photo of their health complaint (Andriessen et al., 2020). The Dutch Triage Standard is developed to assist in determining the urgency of a patients' health complaint and the appropriate treatment from the relevant healthcare provider (NTS, 2014). When patients check a box with a high urgency medical issue, they are automatically sent to a page instructing them to contact the general practice's emergency line, or in life threatening situations the national emergency number. After the patient has completed the questionnaire, equalling the patient has no high urgency medical needs that need to be met within a few hours, the HCP will receive all the answers. The HCP will open the healthcare query of the patient, assess the answers from the questionnaire, and ask additional questions, and provide information and/or advice to the patient via chat messages (Andriessen et al., 2020). The HCP can type the message, or send a pre-prepared

template, designed by DigiDok (DigiDok, n.d.). After this first chat is sent by the HCP, the patient can respond and the conversation is started. The whole process of receiving the questionnaire and chatting is called an online consult, or e-consult. HCPs can open multiple e-consults and chat with multiple patients simultaneously.

What Are the Working Methods of the Participating General Practices?

In practice A, when an e-consult has come in through Spreekuur.nl the assistant or CNS is the first one to respond. The assistant works in a separate room with Spreekuur.nl, also answering calls. Reportedly, the practice stimulates digital use of patients by actively referring to Spreekuur.nl over the phone. In Spreekuur.nl, the assistant sends a chat to the patient confirming their question has been received in good order and that they can expect a response soon. Questions, such as repeat prescriptions, are solved by the assistant. The assistant reports the information from the Spreekuur.nl questionnaire in the Electronic Health Record (EHR), a separate system that stores all medical information of patient reports. Around noon, the GPs and assistants hold a consultation session regarding healthcare queries on Spreekuur.nl. They review all queries, and unresolved queries are addressed by the GP, who instructs the assistant what information or advice to type. There is always one assistant working a morning or afternoon shift. According to the CNS, they are one of the employees working the most with Spreekuur.nl, working approximately 1 to 1.5 hours a day with Spreekuur.nl, generally in the morning. Accordingly, most healthcare queries are received in the morning. Chat observations of practice B confirm that most healthcare queries arrive in the morning. Similar to the GP, the CNS gives information and advice to the patient through chats in Spreekuur.nl.

In practice B, assistants start answering health queries that have come in the previous day after working hours from 8:00 to 8:30 AM. During this time, and other fixed hours, the practice cannot be reached by phone. Allegedly, assistants focus on Spreekuur.nl e-consults during this time. An answering tape is used to direct patients to Spreekuur.nl, or their emergency line in case of an emergency. Assistants work in shifts of a few hours on Spreekuur.nl. From the interviews and chat observation became evident that assistants generally do repeat prescriptions, lab and research results, and administrative tasks. Similar to practice A, assistants transfer information from Spreekuur.nl to the EHR. When assistants encounter a healthcare query they cannot resolve, they inform the patient via chat that they will include the GP in the conversation and then exit the chat themselves. A GP of the practice said they also start their workday from 8:00 to 8.30 AM with Spreekuur.nl consults,

picking out e-consults that require a GPs' assessment. GPs of the practice seldom work more than one hour in Spreekuur.nl, often doing e-consults in between other tasks.

Participants from both practices mentioned that they aim to finish the healthcare query of the patient within 24 hours. Based on the data, the time an assistant spends on a healthcare query is estimated to be 66 minutes on average, measured from the first to the last chat sent, excluding out-of-office hours. Furthermore, chats of practice B demonstrated that out of 50 chats, 27 chats were handled by the assistant and 23 were sent to a GP. Out of the 27 chats, 18 were successfully resolved using Spreekuur.nl. The remaining 9 got a consultation over the phone or in person. Both practices mutually experience a healthcare query peak on Monday morning received over the weekend, which is also evident in the observed chats. Table 1 provides an overview of the participants and information about them.

Table 1

Information about the participants

Participant number	Job title	Abbreviation of job title	General practice	Works in the current practice since…
1	Clinical Nurse Specialist	CNS	A	1 year and 5 months
2	General Practitioner	GP	A	15 years
3	Doctors Assistant	AS	A	10 years
4	Doctors Assistant	AS	B	6 months
5	General Practitioner	GP	B	5 months
6	Doctors Assistant	AS	B	16 years
7	General Practitioner	GP	B	13 years
8	General Practitioner	GP	B	9 months

Physical Opportunities

The eHealth questionnaire and chat tools appear to shift certain healthcare queries or steps in the treatment process from in-person or telephone consultations to online, thereby influencing the environmental context and work tasks in the general practice. Facilitating this shift are the questionnaires that replace the first triage and anamnesis being deemed as "relevant" and "complete" by almost all assistants, GPs and the CNS. Which is also substantiated by Zhakhina et al. (2023). Practice owner and GP of practice B explains how the Spreekuur.nl

questionnaire can be an opportunity to gain extensive information from the patient about their health complaint and healthcare query:

> "When patients fill out the questionnaire, you get structured, good, useful and extensive information about problems that I think we often don't even ask on the telephone or even during consultation hours." Interviewee 7 GP

The HCPs experience convenience of not having to ask the questions themselves, as expressed by an assistant who has been working in practice A for 10 years:

> "It's just convenient that we don't have to do it ourselves because the questionnaire has already been completed." Interviewee 3 AS

Another factor facilitating this movement of tasks to digital platforms was the function for patients to send photos of their health complaints (Eldh et al., 2020), as this makes the health complaint immediately visual. All participants of this study found that dermatological healthcare queries were most suited for online treatment.

Technical malfunctions that slow down the execution of work tasks could discourage working online. Mentioned by almost all participants and of both practices and job titles was the lack of a connection between Spreekuur.nl and their EHR.

Social Opportunities

Findings of Macdonald et al. (2018) implied a two-way conversation between HCPs and patients would be facilitated by eHealth information and communication tools. However, the chat observation demonstrated otherwise. Out of the 28 e-consults solved by the assistant, an average of 2.07 chats sent by the assistant, and 1.32 chats sent by the patient. This result portraits more of a one-way conversation from the HCP (Macdonald et al. 2018), which could potentially be explained by the experienced communication and relationship of the HCPs with patients.

The impact of the eHealth questionnaire and chat tools on the role of the HCP, according to the participants, is an interaction with patients that is less personal. Translating from the experience of patients during COVID-19, who considered using digital tools "less personal" (Kaihlanen et al., 2022), the CNS and almost all GPs and assistants also considered the online relationship to be less personal. To explain this less personal relationship in Spreekuur.nl, four reasons were given. Firstly, both the CNS and an assistant argued that non-verbal communication is challenging. The CNS expressed how non-verbal communication is part of

the anamnesis. Secondly, two GPs of both practices and an assistant found it harder to comfort patients online. Thirdly, an assistant and GP of practice B considered it tougher to coordinate with the patient. Fourthly, one assistant mentioned that showing empathy towards the patient was more difficult. An assistant with 16 years of experience in the practice that has more experience with phone calls than chatting described a situation in which they missed personal communication in a chat message:

"I had someone who was pregnant last week. On the telephone, you can already hear whether someone is happy or not, and otherwise you can immediately ask whether it is a desired pregnancy or not. And I find that, well, via Spreekuur.nl a bit, well, uncomfortable or something." Interviewee 6 AS

The two practice owning GPs argued that this less personal contact does not have to affect the HCP-patient relationship when patients have online contact with their own GP.

In this study, none of the participants talked about experiencing a "partnership relationship" with patients (Macdonald et al., 2018). This could potentially be explained by the experience of assistants and GPs, who mention a "distant", "to-the-point" relationship, and "more difficulty to build a connection".

Additionally, GPs and assistants are divided on the self-reliance of patients, as they point out changes in the threshold for patients to ask healthcare queries. Two GPs don't notice this change. However, two assistants and a GP experience this lower threshold, which is also expressed in the scoping review of Radionova et al. (2023). Division in opinions on the threshold also exist within participants, as an assistant argues with themselves that filling out a questionnaire can also be considered a threshold:

"I think patients come with a healthcare query more easily. Otherwise, they may have waited. But I don't know. On the other hand, they do have to go through an entire questionnaire. So they had to make an effort to submit a healthcare query." Interviewee 4 AS

If more healthcare queries are being asked, the role of the HCP changes as they now also have to treat healthcare queries that wouldn't have come in if a digital option wasn't available, also impacting their work pressure and stress.

Role and interaction changes between GPs, assistants, and the CNS were not found. Research of Lottonen et al. (2024) suggested that because of eHealth systems, work tasks transferred from GPs via nurses to secretaries. This trickledown effect of work tasks did not become

evident. However, this does not preclude the possibility that it is currently occurring or may occur in the future.

Capabilities

The impact of the eHealth questionnaire and chat tool on the HCPs' work efficiency appears to centre on enabling task-switching. To the best of the author's knowledge, this result has not been identified in prior research. The CNS, GPs and the assistants of both practices were satisfied with this working method, as they could do other tasks while awaiting patient responses on Spreekuur.nl. However, one assistant noted decreased efficiency of this working method, as they were now unable to finish a consult immediately. A question that arises from this finding is whether task-switching increases work efficiency, because waiting time can be filled up with doing work tasks, or it decreases work efficiency, because leaving tasks unfinished leads to higher work pressures and more stress. Another question that should be asked is whether this working method improves the quality of healthcare.

Reportedly, all participants possessed the capabilities needed to shift medical services to digital operations (Alekseeva et al., 2022), although it took habituation (Eldh et al. 2020). Nevertheless, even with possession of digital capabilities, it was expected that typing a message in an e-consult would be slower than spoken over the phone or in a consult. However, results of the current study showed that participants within both practices and of both job titles were divided on this matter. A younger GP that recently became a qualified GP mentioned that they are less likely to respond thoroughly online, saving time:

"I think it is less extensive online. And if you see someone, you might go into it a little more. So that takes more time." Interviewee 5 GP

An assistant who has been working in the practice for 16 years concluded that giving advice spoken out was faster because speaking is faster than typing:

"Maybe sometimes it takes a little more time. But that is also due to experience. I have had so many years of experience giving advice over the telephone. You have your standard advice that you already know." Interviewee 6 AS

A GP in training who has worked for 9 months in the practice agrees with the statement:

"What you just say quickly can take a little longer to type. So you have to pay more attention to that and think: what exactly do I want to say?" Interviewee 8 GP

According to Eldh et al. (2020) templates can explain a faster pace. However, no link was found between participants using templates and delivering advice more quickly, as all participants reported to use the templates "sometimes" at most.

It was challenging to assess a change in overall work efficiency because distinguishing the effects attributable to Spreekuur.nl from those stemming from other factors proved difficult. The double greying process result in more healthcare queries (WHO, 2015; Aceto, 2018). A practice owner and GP of practice A, who's been working in the practice for 15 years, talked about always having a waiting list:

"If a patient consultation were to fall out, because you have relatively few consultation hours, you would not really see the effect that Spreekuur.nl would take away. There is always someone who can come along." Interviewee 2 GP

Reflective Motivations

The HCPs of this study predominantly believe that an eHealth questionnaire and chat tools provide quality care for patients. They recognise this quality foremost in the patient not having to visit the practice to get medical advice and treatment, a finding equal to that of Eldh et al. (2020) and Heinsch et al. (2022). This seems to relate to their reflective motivations of being an HCP and wanting to provide the best suiting healthcare (Radionova et al., 2023). Assistants, GPs, and the CNS fill in the perspective of the patient that having Spreekuur.nl as an option could be a relieve for them, as told by an assistant:

"I like that we can also help patients in this way. Everyone's life is busy and turbulent. Everyone is in a hurry these days and with this option that we can offer to patients to handle something digitally without having to leave work or ask them for time off, they can also be helped in this way. So I think it is very patient friendly." Interviewee 3 AS

Participants are divided over whether advice online and over templates provide better quality care compared to spoken over the phone or in person. Practice A predominantly thinks there is no difference, because the content of the advice is the same, while in practice B, all job titles are divided. Arguments in favour are that the patient can re-read it and the templates provide clear instructions. Arguments against are that the HCP can't see the reaction of the patient. Two GPs argued that it does not matter as long as the patient's contact person is their own GP.

An argument against quality care provision by Eldh et al. (2020), is that prolonged chatting extended over multiple days could cause hazardous situations. However, this was not supported by findings of this study, which could be due to the practices aiming to solve healthcare queries within 24 hours and the questionnaire of Spreekuur.nl that instructs patients to call the general practice emergency line in case of a high emergency medical issue.

Participants of all job titles and practices express the importance of digitalisation in providing quality care, arguing that there is no choice but digitalising healthcare because of rising care demands and personnel shortages (WHO, 2015; Aceto, 2018; Flinterman et al., 2018; Stuijver, 2022). All GPs of this study argued primary care was lagging behind in digitalisation. One GP, who has been working in the practice for 5 months, told why they thought primary care doesn't keep up with digitalisation, making a connection with the belief of other GPs about the capabilities of patients:

"If you look at the primary care, the general practitioners say: well, the patients are not ready for this, or say the systems are not yet good enough. I think that's nonsense. I think we should take steps." Interviewee 5 GP

The opinion of another GP was that digitalisation in healthcare was lagging behind because the quality of existing eHealth tools is not good enough:

"I no longer go to the travel agency, because booking.com works much better. And with Spreekuur.nl, that isn't the case yet. So the application is not good enough. That's what it means in my opinion. It's that simple. So what grade people give to the application is completely irrelevant. When usage explodes, you know it's good. V&D is bankrupt because bol.com is better. It's that simple." Interviewee 7 GP

When asked this GP what needed to improve in eHealth to get to their described situation, they answered "usability". Continuing they would remain seeing all patients in the practice, but less often. According to hem, chronic healthcare queries can partially be treated online. Interestingly, GP 2 already said they saw this effect of the same patient sometimes asking their healthcare queries online, and other times visiting the practice.

Automatic Motivations

In line with the scoping review of Radionova et al. (2023), findings of this study indicated no impact of the eHealth questionnaire and chat tools on the overall job-satisfaction of the HCP.

Participants rated their overall job-satisfaction with an average of 8.3. Generally, GPs gave a higher rating than assistants, with the CNS in between. When asked whether this grade has changed since the use of Spreekuur.nl, almost all participants grades remained unchanged. After rating their job-satisfaction with Spreekuur.nl, the CNS immediately adds:

> "I look at the patient and not at the tools. Helping the patient as best as possible is what I am here for, and Spreekuur.nl can help me achieve my goal." Interviewee 1 CNS

An important indicator of job-satisfaction, according to participants of all job titles, is the beliefs of quality of care provision. As long as the digital tool provides quality and convenience for the patient, the job-satisfaction should remain unchanged. Another indicator of job-satisfaction, which was not substantiated by prior findings, was the amount of personal contact the HCP has. Online contact is excluded from personal contact. If the online contact is too high, this would detract from the job-satisfaction. A few GPs and assistants from both practices express how doing e-consults only would detract from their job-satisfaction:

> "If I only had to do online consultations all day, I wouldn't like that. But I think now, because there is variety and I think it is a very good part of healthcare, it is very good, it is fun. But I don't want to think about just answering online consultations here all day." Interviewee 5 GP

Discussion

Findings

In this study, the main RQ was as followed: what impact does the use of an eHealth questionnaire and chat tools have on the opportunities, capabilities, motivations of primary care healthcare professionals in comparison to previous working methods of spoken consultations over the phone, or in person? In this section, the formulated SQs will be addressed, followed by an answer to the RQ.

SQ1 was as followed: What impact does the use of eHealth questionnaire and chat tools have on the environmental context and work tasks (physical opportunities) of healthcare professionals in comparison to previous working methods of spoken consultations over the phone, or in person? Contrary to the findings of Radionova et al. (2023) and Eldh et al. (2020), but similar to Zhakhina et al. (2023) this study depicted satisfaction of HCPs with how patients complete eHealth questionnaires, often resulting in a more comprehensive triage and anamnesis. This suggests that questionnaires can effectively take over these tasks from HCPs. Additionally, compared to phone consultations, the inclusion of photos makes

assessments safer and more complete (Eldh et al., 2020), allowing HCPs to address dermatological issues online. However, technical malfunctions, specifically the lack of integration between different eHealth systems, increase work tasks for HCPs.

SQ2 was as followed: What impact does the use of eHealth questionnaire and chat tools have on the role (social opportunities) of healthcare professionals in comparison to previous working methods of spoken consultations over the phone, or in person? Similar to the findings of Kaihlanen et al. (2022), HCPs experienced online communication as less personal. Results indicate that both HCPs and patients are more to-the-point and distant, with patients sending fewer messages per e-consultation compared to assistants. This contradicts Macdonald et al. (2018), who suggested that eHealth tools facilitate a partnership relationship and two-way conversation between HCPs and patients. However, the relationship may remain unaffected if patients use a mix of online and in-person interactions and have online contact with their own GP. Moreover, when patients seek help more easily from their GP via online platforms (Radionova et al., 2023), the HCP's role is altered, requiring them to address an increased number of inquiries, that do not always necessitate medical assistance. This shift could increase stress due to higher workloads and reduced work efficiency, leading to SQ3.

SQ3 was as followed: What impact does the use of eHealth questionnaire and chat tools have on the work efficiency (capabilities) of healthcare professionals in comparison to previous working methods of spoken consultations over the phone, or in person? In addressing SQ1, the study identifies the impact of eHealth questionnaires and photos on physical opportunities. While these tools suggest an increase in work efficiency, technical malfunctions indicate a potential decrease. The study also reveals that eHealth tools facilitate task-switching, a finding not previously identified. The ability to fill spare time with work tasks allows HCPs to assist more patients, yet the lack of free moments between tasks can lead to decreased efficiency and increased stress. Additionally, contrary to Eldh et al. (2020), who posited that speaking is faster than typing, this study found inconsistent results. The speed of communication may cohere to the extensiveness of the HCP's reply, as distant and to-the-point digital messages or templates are faster. This finding also informs SQ2.

SQ4 was as followed: What impact does the use of eHealth questionnaire and chat tools have on healthcare professional's beliefs of quality care provision (reflective motivations) in comparison to previous working methods of spoken consultations over the phone, or in person? Despite some criticisms of digital questionnaire and chat tools, this study shows that

HCPs believe these tools can enhance the quality of care provided to patients. An added value recognised is the convenience for patients, who do not need to visit the practice physically (Eldh et al., 2020; Heinsch et al., 2022). Additionally, HCPs believe the advice delivered via messages can be re-read by patients, potentially reducing the need for HCPs to repeat information and thus decreasing their work tasks. The foremost reason given by HCPs for adopting digital tools is the rising care demands and personnel shortages (WHO, 2015; Aceto, 2018; Flinterman et al., 2018; Stuijver, 2022). This raises the question: if there were no increasing care demands and personnel shortages, would HCPs still opt for digital healthcare solutions? Based on Radionova et al. (2023) and findings of this study, the expectation is that HCPs choose the option that provides the highest quality of care.

SQ5 was as follows: what impact does the use of eHealth questionnaire and chat tools have on the overall job-satisfaction (automatic motivations) of healthcare professionals in comparison to previous working methods of spoken consultations over the phone, or in person? Findings suggest that job-satisfaction is not impacted by the eHealth tool itself, but the quality of the care it provides the patient (Radionova et al., 2023). Implying an interconnection between quality care provision and job-satisfaction. Furthermore, results also suggest an interconnectedness between the role of the HCP and job-satisfaction, as the lack of personal contact is associated with lower job-satisfaction of the HCP.

Application of the COM-B model revealed changes in the capabilities, opportunities, and motivations of HCPs after implementing an eHealth questionnaire and chat tool. The study found that the environmental context and work tasks have been altered, requiring assessment of questionnaires and photos, which impacts work efficiency by enabling more comprehensive and safer assessments. However, there is debate over the efficiency of task-switching and whether typing messages is faster than in-person communication. This shift towards quicker, less personal communication could reduce job-satisfaction. Despite these challenges, HCPs are receptive to changes that enhance the quality of patient care, highlighting reflective motivations as an overarching factor.

Strengths and Weaknesses

The study was conducted employing an interdisciplinary approach, integrating theoretical insights from health psychology, public health, health informatics, and various subdisciplines of medicine. This multifaceted perspective provided a comprehensive understanding of the critical elements in eHealth tools for both individual and public health contexts, and the

behaviours associated with their use. Data triangulation was employed by using interviews, chat observations, and fieldnotes to collect data and answer the RQ and SQs. The eight interviews, consisting of four different types of HCPs, assured a comprehensive understanding of the opinions and working methods with eHealth questionnaire and chat tools among all employees of the general practices. However, for both the interviews and chat observations there are concerns on whether data saturation was reached. Therefore, reliability would be enhanced with a larger number of participants and chat observations over a larger number of organisations. Another notable limitation of this research is the exclusion of patient perspectives and the interactions between patients and HCPs. This omission restricts a comprehensive understanding of the context within healthcare provision and receipt. Lastly, the author's involvement with DigiDok led to data exclusively from Spreekuur.nl, thereby affecting the generalisability.

Implications and Recommendations

The main implications of this study highlight the necessity for larger-scale research with more participants and observations across various healthcare settings, including patient perspectives. Future research should also consider a broader range of eHealth questionnaire and chat tools. The COM-B framework provided valuable insights into behavioural changes, but analysis revealed overlapping themes and outcomes across multiple components, suggesting the need for a more integrated approach. Further investigation is warranted on the impact of task-switching on work efficiency and stress levels. Additionally, it is valuable to explore whether healthcare professionals would prefer digitalisation in the absence of increasing care demands and staff shortages, presenting them with the choice between hiring more staff or opting for digitalisation. Lastly, an action-research approach is recommended to not only study social systems but also drive social change by co-creating new or improved eHealth tools with HCPs and patients.

Recommendations for practice include careful consideration by general practices and other healthcare institutions in the selection and implementation of eHealth questionnaire and chat tools, as different tools yield varied outcomes. Supporting a hybrid form, where patients alternate between online and in-person contact with their GP, is also recommended. This approach can reduce the likelihood of impersonal interactions and distant relationships, offering benefits such as increased patient flexibility and improved perceptions of care quality by HCPs. This, in turn, can enhance job-satisfaction among healthcare providers.

A final recommendation, directed towards developers of eHealth questionnaires and chat tools, EHR-systems, and other digital tools, is to enhance cooperation and collaboration. Improved integration and interoperability will enable HCPs to perform their work tasks more efficiently and will improve their ability to maintain a comprehensive overview of patient care.

Concluding Remark

The current study addressed a research gap by examining the impacts of eHealth questionnaire and chat tools on the behaviour of HCPs in general practice. HCPs indicated that eHealth has the potential to help them provide high-quality care while maintaining work efficiency and job-satisfaction. However, to realise this potential, improvements of technicalities need to be made by developers. Additionally, further research is needed to explore the effects of eHealth on the patient-HCP relationship and to identify ways to mitigate any negative impacts. As Thimbleby (2013) posited, the primary goal of implementing eHealth tools should be to enhance patient care and support healthcare staff.

References

Aceto, G., Persico, V., & Pescapé, A. (2018). The role of Information and Communication Technologies in healthcare: taxonomies, perspectives, and challenges. *Journal of Network and Computer Applications, 107*, 125-154.

Alekseeva, D., Ometov, A., Arponen, O., & Lohan, E. S. (2022). The future of computing paradigms for medical and emergency applications. *Computer Science Review, 45*, 100494.

Andriessen, P., Bijland, L., & Jaspers, D. (2020). De digitale HAP. *Huisarts en wetenschap, 63*(12), 79-   79.

Batenburg, R., Bosmans, M., Versteeg, S., Vis, E., Van Asten, B., Vandermeulen, L., & Van der Kruis, L.   (2018). *Balans in vraag en aanbod huisartsenzorg*. Utrecht, Netherlands: Nivel, Prismant. Retrieved 19 February, 2024, from https://www.nivel.nl/nl/publicatie/balans-vraag-en- aanbod-huisartsenzorg

Black, A. D., Car, J., Pagliari, C., Anandan, C., Cresswell, K., Bokun, T., ... & Sheikh, A. (2011). The   impact of eHealth on the quality and safety of health care: a systematic overview. *PLoS medicine, 8*(1), e1000387.

Bryman, A. (2016). *Social research methods*. (5th ed.). Oxford University Press.

Centraal Bureau voor de Statistiek. (2022). *Arbeidsmarkt zorg en welzijn*. Retrieved 21 March, 2024, from https://www.cbs.nl/nl-nl/dossier/arbeidsmarkt-zorg-en-welzijn#:~:text=Eind%202022%20werkten%20ruim%201,pedagogisch%20medewerkers%2C%20verpleegkundigen%20en%20verzorgenden.

Denecke, K., Lutz Hochreutener, S., Pöpel, A., & May, R. (2018, April). Talking to ana: A mobile self-anamnesis application with conversational user interface. *Proceedings of the 2018 international conference on digital health* (pp. 85-89).

DigiDok. (n.d.). TemplateDoc. *Efficiënte patiëntenzorg binnen handbereik*. Retrieved 17 June, 2024, from https://digidok.nl/tamplatedoc/

Eldh, A. C., Sverker, A., Bendtsen, P., & Nilsson, E. (2020). Health care professionals' experience of a digital tool for patient exchange, anamnesis, and triage in primary care: qualitative study. *JMIR human factors, 7*(4), e21698.

Flinterman, L., Groenewegen, P., & Verheij, R. (October, 2018). *Zorglandschap en zorggebruik in een veranderende eerste lijn*. Nivel. Retrieved 15 February, 2024, from https://www.nivel.nl/nl/publicatie/zorglandschap-en-zorggebruik-een-veranderende-eerste-lijn

Gottliebsen, K., & Petersson, G. (2020). Limited evidence of benefits of patient operated intelligent primary care triage tools: findings of a literature review. *BMJ health & care informatics,27*(1).

Heinsch, M., Tickner, C., & Kay-Lambkin, F. (2022). Placing equity at the heart of eHealth implementation: a qualitative pilot study. *International Journal for Equity in Health, 21*(1), 38.

Kaihlanen, A. M., Virtanen, L., Buchert, U., Safarov, N., Valkonen, P., Hietapakka, L., ... & Heponiemi, T. (2022). Towards digital health equity-a qualitative study of the challenges experienced by   vulnerable groups in using digital health services in the COVID-19 era. *BMC health services research, 22*(1), 188.

Khayyat, S. M., & Nazar, H. (2023). Qualitative investigation of barriers to providing an electronic hospital to community pharmacy referral service for discharged patients. *Plos one, 18*(3), e0283836.

Lottonen, T., Kaihlanen, A. M., Nadav, J., Hilama, P., & Heponiemi, T. (2024). Nurses' and physicians' perceptions of the impact of eHealth and information systems on the roles of health care professionals: A qualitative descriptive study. *Health Informatics Journal, 30*(1), 14604582241234261

Macdonald, G. G., Townsend, A. F., Adam, P., Li, L. C., Kerr, S., McDonald, M., & Backman, C. L. (2018). eHealth technologies, multimorbidity, and the office visit: qualitative interview study on the perspectives of physicians and nurses. *Journal of medical Internet research, 20*(1), e31

Melms, L., Schaefer, J. R., Jerrentrup, A., & Mueller, T. (2021). A pilot study of patient satisfaction with a self-completed tablet-based digital questionnaire for collecting the patient's medical history in an emergency department. *BMC Health Services Research, 21*(1), 1-13.

Michie, S., Van Stralen, M. M., & West, R. (2011). The behaviour change wheel: a new
method for characterising and designing behaviour change interventions.
Implementation science, 6(1), 1-12.

Nederlandse Triage Standaard. (2014). *Nederlandse triage standaard, ketenstandaard voor
triage in de acute zorg*. Retrieved 17 June, 2024, from https://de-nts.nl/

Radionova, N., Ög, E., Wetzel, A. J., Rieger, M. A., & Preiser, C. (2023). Impacts of
Symptom Checkers   for Laypersons' Self-diagnosis on Physicians in Primary Care:
Scoping Review. *Journal of Medical Internet Research, 25*, e39219.

Richardson, S., Dauber-Decker, K. L., McGinn, T., Barnaby, D. P., Cattamanchi, A., &
Pekmezaris, R. (2021). Barriers to the use of clinical decision support for the
evaluation of pulmonary embolism: Qualitative interview study. *JMIR Human
Factors, 8*(3), e25046.

Stuijver, D. (April, 2022). Huisartsen stoppen vanwege steeds hogere werkdruk. *Nederlands
Tijdschrijft voor Geneeskunde*. Retrieved 15 February, 2024, from
https://www.ntvg.nl/artikelen/huisartsen-stoppen-vanwege-steeds-hogere-werkdruk

Szinay, D., Perski, O., Jones, A., Chadborn, T., Brown, J., & Naughton, F. (2021). Influences
on the uptake of health and well-being apps and curated app portals: think-aloud and
interview study. *JMIR mHealth and uHealth, 9*(4), e27173.

Thimbleby, H. (2013). Technology and the future of healthcare. *Journal of public health
research, 2*(3), jphr-2013.

Van der Kleij, R. M., Kasteleyn, M. J., Meijer, E., Bonten, T. N., Houwink, E. J., Teichert,
M., ... & Chavannes, N. H. (2019). SERIES: eHealth in primary care. Part 1:
Concepts, conditions and challenges. *European Journal of General Practice, 25*(4),
179-189.

van Dijk, E. (2013). Telefonische triage: laat diagnostische denktrant los. *Huisarts en
wetenschap, 56*(11), 570-572.

Velez-Lapao, L., Maia, M., & Dussault, G. (2019). eHealth solutions to regional shortages in
the health workforce. *European Journal of Public Health, 29*(Supplement_4), ckz185-
411.

Virtanen, L., Kaihlanen, A. M., Laukka, E., Gluschkoff, K., & Heponiemi, T. (2021). Behavior change techniques to promote healthcare professionals' eHealth competency: A systematic review of interventions. *International Journal of Medical Informatics, 149*, 104432.

World Health Organization (2015). Chapter 3: Health in older age. In *World report on ageing and health* (pp. 43-85). Geneva: WHO.

Zhakhina, G., Tapinova, K., Kanabekova, P., & Kainazarov, T. (2023). Pre-consultation history taking systems and their impact on modern practices: Advantages and limitations. *Journal of Clinical Medicine of Kazakhstan, 20*(6), 26-35.

Zorginstituut Nederland. (September, 2022). *Waar we met IZA nu staan, is al een enorme stap voorwaarts*. Retrieved 21 March, 2024, from https://www.zorginstituutnederland.nl/actueel/nieuws/2022/09/19/waar-we-met-iza-nu-staan-is-al-een-enorme-stap-voorwaarts

Appendices

Removed for publication.