



**TURUN
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OF TURKU

ACTIONABILITY OF PUBLIC WAITING TIME REPORTING

Exploratory Research in
Finland's Public Primary Oral Healthcare

Riitta Söderlund



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ABSTRACT

The study explored the actionability of public waiting time reporting in Finnish public primary oral healthcare. We defined an actionable public waiting time reporting system as a system that collects, processes, and delivers relevant and accurate information about waiting times to stakeholders for utilization in action-related decision-making to realize intended actions.

The functional paradigm guided this quantitative cross-sectional study. Data was collected through a literature review focused on the use of waiting time information in healthcare, as well as electronic surveys targeted at public oral healthcare managers, citizens, and dental nurses involved in telephone triage. We used descriptive statistics and regression analysis to evaluate the survey data. The findings were utilized to explore the actionability of two public waiting time reporting systems from various stakeholders' perspectives. Our conceptual framework for exploring actionability was based on the Shannon-Weaver communication model alongside Mason's levels of information output in communication systems.

The actionability of the systems varied significantly by stakeholder group, but unfortunately, the systems did not adequately achieve their goal of public reporting. The results of this study were consistent with previous evaluations of public reporting. While public reporting has somewhat contributed to improving care quality within healthcare organizations, it has had a limited impact on patients' ability to choose healthcare providers. The actionability of public reporting has been hindered because the information provided has not met users' needs, and the healthcare system has not promoted patient choice. Public reporting, both in Finland and in other countries, has often been implemented mainly to ensure public accountability, offering transparency regarding public services but frequently providing poor-quality information without the means to enhance care quality.

Further studies are needed to describe and evaluate public reporting across the entire Finnish public healthcare system. The established conceptual framework should be assessed and refined for analyzing public reporting in contexts that include information beyond just waiting times.

KEYWORDS: evaluation of information and communication technology; health policy; public healthcare; public reporting; waiting time

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Tutkimuksessa arvioitiin Suomen julkisen suun perusterveydenhuollon hoitoon pääsyn odotusaikatietojen julkista raportointia. Toimiva julkinen odotusajan raportointi määriteltiin järjestelmäksi, joka kerää, käsittelee ja jakaa relevanttia ja tarkkaa tietoa odotusajoista sidosryhmille käytettäväksi tavoiteltuun toimintoon liittyvässä päätöksenteossa toiminnon toteuttamiseksi.

Funktionaalinen paradigma ohjasi tämän kvantitatiivisen poikittaistutkimuksen toteuttamista. Tieto tutkimukseen kerättiin kirjallisuuskatsauksella odotusaikatiedon hyödyntämisestä terveydenhuollossa ja sähköisillä kyselyillä julkisen suun terveydenhuollon johdolta, kansalaisilta ja hoidon tarpeen arvioinnissa työskenteleviltä hammashoitajilta. Kyselyaineisto analysoitiin käyttäen kuvailevaa tilastotiedettä ja regressioanalyysiä. Näiden tutkimustulosten avulla arvioitiin kahden julkisen odotusaikatiedon raportoinnin toimivuutta eri sidosryhmien näkökulmista. Teoreettinen viitekehys arviointiin muodostettiin Shannon-Weaver-viestintämallista ja Masonin tiedon tuotoksen tasoista.

Järjestelmien toimivuus vaihteli merkittävästi sidosryhmittäin, mutta järjestelmät eivät valitettavasti täyttäneet tehokkaasti julkisen raportoinnin tavoitteita. Tutkimustulokset vastasivat aiempien julkisen raportoinnin arviointien tuloksia. Julkinen raportointi on edistänyt terveydenhuollon organisaatioita laadun kehittämisessä jossakin määrin, mutta potilaita terveydenhuollon palveluntuottajan valinnassa vähän. Julkisen raportoinnin toimivuus on ollut heikkoa, koska raportoitava tieto ei ole vastannut käyttäjien tietotarpeita eikä terveydenhuoltojärjestelmä ole mahdollistanut potilaan valinnanvapautta. Julkinen raportointi niin Suomessa kuin muuallakin on monesti toteuttanut ainoastaan julkista vastuuvollisuutta tiedon jakamisesta usein heikkolaatuisella tiedolla edistämättä hoidon laatua.

Lisätutkimuksia tarvitaan julkisen raportoinnin kartoittamiseksi ja arvioimiseksi kaikkialla Suomen julkisessa terveydenhuollossa. Muodostettua viitekehystä pitäisi arvioida ja kehittää edelleen julkisen raportoinnin arviointiin tilanteissa, joissa raportoitava tietosisältö ei rajoitu odotusaikatietoihin.

ASIASANAT: julkinen raportointi; julkinen terveydenhuolto; odotusaikatieto; terveydenhuoltopolitiikka; tieto- ja viestintätekniikan arviointi

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Turku, 1.6.2025
Riitta Söderlund

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List of Original Publications

This dissertation is based on the following original publications, which are referred to in the text by their Roman numerals:

- I Riitta Söderlund. Waiting times in healthcare: a literature review. *International Journal of Telemedicine and Clinical Practices*, 2023; 4(1): 16–42.
<https://doi.org/10.1504/IJTMCP.2023.136158>
- II Riitta Söderlund. Digital national waiting time information system – View of Finnish public oral healthcare managers. *Health Policy and Technology*, 2024; 13(4): Article 100900.
<https://doi.org/10.1016/j.hlpt.2024.100900>
- III Riitta Söderlund. Signalling waiting times to citizens on public oral healthcare providers' websites. *Acta Odontologica Scandinavica*, 2023; 81(7): 517–527.
<https://doi.org/10.1080/00016357.2023.2204934>
- IV Riitta Söderlund. National waiting time monitoring in oral healthcare – The role of triage dental nurses. *Health Informatics Journal*, 2024; 30(4): Article 14604582241270843.
<https://doi.org/10.1177/14604582241270843>

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1 Introduction

1.1 Background

This study explored public waiting time reporting in public primary oral healthcare in Finland. Public reporting is a strategy to address the quality and costs of care to healthcare stakeholders with information about healthcare providers' performance (James, 2012). The reported performance-related information about identifiable healthcare providers is based on systematically collected comparative data (Cacace et al., 2019). Public reporting has also been described as quality assessment reports, league tables, performance reports, provider profiles, and report cards (Marshall et al., 2000a). The typical objectives of public reporting are (Cacace et al., 2011, xiii):

- to support a patient in choosing a high-quality healthcare provider
- to influence healthcare providers to improve the quality of care they provide
- to increase the transparency of the provider – organizer relationship and the healthcare system as a whole
- to hold healthcare providers and organizers to account for the quality of care they provide and for the purchasing decisions they make.

The purposes of public reporting have been described with three models (Marshall, Shekelle, Brook, & Leatherman, 2000). The Public Accountability Model sees public reporting as a public responsibility to provide openness about public services. In this model, the scientific rigor of the reported information may be less important than the fact that information is delivered widely. Without clear strategic purposes, this model may have little impact on the quality of care. The Market Orientated Model assumes that delivering comparative information on care quality will allow informed and willing customers to make valid and fair comparisons about the quality of care. The Professional Orientated Model assumes an intrinsic desire of healthcare providers to improve their services given the appropriate environment. This may be based partly on a desire to retain autonomy instead of greater governmental regulations. The information helps to identify and solve problems in care quality, and reporting works as a catalyst for this work.

Public reporting can affect care quality mainly through three mechanisms: selection, change, and reputation.

- In the selection mechanism, customers compare healthcare providers utilizing public reporting information and choose high-quality providers over low-quality providers, thus motivating providers to improve the care quality (Berwick et al., 2003). The selection mechanism is associated with providers' motivation to maintain or increase market share.
- In the change mechanism, healthcare providers identify with public reporting deficiencies in their care quality, which leads them to change their activities to improve quality (Berwick et al., 2003). The change mechanism is also associated with providers' motivation to maintain or increase market share.
- In the reputation mechanism, public reporting may affect the public image of healthcare providers, which motivates providers to improve the quality to protect or promote their public image (Hibbard et al., 2005).

Public reporting has also been associated with financial rewards, e.g., pay-for-performance programs, to receive set standards or targets to promote care quality (Lindenauer et al., 2007).

Public reporting in healthcare dates back to the 1860s when Florence Nightingale started to collect, analyze, and deliver comparative information on hospital treatment outcomes (Smith, 2005). The objective of reporting the information was to improve hospital care. In the US, a wider deployment of public reporting began more than a hundred years later in the mid-1980s when in New York, all 30 hospitals that performed coronary artery bypass graft surgery implemented public reporting on outcomes of surgical operations (Hannan et al., 1994). Also, in the UK in the early 1980s, the National Health Service began to deliver care-quality information publicly (Smith, 2005). The users of public reporting in the countries differed. In the UK, information was for healthcare managers reporting hospital mortality rates (Marshall et al., 2003). With the Patient's Charter in 1991 (Beecham, 1992), public reporting was also targeted for patients reporting mainly waiting times (Marshall et al., 2003). In the US, public reporting was for patient choices and controlling costs (Marshall et al., 2003). Patients were accustomed to competition and the possibility of choosing a healthcare provider, whereas in the UK, there was a long history of general practitioners making the choices on patients' behalf (Magee et al., 2003).

Business in public reporting grew into a multi-million-dollar industry by the beginning of the 21st century, though evidence of the effectiveness of public reporting was scarce during 1986-1999 (Marshall et al., 2000b). Information was rarely searched in public reporting systems. Patients did not understand or trust the systems, and physicians were skeptical. Only hospitals appeared to be interested in

public reporting. A review of articles published between 1991 and 2014 concluded that improving healthcare providers' care quality at different levels of healthcare by public reporting was challenging (Campanella et al., 2016). The findings of a literature review based on 45 studies published between 2000 and 2020 indicated a moderate level of evidence to support the role of public reporting in stimulating quality improvement activities, informing patient choice, and improving treatment outcomes (Prang, Maritz, Sabanovic, Dunt, & Kelaher, 2021). The effects of public reporting vary across hospitals, and factors, such as the structural characteristics and culture of the hospitals, might influence the uptake of public reporting.

Most research on public reporting originates from the US, the UK, and the Netherlands (Kumpunen et al., 2014; Pross et al., 2017). The evidence of public reporting on customers' behavior, improved healthcare processes, or treatment outcomes has not increased sufficiently to directly inform policies and practices (Metcalf et al., 2018). Evidence on costs and cost-effectiveness is missing (Cacace et al., 2019). In Australia, there was no agreement on the objectives and the users for public reporting on hospital performance information (Canaway et al., 2018). In 2013, it was wondered whether public reporting works at all, and if it works, its working is too slow (Greene et al., 2015).

The scope of quality-related information in public reporting has ranged from a large amount of detailed information about structures, processes, and outcomes in care to a single indicator within one theme (Cacace et al., 2019). For example, the Swedish website, vantetider.se, has reported only waiting times. In general, waiting time for public hospital treatment has been among the most reported information in many high-income countries (Rechel et al., 2016). This is obvious as waiting times and access to care are among the most used performance measures in healthcare (Beks et al., 2023; Gartner & Lemaire, 2022; Viberg et al., 2013).

In the literature, there are descriptions of public waiting time reporting in different countries. The Swedish public waiting time reporting website was taken into use in 2000 (Cacace et al., 2011, Chapter 8). The information in the system was based on data provided by county councils and regions and on the national common database on waiting times. The system was implemented to support patients to choose healthcare providers, and to inform healthcare providers about referrals under the care guarantee. Patients can view current waiting times by service, e.g., general appointments or elective surgery. The website shows the user the date the information is last updated. In Denmark, waiting times have been reported publicly on a website to patients and healthcare providers. Information has consisted of hospital waiting times (public, private, clinic) by region (Cacace et al., 2011, Chapter 3). In addition to elective surgery, information on waiting times for, e.g., outpatient appointments, follow-up consultations, and rehabilitation, has been reported. Waiting times have been presented in weeks and indicated the maximal waiting time

expected for a typical patient, and healthcare providers have updated the information based on approximations when they consider it necessary. In Canada, public reporting on waiting times started after a reform of public healthcare in 2000 (DeCoster, 2002). Waiting times were reported for key services to ensure comparability between provinces. Lee et al. (2021) studied how waiting times, waiting lists, and key performance indicator statistics for elective surgery were publicly reported in 15 English-speaking jurisdictions in 2017. Comparisons of waiting time and waiting list reduction strategies across national systems were challenging because definitions and measurements of waiting times varied. There was a need for further international standardization in reporting waiting times. In 2020 in Italy, waiting times for outpatient services of public healthcare providers were reported on websites, but the quality of this information fluctuated (De Rosis et al., 2020).

The number of studies evaluating the impacts of public waiting time reporting is scarce. Excessive waiting times shortened after the implementation of a public reporting system in Portugal in 2005, but it was difficult to show the contribution of this system from the other simultaneous changes, such as diagnosis-related group funding and the capacity increase (Barros et al., 2013). The effects of public reporting and patient choice policy were evaluated in the UK (Gaynor et al., 2013). The policy implemented in 2006 mandated that all patients were allowed to choose a provider among five hospitals. The national hospital accreditation bodies collected information for the public reporting system, such as waiting times for services and risk-adjusted mortality rates. No major effects on waiting times were found. Waiting times were supposed to be already reasonable because of previous policy initiatives, and it was hard to find the effects of a single reform because of many simultaneous reforms.

The debate about the role of public reporting in supporting quality improvement in healthcare has continued. The knowledge on the effectiveness of public reporting in primary care is especially scarce (Campanella et al., 2016). Public reporting in primary care has been minor, for example, in most European countries (Cacace et al., 2019), as physician practices have been mainly private. Public reporting has often been mandatory only for hospitals, as the state has been involved in providing hospital care (Cacace et al., 2019).

Though evaluations of public reporting have remained low, the interest in public reporting has grown in Europe (Cacace et al., 2019). Initiatives and investments in public reporting have been without relevant justifications. It has been discussed that political motives have driven government-initiated public reporting programs rather than a desire to improve care (Greenhalgh et al., 2017). On the other hand, information and communication technologies have made public reporting easier.

Public reporting systems are information and communication systems. An information system (IS) can be defined as a system that collects, stores, processes, and delivers information in a way that the information is accessible and useful to those who wish to use it (Buckingham et al., 1987). In communication systems, the basic idea is to affect in some way information users and their behavior with the information (Mason, 1978). The information has to be actionable, meaning the information fits for use and purpose (Barbazza et al., 2021). Fit for use means that the right information is accessible by the right users at the right time. Fit for purpose requires that the information supports intended decision-making functions. Failures in communication are a significant reason why we often struggle to use information effectively (Organization for Economic Co-operation and Development [OECD], 2019, Chapter 1). There may be problems in fit for use because of indirect communication when the sender and receiver of communication are separated in time and space. There may be problems in fit for purpose because the sender and receiver do not understand the information similarly and their information needs vary.

As the number of descriptions and evaluations of public reporting in primary care was scarce, we decided to study public reporting in public primary healthcare in Finland. We limited the study on public waiting time reporting systems. Public waiting time reporting was mandatory in public primary care. So, we knew that it was possible to collect data for the study. The interest in waiting times was also increasing. A major reform of public health and social services was scheduled for 2023, and one of its objectives was to improve access to public primary care (Kangas & Kallioma-Puha, 2022). Waiting times are considered a key indicator of the accessibility of health services (Lee et al., 2021).

We chose a functionalist paradigm to explore the actionability of public waiting time reporting systems. The functionalist paradigm is based on the statements of Burrell and Morgan (1979) on how ontology and epistemology shape how social science researchers view and study social phenomena. The paradigm believes that a phenomenon can be understood in terms of its components which can be analyzed using objective research methodologies, such as surveys. To understand sufficiently the use of waiting time information in healthcare, we did a literature review to know how waiting times were defined and measured in healthcare, as well as to know how waiting time information was utilized. After the literature review, we collected data with three electronic surveys to analyze public waiting time reporting components from the views of oral healthcare managers, citizens, and triage dental nurses. Combining the results of these studies, we explored the actionability of two public waiting time reporting systems. We defined an actionable public waiting time reporting system as a system that collects, processes, and delivers relevant and

accurate information about waiting times to stakeholders for utilization in action-related decision-making to realize intended actions.

The empirical setting of the study was public primary oral healthcare in Finland where healthcare is a combination of tax-funded and private services. Everyone is entitled to public oral healthcare services, and thus, waiting times for non-urgent care are long. To reduce waiting times, maximum waiting times for non-urgent public primary oral healthcare were set in law in 2005 (Laki kansanterveyslain muuttamisesta 1:15b.2 §). To monitor access to care nationally, each public primary oral healthcare organization had to submit data from its electronic patient IS to the electronic ISs of the Finnish Institute for Health and Welfare Institute (hereafter the Institute) since 2014 (Laki sosiaali- ja terveydenhuollon asiakastietojen sähköisestä käsittelystä [Asiakastietolaki] 2:7.1 §; Laki Terveyden ja hyvinvoinnin laitoksesta 1:2.1 §, 1:5.1 §; Mölläri & Saukkonen, 2020, Chapter 1). This required that each public primary oral healthcare organization implement a new module in its electronic patient IS to enable the practice. The Institute processed the submitted data into waiting time information to be reported on its public website (Mölläri & Saukkonen, 2020, Chapter 1). This bunch of systems, which reported retrospective waiting times of all public primary oral healthcare organizations on a single website of the Institute, was the other public waiting time reporting system we studied. We named the system the national waiting time reporting system. We explored its actionability from the views of oral healthcare managers who worked in public primary oral healthcare and from the views of the national authorities who monitored access to care in public primary oral healthcare.

On the other hand, the Finnish Healthcare Act required each public primary oral healthcare organization to report its waiting times for non-urgent care publicly on its website (Terveydenhuoltolaki [TervHL] 6:55.1 §). Thus, the number of websites was equal to that of organizations. The reported information was prospective waiting times. This bunch of systems was the other public waiting time reporting system that we studied, and we named the system the organizational waiting time reporting system. We explored its actionability from the views of patients and citizens. Patients may require information to choose a dentist, and citizens may require information to assess the legitimacy of access to care in public primary oral healthcare.

Our study has both theoretical and practical implications. From the theoretical standpoint, the main contribution of the study is a conceptual framework to explore the actionability of public waiting time reporting systems. As practical implications, we present solutions to design and implement actionable public waiting time reporting systems addressed specifically to national actors within public healthcare, meaning politicians and authorities, and managers of healthcare organizations. The issue may also interest healthcare professionals engaged in clinical work and citizens.

1.2 Research Questions

To explore the actionability of public waiting time reporting systems in public primary oral healthcare in Finland, we had three research questions. To answer the questions, we did a literature review on waiting times in healthcare and three electronic surveys. One was for oral healthcare managers, one for triage dental nurses, and one for citizens. To explore the actionability of the two public waiting time reporting systems, the national system and the organizational system, we designed a conceptual framework from the Shannon–Weaver model of communication (1964) and Mason’s levels of information output in communication systems (1978), as we considered public reporting systems as information and communication systems. The three research questions of the dissertation were as follows.

Research Question 1

How are waiting times defined and measured in different healthcare areas and for which purposes is waiting time information used?

Research Question 2

Is the national public waiting time reporting system actionable?

Research Question 3

Is the organizational public waiting time reporting system actionable?

To answer Research Question 1, we had five study questions in our literature review. They were as follows.

1. In which healthcare areas are waiting times studied?
2. What are the purposes of the studies on waiting times in health care?
3. How are waiting times in health care defined?
4. Which measure of central tendency – the mean or median – is used most in the studies on waiting times in health care?
5. How are data on waiting times for health care collected?

To answer Research Question 2, we had four study questions in our surveys. The first two questions were included in the survey of public primary oral healthcare managers using items based on a framework adapted from the original IS success

model of DeLone and McLean (1992) and the IS-impact measurement model of Gable et al. (2008). The other two study questions were for the survey of dental nurses who worked in telephone triage to assess the need for treatment. We based the items in the survey on a framework adapted from the Unified Theory of Acceptance and Use of Technology, UTAUT (Venkatesh et al., 2003). The questions were as follows.

1. How do oral healthcare managers perceive the digital national waiting time IS?
2. How do oral healthcare managers perceive different waiting time measures?
3. How do dental nurses use the electronic patient IS module in triage?
4. Which factors determine this usage?

To answer Research Question 3, we had three study questions. The first study question was for the citizen survey and the third question for the survey of public primary oral healthcare managers using items based on a framework adapted from signaling theory (Spence, 1973) and agency theory (Eisenhardt, 1989; Ross, 1973). The second question evaluated the quality of reported waiting time information on the websites of public primary oral healthcare organizations.

1. Do citizens screen their environment for signals of waiting times for choices of a dentist?
2. What is the quality of signalled waiting times on the websites of public oral healthcare providers?
3. How does the management of oral healthcare providers perceive signalling waiting times to citizens?

1.3 Outline of the Dissertation

The dissertation consists of two parts: a synthesis and four independent original publications. The synthesis has six main chapters. The first chapter introduces shortly public reporting in healthcare and presents the research questions. The second chapter presents the empirical context of the study referring to waiting times and public primary oral healthcare in Finland. In publicly funded healthcare, waiting times and access to care are fundamental policy issues, and when maximum waiting times are set, they must be monitored as in public primary oral healthcare in Finland. The third chapter presents knowledge of public reporting in healthcare based on the existing literature. The fourth chapter presents our research design and methodological choices including the philosophical assumptions, and the collecting

and analyzing of the research data. In this chapter, we also present the conceptual framework we designed to explore the actionability of the two public waiting time reporting systems. The fifth chapter summarizes the results of the four original publications and presents the actionability of the two public waiting time reporting systems. In the sixth chapter, we discuss how the main results of our research are related to the earlier literature on public reporting, and we present some theoretical and practical implications of the study. Finally, we address some research limitations and implications for future research to describe and evaluate public reporting. The chapter ends with conclusions.

The second part of the dissertation includes the four independent peer-reviewed publications. They differ in their theoretical and empirical focus, but each elaborates on different views on the actionability of public waiting time reporting. One publication is a literature review, and the three other publications are original research articles. First, we present Article I which was a literature review on waiting times in healthcare. Most articles handled waiting times for elective surgery and hospital care from the views of policy and management issues. Article II describes the perceptions of the oral healthcare managers on the national waiting time reporting system. The managers perceived that it was easy to access the national waiting time reporting system, but the information in the system was of low quality. The managers could utilize the retrospective waiting time information to a minor degree to manage waiting times in their organizations. Article III discusses the organizational waiting time reporting system. The citizen respondents considered waiting time a high-priority criterion in choosing a dentist, but they rarely utilized public reporting to search for information to support their decision-making to choose a dentist. There was no need for information as there were only limited possibilities to choose a dentist when a patient used public healthcare services, and patients wanted to visit the dentist they had visited earlier. Also, the information on the websites was of low quality. One-fifth of the oral healthcare managers responded that the reported waiting time information was estimated based on their experience. Article IV analyzed how dental nurses used electronic patient ISs on telephone triage tasks and which factors determined this usage. Their data recording for national purposes to monitor waiting times was sparse. As this input data was processed into the waiting time information in the national waiting time reporting system, it is obvious that the information on waiting times in the system was inaccurate. Each independent article complements and enriches the theoretical discussion in the first part of this dissertation.

2 Empirical Context of the Study

This chapter starts with a description of waiting times in healthcare. Especially in countries with publicly funded healthcare, access to care and waiting times are centric health policy issues. However, the political interest in access to oral healthcare is not high, as oral healthcare is predominantly provided by private dentists all over the world (World Health Organization [WHO], 2022, Chapter 3). Access to dental care for adults has been studied in 11 European countries, but access was evaluated using the physical availability of services and other determinants of access, but not waiting times (Winkelmann et al., 2022). However, measuring and managing waiting times is essential in all public healthcare areas. After the description of waiting times, we discuss Finnish public primary oral healthcare from the view of maximum waiting times for non-urgent oral healthcare and their public reporting.

2.1 Waiting Times

2.1.1 Waiting Times, Waiting Lists, and Access to Care

Waiting times and access to care are centric in healthcare. Waiting times may be associated with costs, health outcomes, and patient satisfaction (Fielden et al., 2005; Reichert & Jacobs, 2018; Rönnerstrand & Oskarson, 2020). The three key actors in healthcare – patients, healthcare providers, and politicians – consider that reasonable waiting times for non-urgent care and the choice of a provider are expectations of patients, which need a response (WHO, 2000, Chapter 2). From the view of performance measurement, waiting times and access to care are among the most used measures in healthcare (Beks et al., 2023; Gartner & Lemaire, 2022; Viberg et al., 2013). Performance measures are reported to customers and the governments to promote the accountability of healthcare providers by communicating, e.g., the degree to which healthcare providers meet the goals set for them.

Waiting time is the period between two points: a starting point and an endpoint. As the points can be defined in many ways, there are many definitions of waiting time for healthcare services in different healthcare organizations. From the view of

a patient, the first starting point of a waiting time for non-urgent care is the moment, when the patient contacts healthcare to get service. In many cases, phone calls are still needed for booking an appointment with a healthcare professional. When calling a healthcare unit, in the unit, an attempt may be made to answer the call, or the call may be diverted to the callback system. The time spent waiting for the call to be answered and waiting for the return call is associated with patient satisfaction (Kelly et al., 2010). In primary care after a successful booking, there is a waiting time from the date obtained an appointment to the date to see a healthcare professional (Martin et al., 2020). In hospital care, three waiting periods are used at their simplest: waiting time to see a specialist, waiting time for hospital treatment, and total waiting time (Sanmartin, 2003).

Waiting list is another major concept in managing patients' access to treatment. Waiting lists contain the patients waiting for a planned procedure at a hospital (Godden & Pollock, 2009). Waiting lists are technical means for managing queues of patients waiting for procedures. A long waiting list does not necessarily mean a long waiting time, though there often is a positive association between these two. Waiting lists have been used in the British National Health Service since its formation in 1948 (Sheard, 2018). Explanations for the existence and size of waiting lists and waiting time for care have included underinvestment in healthcare, the inefficient use of available resources, and physicians' manipulations of their productivity to maintain demand for private practice (Sheard, 2018).

The concept of access to care is also centric in the context. Access to healthcare refers to the severity of illness and the waiting time to enter the healthcare system (Simon et al., 1979). Access can also be used as a general concept that summarizes the dimensions of availability, accessibility, accommodation, affordability, and acceptability to describe the fit between the patient and the healthcare system (Penchansky & Thomas, 1981). Lately, awareness has been added as a sixth dimension of access (Saurman, 2016). Awareness refers to the communication and information strategies of the healthcare organization with its stakeholders. The sixth dimension is necessary to report that a service can be accessed and to determine ways to improve access.

2.1.2 Managing Waiting Times

Waiting times and waiting lists are typically used in healthcare systems in countries like Australia, Canada, New Zealand, and the Nordic countries, which have a universal tax-financed healthcare system (Sheard, 2018). In market circumstances, prices determine the output of healthcare services, and price changes stimulate changes in the level of the service output (Cullis & Jones, 1983). In a public system, the service price is not high enough to equate the demand for services with the

available resources and supply. With excess demand, queues become apparent. Using waiting times as a form of rationing has aroused political pressure to reduce waiting times and increase patient choice (Or et al., 2010).

To keep waiting times reasonable, combining maximum waiting times stipulated in regulation and regular waiting time monitoring with different demand- and supply-side interventions have been used successfully (OECD, 2020, Chapter 4). The maximum waiting time policy means that if a public hospital with primary responsibility for a patient cannot provide treatment within the maximum waiting time, the patient has a right to choose another organization for the operation among public or private hospitals at the expense of the hospital with primary responsibility. Maximum waiting times for access to care have been set, for example, in Sweden already in 1992 for hip and knee replacement and cataract surgery (Hanning, 1996). The maximum waiting times set have varied from country to country, depending on the resources of a country (OECD, 2020, Chapter 4). Waiting-time guarantees seem to have received a broad positive public response showing the idea of responsiveness between policymakers and citizens, but patients are not well informed by healthcare providers about the waiting-time guarantee (Rönnerstrand & Oskarson, 2020).

Policymakers have used either blanket waiting-time targets or vertical waiting-time prioritization (Januleviciute et al., 2013). Blanket waiting-time targets mean that patients have equal priority regardless of their clinical condition and the treatment they are waiting for. These targets have been used in, e.g., Australia, England, and Sweden. This unconditional guarantee may be effective in reducing long waiting times (Siciliani & Hurst, 2005), but the reduction of waiting times does not necessarily benefit all patients because hospitals may choose to treat patients with fewer needs. Vertical waiting-time prioritization, which is used in, e.g., New Zealand and Norway, means that explicit guidelines are given on how those with the highest needs are correctly identified and prioritized. Vertical waiting-time targets will probably lead to improved prioritization and reduced waiting times for patients who need treatment most. The broad vertical prioritization – urgent, soon, and non-urgent – has been used traditionally everywhere (Edwards, 1999).

When maximum waiting times are enacted, politicians and authorities require information to monitor the realized maximum waiting times in each healthcare organization. Thus, healthcare organizations have been obliged to provide information for monitoring. It has been speculated that the self-reported information may be biased (Siddins et al., 2012; Vrangbæk et al., 2007). To question these speculations, investments in electronic information systems have been made to get data to control organizations' behavior (Eisenhardt, 1989). There is evidence that using electronic information systems has not removed the question of biased data. In Sweden, the validity of the waiting time registry based on data extracted automatically from electronic records was questioned in a study in 2017-2018

(Ebbevi et al., 2021). This was because of the misconceptions underpinning the waiting time reporting system.

Also, healthcare organizations have used different means to reduce waiting times. Process improvements have brought positive results as well as realigning resources and increasing operational efficiency (Naiker et al., 2018). In addition, improving the allocation of appointment slots and controlling no-shows' time have been good solutions.

2.1.3 Waiting Time Measures

There are three ways to measure the length of waiting time about the passage of time (Viberg et al., 2013). Retrospective measures describe completed waits, meaning realized waiting times of patients already treated. The two other measures describe prospective waiting times. One is for ongoing waits, meaning the waiting times of those on the waiting list, and the other is for expected waiting time, meaning an estimate of future waiting time for a new patient.

Different stakeholders have different waiting time information needs, and thus, different measures should be used to satisfy their information needs. To monitor waiting-time targets, the waiting time of patients already treated is a good measure, as it refers to the full duration of waiting time that patients have experienced (Dixon & Siciliani, 2009). As the measure is calculated retrospectively, it has limited usefulness for managing current performance. The patients' interest is the total waiting time (Siciliani et al., 2014). Patients require valid and updated information on waiting times in a relevant and understandable format to empower them to choose a healthcare provider. It may be challenging if healthcare organizations have disincentives to provide this information (Winblad et al., 2010). Healthcare organizations often use internal waiting time indicators to assess and manage their waiting times (Stoop et al., 2005).

As statistical key figures to present waiting times, the mean, median, number of patients waiting, number of patients waiting per inhabitant, and number of patients waiting within a certain time interval have been calculated (Viberg et al., 2013). For presenting organizations' performance data simply, color symbols have been suggested. Symbols are challenging, as they do not explain differences and variations (Anhoj & Hellesoe, 2017). Similarly, a single statistical key figure of waiting times is inadequate for designing policies to tackle waiting times (Dimakou et al., 2015), and knowledge behind waiting list numbers is unsatisfactory (Cullis et al., 2000). Routine reporting should show the dynamic aspects of waiting lists and waiting times. It is important to monitor not only the number of patients on the waiting list or average waiting times but also the queue discipline and the balance between arrivals and departures (Torkki et al., 2002).

Comparing waiting times and maximum waiting times among healthcare providers is difficult. Maximum waiting time targets for elective treatment have been set varyingly for time-to-diagnosis, time-to-treatment, and the full pathway (Lee et al., 2021). Depending on how the starting point and endpoint of different waiting times are defined matters hugely in the length of waiting times, and challenges comparisons between healthcare providers (Viberg et al., 2013). In addition, waiting times are measured retrospectively and prospectively and presented with different statistical key figures at different healthcare levels. Measuring and comparing waiting times is necessary to understand and manage waiting times. Despite the importance of effective information management on waiting times, there is little evidence that mere reporting of waiting time information guarantees effective waiting time reduction (Kreindler, 2010). Waiting time reporting has not motivated healthcare providers or influenced patient choices for reducing waiting times significantly (Kenis, 2006; Stoop et al., 2005). Combining public reporting strategies with pay-for-performance approaches may help healthcare providers achieve defined waiting time targets when they get more funding (Martalog & Bains, 2009).

2.2 Maximum Waiting Times in Public Primary Oral Healthcare in Finland

The empirical context of the study was public primary oral healthcare in Finland. Oral health refers to the status of the craniofacial complex with several abilities, such as speaking, tasting, swallowing, and conveying a range of emotions through facial expressions (Glick et al., 2016). Oral conditions have remained a public health challenge everywhere (Kassebaum et al., 2017). The expenditure on oral diseases has ranked third behind diabetes and cardiovascular diseases in the EU member states (Peres et al., 2019). In high-income countries, there are around seven dentists per 10,000 inhabitants (WHO, 2022, Chapter 3). Across the world, oral healthcare is provided mainly by private dentists, and politicians often consider dentistry a marginal issue with low priority.

The Finnish healthcare system is a combination of tax-funded and private services. In oral healthcare, the role of private services is significant, and private-sector dentists provide almost half of the adult visits (Sotkanet, 2021a). The number of dentists working in public services in 2021 was 4,5 per 10,000 inhabitants (Sotkanet, 2021b). Based on the FinHealth 2017 study, 59% of men and 69% of women felt that their oral health was quite good or good (Suominen & Raittio, 2018b). Of men, 52% and 67% of women visited a dentist regularly for check-ups (Suominen & Raittio, 2018a). One-fifth expressed that long waiting times made it difficult to access care, and one out of six said that the customer fee was too high. About 2% felt it was problematic to visit a dentist because of poor transport

connections. Public healthcare patients have considered that the waiting time for non-urgent public oral health services should be, at most, 46 days (Tuominen & Eriksson, 2012).

To ensure oral healthcare services in sparsely populated areas in Finland, the production of public primary oral healthcare services began in 1972 (Kansanterveyslaki [KansanterveysL] 1:1.1 §). The entire population was entitled to public subsidies for oral health services in 2002 (Jauhiainen et al., 2013). There has been no control over prices charged for private dental services (Niiranen et al., 2008). Customer fees for public oral services have been heavily subsidized for adults and free of charge for children and adolescents. In 2021, every Finn was entitled to public primary oral healthcare services, and within the limits of resources, an individual had some possibilities regarding choice, such as choosing the public service organizer, the service unit, and the dentist (TervHL 6:47.1 §, 6:49.1 §).

Waiting times became long as everyone was entitled to public oral health services. They were used as a form of rationing, but to keep waiting times reasonable, the care guarantee with maximum waiting times came into force in Finland in 2005 (Laki kansanterveyslain muuttamisesta 1:15b.2 §). Compared to the other Nordic countries, Finland was the last to introduce maximum waiting times into use. It took almost 10 years to prepare for the care guarantee in Finland (National Audit Office of Finland, 2008, Chapter 1).

According to the care guarantee, a patient must get an appointment with a healthcare professional in public healthcare within the period stipulated in the regulation. If a healthcare organization cannot provide the service within the maximum waiting time, the service must be outsourced to another provider. A patient unsatisfied with the care provision has the right to submit an objection to the manager responsible for healthcare in the healthcare unit in question (Laki potilaan asemasta ja oikeuksista [PotL] 3:10.1 §). A patient also has the right to appeal about the care to the national authorities who control healthcare (PotL 3:10.3 §). In public primary healthcare, the regional state administrative agencies, who are national authorities, have controlled the care guarantee system.

An evaluation report on the Finnish care guarantee system was published in 2008 (National Audit Office of Finland, 2008). In 2005, the need for the system had been justified on the grounds of fairness, equality, and cost savings. The objectives of fairness and equality had developed in a positive direction, although there were still problems. As to cost savings, the trend was not as hoped. The non-achievement of the set objectives was partly due to the legislation, which left opportunities to interpret how to apply the law. The letter of the law was fulfilled, but the spirit of the law was not. Information for monitoring access to care was provided, but the information did not tell anything about the reasons why queues existed and there were regional differences. Despite the shortcomings of the information, its

usefulness was considered reasonable. In particular, the national analyses were considered reliable because the number of observations in the data was high (Pekurinen et al., 2008). Concerning regional information, shortcomings in the data challenged its usage, especially for analyzing queue times.

In 2013, the care guarantee system was evaluated for future policies (Pelttari & Kaila, 2014, Chapter 1). At the time, access to care was monitored with data collected twice a year with questionnaires from public healthcare managers. For example, 147 managers out of 150 public primary oral healthcare managers responded to the questionnaire in the spring of 2013. Compared with the oral healthcare questionnaire in the autumn of 2012, the number of patients waiting more than six months had decreased while the number of patients waiting more than three months had increased. The system was criticized as the measurement focused on the beginning of care, and it did not support the whole episode and continuity of care. Primary care physicians questioned the significance of the statistical data collected, as it was not directly useful in clinical work. It was also evaluated how patients accessed the waiting time information. The Healthcare Act (TervHL 6:55.1 §) required that public oral healthcare organizations report publicly waiting times for non-urgent care on their websites. About $\frac{3}{4}$ of oral healthcare organizations reported information on access to care according to the Healthcare Act. The information on the fulfillment of the maximum waiting times set was not interesting from a patient's view. The interest is in the waiting time that applies to an individual patient. The evaluation report 2013 concluded that patients, clinicians, managers, and the national level need different information as their information needs vary. It might also be that monitoring authorities and policymakers require various information.

Since 2014, public primary healthcare organizations have been obliged to submit data to monitor the care guarantee from their electronic patient ISs to the electronic ISs of the Finnish Institute for Health and Welfare Institute (Asiakastietolaki 2:7.1 §; Laki Terveysten ja hyvinvoinnin laitoksesta 1:2.1 §, 1:5.1 §; Mölläri & Saukkonen, 2020, Chapter 1). The new data acquisition method meant that each public primary healthcare organization, including oral healthcare, had to implement a new module in its electronic patient IS. At the time, there were six electronic patient ISs in public primary oral healthcare.

To access public primary oral care in Finland, a triage dental nurse assessed each patient's dental care needs in telephone triage. With the new patient IS module in 2014, triage dental nurses received wider access rights to the IS. They could search for patients' dental histories to support their treatment-priority decision-making. They could record data for dentists about the symptoms of patients and the reason for seeking treatment in patient ISs. Also, data for waiting time monitoring purposes for the national system was collected through triage contacts. Data was recorded into electronic patient ISs either automatically or manually by nurses. The manual

recording might mean data entry in structured form. As the recorded data originated from discussions with patients about their symptoms, nurses had to change unstructured discussions to some degree into structured form. Tuomi (1999) discussed reversing the data, information, knowledge, and wisdom hierarchy common in information systems literature (Rowley, 2007).

Entered triage contact data, which might be incomplete, was automatically submitted to the Institute once a day, using pre-defined content (Häkkinen et al., 2020). The data extracted from the electronic patient ISs was encrypted before the submission to the Institute. The systems of the Institute processed the individual-level data, including the data of each triage contact, appointment, and cancellation into aggregated summary reports of realized waiting times. This was the information with which oral healthcare organizations accounted for access to care for the national authorities.

The information on realized waiting times of all public primary oral healthcare organizations was reported publicly on one website of the Institute (Mölläri & Saukkonen, 2020, Chapter 1). New waiting time information was published once a month. In spring 2021, information on realized waiting times was presented with the numbers of patients within six realized waiting time categories. The categories for realized waiting time for non-urgent care were 0 days, 1-3 days, 4-21 days, 22-90 days, 91-180 days, and more than 180 days. The information was also classified by area of regional state administrative agency, province, organization, and unit. Figure 1 (available only in Finnish) illustrates the realized waiting times for non-urgent care in public primary oral healthcare in April 2021. The category of 0 days meant no waiting time to access non-urgent care. In practice, it was zero in most organizations. When the number of patients in this category was large, the statistical key figure was probably wrong. In addition, if the total number of patients across all categories in a monthly report was small relative to the organization's size, the report was likely incorrect (Figure 2, available only in Finnish).



Figure 1. Realized waiting times for non-urgent public primary oral healthcare by regional state administrative agency in April 2021 on the national waiting time reporting system.

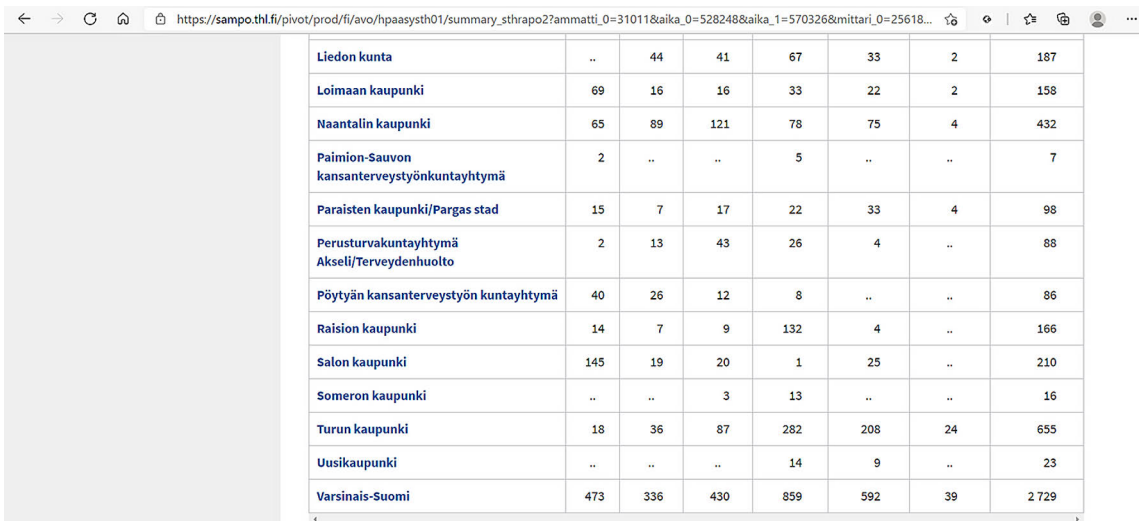


Figure 2. Realized waiting times for non-urgent public primary oral healthcare by organization in April 2021 on the national waiting time reporting system.

Based on the statistical report on the care guarantee in the spring of 2021, about 55% of patients waited less than three weeks to see a dentist for non-urgent care in public primary oral healthcare, and about 10% had a waiting time longer than three months (Mölläri et al., 2021). Concerning public primary care, data coverage had improved

since 2020. It was not reported whether there were differences in the data coverage between different outpatient care areas, such as visits with a general practitioner and a dentist. It was thought that the data for waiting time monitoring would be more comprehensive if only one timestamp instead of three timestamps of a triage contact of a patient were used in measurements, the moment of contact. This moment when a patient contacted a telephone triage was automatically generated in the electronic patient IS. The two other timestamps were the moment of assessing the need for treatment and the moment of booking an appointment, which were based on triage dental nurses' data entry.

Collecting electronic data for the national waiting time reporting system did not change the Healthcare Act requirement (TervHL 6:55.1 §) that each public oral healthcare organization had to report publicly its waiting times for non-urgent care on its website every fourth month by functional units. The four-month interval update meant that the information was not timely. In the reporting, the third next available non-on-call dentist appointment time (T3) was commonly used (Salkinoja et al., 2022). The measure has been preferred in primary care, as random cancellations do not have as much effect on these as on first available appointments (T1) (Murray & Berwick, 2003). Figure 3 (available only in Finnish) presents how differently prospective waiting times were presented on the websites of four public primary oral healthcare organizations in Southwest Finland on 15.9.2021.

Turku [Hoitotakuun toteutuminen suun terveydenhuollossa | Turku.fi](#)

Odotusaika suun terveydenhuoltoon
Kiireetön hoito: noin 4 kuukautta.

Kaarina [Hoitoon pääsy suun terveydenhuollossa | Kaarina](#)

Hoitoon pääsyn tavoiteaika uusille tarkastuksille on 5 kuukautta.

Salo [Terveyspalvelut - Salo](#)

Odotusaika kiireettömään hoitoon suun terveydenhuollossa
(hammaslääkärin vastaanotto) 19.7.2021

Läntinen hammashoitola – 94 päivää
Halikon hammashoitola – 82 päivää
Moision hammashoitola – 114 päivää

Raisio-Rusko [Hoitoonpääsy suun terveydenhuollossa | Raisio](#)

Odotusajat Toukokuussa 2021

- Raisio, hammaslääkäri 79 vuorokautta
- Rusko, hammaslääkäri 61 vuorokautta
- Raisio, suuhygienisti 75 vuorokautta
- Rusko, suuhygienisti 49 vuorokautta

Figure 3. Prospective waiting times for non-urgent public primary oral healthcare on the websites of four public primary oral healthcare organizations on 15.9.2021.

For citizens, it was easy to access public reporting via the Internet. In 2020 (Statistics Finland, 2020), 89% of Finnish households had access to the Internet at home. Of Finns, 72% had searched health and nutrition information on the Internet during the three-month period prior to requesting the issue. Accordingly, 58% had used MyKanta services, and 50% had booked an appointment with a physician electronically.

Though waiting times were long, the number of complaints about the care guarantee was low in 2008 (National Audit Office of Finland, 2008, Chapter 3). Table 1 presents the number of administrative actions by the regional state administrative agencies to control maximum waiting times in public primary oral healthcare during 2018-2022 (R. Kytä, AVI HAKE Information Service, Regional State Administrative Agency for Southern Finland, personal communication, February 27, 2024). Planned supervision refers to the regional state administrative agencies' supervision of access to care, which supervision was based on the health care supervision program. Reactive supervision means that the agency received a notification about neglect by a healthcare service provider of its activities. A patient complaint refers to a notification from a patient. The figures in Table 1 do not include patient complaints, which the agency considered appropriate to transfer to the operating healthcare unit to be handled as an objection.

The total number of all administrative actions by the regional state administrative agencies in public primary oral healthcare during 2018-2022 was 453, of which the number of patient complaints was 323. The number of patient complaints about access to non-urgent care in public primary oral healthcare was 70, about one-fifth of all patient complaints about public primary oral healthcare. The trend was upward during 2018-2022, but the figures remained low. As to the other complaints of patients, there was no trend.

Table 1. The numbers of different administrative actions in monitoring access to non-urgent care in public primary oral healthcare (R. Kytä, AVI HAKE Information Service, Regional State Administrative Agency for Southern Finland, personal communication, February 27, 2024).

Induced by	2018	2019	2020	2021	2022	Total
Planned supervision	19	21	*	9	11	60
Reactive supervision	6	7	7	6	5	31
Patients' complaints	4	15	13	15	23	70
Total	29	43	20	30	39	161

* Covid-19, no maximum waiting times.

In 2021, when the study data was collected, Finnish municipalities had a duty to organize public primary healthcare services. The state supported the organization by paying central government subsidiaries to municipalities. The Healthcare Act defined the services provided and the maximum waiting time for non-urgent care (TervHL 3:26.1 §, 6:51.2 §). It was six months in public primary oral healthcare. To monitor the care guarantee nationally, public primary healthcare organizations submitted data from their electronic patient ISs as from 2014, and the information

on realized waiting times of all public primary oral healthcare organizations was reported publicly on one website of the Institute. As earlier, public primary oral healthcare organizations had to report publicly waiting times for non-urgent care on their websites. A major reform of public health and social services was scheduled for 2023 meaning that instead of the municipalities, the wellbeing services counties organize the public health and social services (Kangas & Kallioma-Puha, 2022). Among other things, the reform aimed to improve the availability and accessibility of public primary services. Different forms of reform have been planned since 2005. Politicians have been debating the role of private sector services and freedom of choice.

3 Literature Review

This literature review aims to deepen our knowledge of public reporting in healthcare. Public reporting is a strategy to report information on the costs and quality of care to healthcare stakeholders (James, 2012). The information is quality-related information about identifiable healthcare providers based on systematically collected comparative data (Cacace et al., 2019). According to Donabedian (1988), healthcare quality refers to the structures, processes, and outcomes of healthcare. Structures denote the attributes of the settings in which care occurs to meet the healthcare needs of a population. The attributes refer to, e.g., the number and qualifications of personnel, material facilities, money, and methods of reimbursement. Processes denote what is done in giving and receiving care, such as patients' activities in seeking care. Of process measures, we bring up waiting times (Victoor et al., 2012). Outcomes denote the effects of care on the health status of patients and populations. Improvements in patients' health behavior are included under a broad definition of health status, and so is the degree of the patient's satisfaction with care. These three quality factors are interdependent; structures promote processes, and processes outcomes.

Public reporting on healthcare quality aims 1) to support patients in choosing high-quality healthcare providers, 2) to influence healthcare providers to improve the quality of care they provide, 3) to increase transparency of the healthcare system, and 4) to hold healthcare providers and organizers to account for the quality of care they provide and for the purchasing decisions they make (Cacace et al., 2011, xiii). Public reporting can affect healthcare quality mainly through three mechanisms: selection (Berwick et al., 2003), change (Berwick et al., 2003), and reputation (Hibbard et al., 2005).

3.1 Materials and Methods

This literature review is a narrative overview, also known as an unsystematic narrative review (Green et al., 2006). We chose to do a narrative overview instead of a qualitative or quantitative systematic review (a meta-analysis), as systematic reviews are based on a strictly defined question in a specific context to synthesize findings from similar studies (Greenhalgh et al., 2018). We did not consider strictly

questions for our purpose on the actionability of public reporting in public primary healthcare relevant, as we knew that the number of evaluations of public reporting was low (Cacace et al., 2019), and the knowledge of the effectiveness of public reporting in primary care was scarce (Campanella et al., 2016). Thus, to get an overall summary of public reporting in healthcare based on a wide variety of different studies (Greenhalgh et al., 2018), we chose to do a narrative overview. A narrative overview reports the author's findings in a condensed format that typically summarizes the contents of each article with interpretation. Some researchers think a narrative overview should include a critique of studies, while others do not consider this necessary (Green et al., 2006). Searches from databases, that are appropriate for the area of study to get reasonable breadth and depth on a topic, are complemented with, e.g., hand searches of the references of retrieved literature. There should not be too many limiting exclusion criteria, and inclusion criteria should not be too wide so that the articles reviewed cover sufficiently the area to enable rigorous objective conclusions based on the literature reviewed.

With the narrative review, we wanted to summarize earlier literature on public reporting in healthcare, which were in our opinion applicable for studying the actionability of public waiting time reporting in public primary oral healthcare in Finland. Thus, we were not highly interested in which outcome measures were used or should be used in various specialties as we were interested in the process measure of waiting time. For the review, we used the database Scopus. We chose the database because it is a multi-scientific database. We did not use more biomedical databases like Cochrane or Medline, including perhaps numerous studies on public reporting on various healthcare outcomes in different healthcare areas. Neither did we use a greater number of multi-scientific databases, such as Web of Science and JSTOR, in searches for relevant articles for our narrative overview.

With the query, we wanted to find English-written journal articles and reviews whose title, abstract, or keywords include "public reporting" and "waiting time*" or "waiting list*". The concept of "waiting list*" was used as it has been common in the context. Waiting lists are a technical means of managing queues of patients waiting for treatment. We did not select other concepts referring to waiting, like wait, as the Medical Subject Headings (MeSH) include only "waiting lists". Neither did we use the concept of "primary care" to limit the healthcare areas, as the number of articles on waiting times in primary care has been minor (Söderlund, 2023). The period when the articles or reviews were published was not limited. On the date of searching, 27.6.2024, we retrieved 18 articles from Scopus.

We complemented the documents retrieved from Scopus with the query described above with a new search among the 2562 articles that shared references with one of the 18 articles already retrieved from Scopus. The chosen article was "Public Reporting on Quality, Waiting Times and Patient Experience in 11 High-income

Countries” by Rechel et al. (2016). With an equivalent query among the 2562 articles, we retrieved 45 articles and reviews in English on 27.6.2024. One article was retrieved in both searches, and two articles were non-accessible. Thus, the total number of articles for the review was 60. In our quality insurance for the articles, we relied on Scopus’s quality of the article selection process (Scopus, 2024). See the whole flow of the literature review in Figure 4.

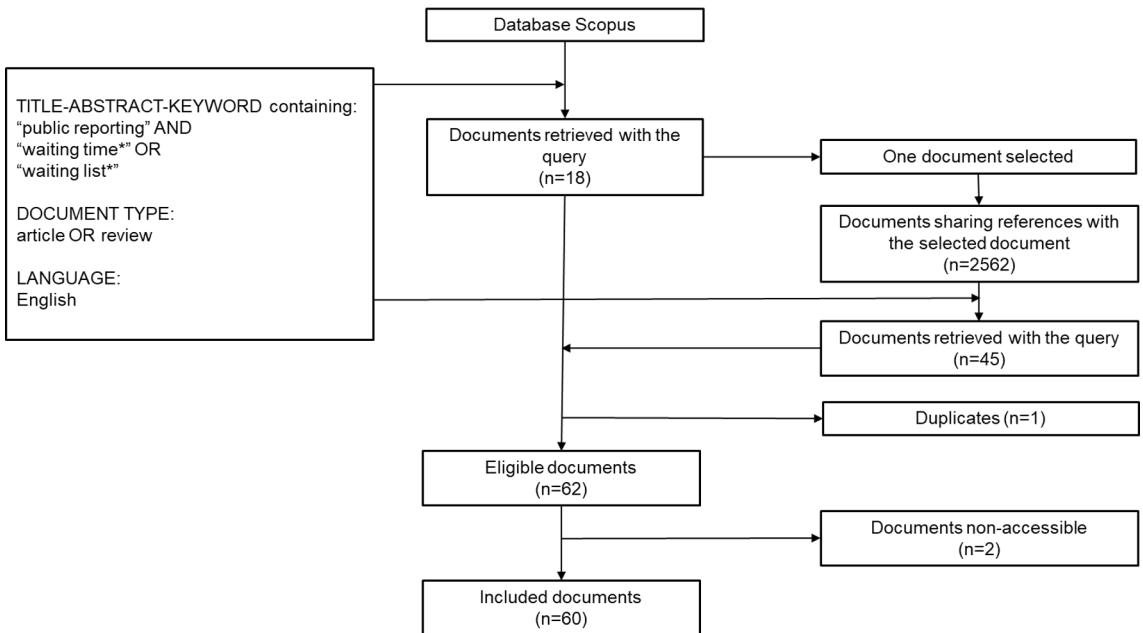


Figure 4. The query and flow diagram of the literature review.

We classified the documents into five categories in the analysis (Appendix 1). The categories followed the ideas of communication systems, as we consider public reporting systems as communication systems. Communication systems affect in some way information receivers and their behavior with the information (Mason, 1978). The first category in the classification was for documents whose theme focused on impacts of public reporting, mechanisms of impacts, and factors enabling impacts referring to effects by communication systems in some way. The second category was for documents on the information of public reporting referring to the delivered information of communication systems. Three categories were for different users of public reporting referring to various receivers of information delivered by communication systems. Thus, the third category was for documents handling public reporting users within different specialties. In the fourth category, we included documents handling public reporting from the perspective of

physicians, and in the fifth category the documents handling public reporting from patients' perspective. Each article or review was classified only into one category by one researcher. Because the number of documents is 60, we do not present interpretations of each article, but we present an interpretation of each category.

3.2 Results

3.2.1 Enumerative Bibliographical Main Findings

The greatest number of articles (n=23) were from the US by Scopus statistics. Thirteen articles were from the UK, eleven from Australia, seven from Canada, six from Germany, and five from the Netherlands. The source country was China in four articles and Italy in three articles. The number of articles by year of publication fluctuated (Figure 5). Six journals published two or more of these articles. Health Policy published seven articles, BMC Health Services Research four, and American Journal of Transplantation three. Annals of Emergency Medicine, BMC Family Practice, and International Journal of Health Care Quality Assurance published two each. Appendix 1 enumerates the analyzed articles and reviews.

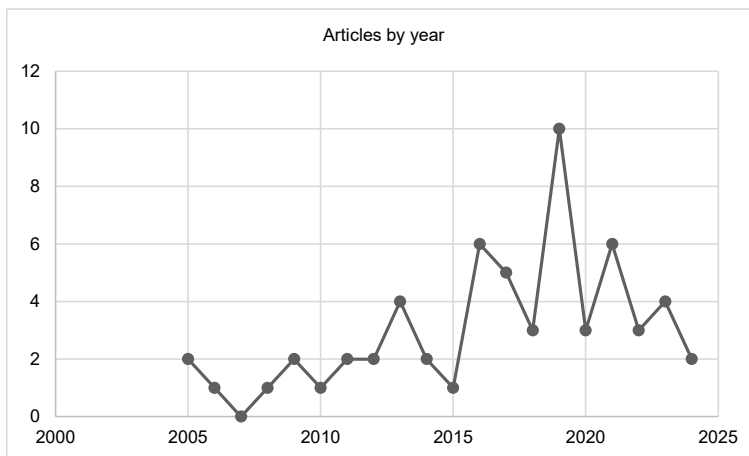


Figure 5. The numbers of articles by year of publication.

3.2.2 Impacts of Public reporting, Public Reporting Mechanisms, and Factors Enabling Impacts

Of the documents included in this category, four were reviews on public reporting (Chen & Miraldo, 2022; Hamblin, 2008; Prang, Maritz, Sabanovic, Dunt, & Kelaher, 2021; Timofeyev et al., 2023). Four articles described mechanisms of how

public reporting impacts the quality of care (Bevan, 2010; Bevan et al., 2019; Garnick et al., 2017; Veillard et al., 2013), and four articles described factors on how to enable the effectiveness of public reporting (Canaway et al., 2017; Canaway et al., 2018; Rousmaniere et al., 2020; Song & Tucker, 2016).

Public reporting expanded in healthcare in the UK and the US since the early 1990s (Hamblin, 2008). The number of studies in the US was higher than in the UK because of a longer history of public reporting in the US. In the UK, public reporting systems have often been national and mandatory, and in the US, the systems have been local and voluntary. Though the number of studies from the countries varied, the findings from both countries were quite similar. Quality improvement was based on providers' initiatives rather than on consumer choice despite the commercial culture in the US. Providers' initiatives were associated with the possibility of reputational damage or incentives of kudos and censure. In many cases, the controlling schemes in the UK stimulated successful quality improvement, though negative responses, such as gaming, existed to a greater extent than in the US.

A literature review including 45 articles published between 2000 and 2020 analyzed how public reporting impacted informed patient choice, quality improvement activities, and clinical outcomes (Prang, Maritz, Sabanovic, Dunt, & Kelaher, 2021). The highest number of articles was from the US. Analyzing the impacts of public reporting was considered complex. Many means were used in reporting. The number of reported quality indicators was huge. There were several levels of reporting on the information. About half of the studies reported positive effects of public reporting through the mechanism of selection (Berwick et al., 2003). The evidence of the impacts of public reporting on the improvements of care quality activities in primary care and hospitals was moderate and strong, though the number of studies on outpatient care was low. Most of the studies reported a moderate level of evidence for positive impacts of public reporting on clinical outcomes. There was also some evidence for the relationship between public reporting and patient experience. The hospitals that health plan insurers required to report the quality information publicly had better patient experiences than other hospitals. The impacts of public reporting varied across healthcare areas probably because of differences in the content of publicly reported information and means used for dissemination.

The impacts of public reporting on the general population in Russia were analyzed in a review that included 13 Russian research articles published between 2014 and 2022 (Timofeyev et al., 2023). Transparency refers to information availability on the websites of medical organizations or the number of accessible indicators compulsory to medical statistical reporting. The law did not mandate the provision of official statistical accounting information to citizens. Neither did the regional health authorities give high priority to safety and quality control of medical activities. The evidence of the effects of information accessibility on patient

satisfaction was contradictory, and patient satisfaction with the quality of the information provided by healthcare organizations varied. In some areas, patients perceived that the information did not meet their interests, and the technical quality of websites was low. The resources were considered scarce to maintain high-quality access to specific performance information, and managers tried to avoid unwanted consequences following excessive transparency. Though increasing transparency in the Russian healthcare system was considered a tool for improving efficiency, little was done to increase transparency.

A literature review analyzed the impacts of hospital price and quality transparency on prices of healthcare services, payments of consumers, and premiums of health insurance plans (Chen & Miraldo, 2022). Almost all studies were from the US, and about 40% focused on hospital quality transparency. Hospital price and quality transparency were not as effective as expected. Price regulation policies across countries varied. Patients had challenges in searching for healthcare provider prices via several websites, and hospitals simultaneously decreased their discounts. However, there were some effects. Hospital price transparency reduced prices of laboratory and medical imaging tests but not prices of office-visit services. Hospital quality transparency generally declined healthcare service prices, but the healthcare service prices and consumers' payments in higher-rated facilities were raised significantly. There was a talk about a reputation premium. Quality and price transparency may enable higher-rated hospitals to capture reputation premiums, but the reputation premium and its policy intervention were not understood sufficiently.

One mechanism for how public reporting can improve healthcare quality is reciprocal altruism with sanctions for unacceptably poor performance and with rewards for high performance (Bevan et al., 2019). This reputation mechanism requires that publicly reported information is accessed widely and regularly, and performance information is easily understandable so that everyone can know providers performing well and those performing poorly. In England, the strategy of "naming and shaming" improved the performance of those who performed poorly at the national level. Combining the strategies "naming and shaming" and "targets and terror" successfully achieved results, but the top-down regime was not politically sustainable. The strategy of "competitive benchmarking" enhanced good performance at the sub-national level in Italy. As multiple performance criteria were used, the system created peer group pressures to be a high-performer at least on one of the several criteria and enabled many to be a high-performer. International benchmarking has not inherently been motivating, though it can induce reputational concerns. In the early 2000s, Zambia focused, e.g., on malaria, and the internationally benchmarked data on maternal mortality was skimmed over. All issues could not be prioritized. Pre-existing ideologies and priorities defined how interests focused on different publicly disclosed outcomes.

The “star rating” system used in England reduced waiting times for hospital care by inflicting reputational damage (Bevan, 2010). Waiting times for each hospital were communicated publicly to signal whether a hospital was performing well against the targets. The well-performing hospitals got rewards, and poor-performing hospitals were punished with severe reputational damage by “naming and shaming” hospitals and their managers and personnel. The change and selection mechanisms (Berwick et al., 2003) were ineffective. The change mechanism assumes that simply identifying an issue for improvement leads to actions without any incentive other than the innate altruism and professionalism of providers. Thus, there is no need to report information publicly beyond a provider. Only avoiding reputational damage has brought about improvements. As patients did not use publicly reported performance information as consumers in the US, such behavior was improbable in other countries.

In interventions, the whole context matters. Improving the quality of treatment of individuals with substance use disorders succeeded neither with financial incentives nor weekly email feedback (Garnick et al., 2017). The agency-level interventions had no effects, as there were many factors beyond the control of an agency. On the other hand, public reporting was not required to improve performance and quality in hospitals when enough attention was paid to leadership, context, intrinsic features of projects, and processes supporting elements in an international hospital performance measurement project (Veillard et al., 2013).

The strengths and barriers to greater effectiveness of public reporting were discussed in Australia, where several participants representing public and private healthcare consumers, providers, and government agencies assembled in 2015 (Canaway et al., 2017). Public hospitals were obliged to public reporting in Australia in 2011. The participants’ opinions on the main objective and users for public reporting varied which was considered a barrier to the effectiveness of public reporting. Barriers were categorized into conceptual, system, technology and resource, and socio-cultural class. Among the system-level barriers, lack of consumer choice in healthcare, lack of private hospitals’ public reporting, and lack of incentives to report were considered strategic. Providers’ institutional cultures were resistant to public reporting, and there was no understanding of consumer information needs or relevant measures. Data rigor/complexity and lack of clinician-level data were mentioned as technical barriers. About the strengths of public reporting, there was not much to say. The intrinsic value of public reporting was emphasized when transparency in healthcare was discussed. The instrumental value of public reporting for informed patient choice was considered minor, but public reporting enabled comparisons of providers.

Implementing successful public reporting requires changes in healthcare at many levels, which is difficult. The healthcare industry differs from other industries in

several ways. The Model of Transformational Performance Improvement (Song & Tucker, 2016) was planned to support system-level performance improvements. The six components of the model are 1) determining and disseminating a system-level goal, 2) developing and using system-level performance measures, 3) managing interdependence, 4) putting into effect a portfolio of projects aligned with system-level goals, 5) creating an organizational engine for improvement, and 6) implementing and sustaining improvements.

For developing public reporting systems, a framework was generated based on interviews with several healthcare consumers, providers, and purchasers in Australia (Canaway et al., 2018). The framework accounted for the public reporting users, desired objectives, outcomes, and impacts, information needs, data collecting and reporting mechanisms, and barriers to utility. It was asked whether public reporting should also be mandatory for private providers to improve the effectiveness of public reporting. Reputation incentives were considered important, and resistant institutional cultures had to be more positive. All relevant stakeholders, including healthcare professionals, should be involved in designing and implementing public reporting systems. For example, several recommendations were given to psychologists to adjust to the requirements of public reporting (Rousmaniere et al., 2020). By following the recommendations, it would be possible to avoid poor implementations that could result in heavy paperwork burden, invalid data, poor administrative decisions, and confused patients.

The greatest number of studies analyzing public reporting originated from the US where the history of public reporting was longer than elsewhere. As the healthcare systems in the US and Finland differ, the possibilities of applying the study results to Finland seemed to be limited. However, the findings from other countries, such as the UK with the National Health Service, were quite similar to the US. There was positive evidence of public reporting on providers' initiatives to improve the care quality rather than on patient choice, and the major effects were via the reputation pathway. These findings promote the possibility of utilizing public reporting in Finland to improve the quality of care. The selection mechanism would not be realistic to improve the care quality if patients have only some possibilities of choosing a healthcare provider in the public sector. Neither would the change mechanism be applicable as it is associated with an organization's motivation to maintain or increase market share (Berwick et al., 2003). In public Finnish healthcare, there have not been discussions about market shares as the entitlement to public services has been based on an individual's municipality of residence. The articles offered many practical issues for designing and implementing public waiting time reporting systems successfully. The users and objectives of public reporting must be defined so that the information content in public reporting meets the information needs of the users of public reporting. To succeed in implementations,

all relevant stakeholders, including healthcare professionals, should be involved, as this may positively affect providers' institutional cultures that have resisted public reporting.

3.2.3 Information Content

Requirements for relevant information for public reporting are broad as the healthcare context is rather complex with several specialties. Two articles described how to improve information quality in public reporting generally (Berg et al., 2005; Mason & Street, 2006) and four articles from views of different specialties (de Cordova et al., 2019; Kast et al., 2023; Romanelli et al., 2019; Wang et al., 2019). An article estimated composite measures (Friebel & Steventon, 2019), and three articles discussed waiting time information in public reporting (De Rosis et al., 2020; Lee et al., 2021; Rechel et al., 2016).

Publicly reported high-quality information for decision-making was required for managers at different levels of healthcare and patient choices (Mason & Street, 2006). Also, policymakers require aggregate indicators that measure healthcare activities in a transparent, valid, and robust way. The reported performance information was associated with many problems as the information was often based on data collected for other purposes. The data was incomplete. There was miscoding and variation in coding practices. There was a risk of making incorrect inferences that resulted in dysfunctional consequences. Several recommendations were given to improve the quality of the reported outcome information. Outcome statistics should fit for the purpose so that quality indicators are adequate with benefits, bearing in mind that the information needs of different stakeholders vary. Cooperation between stakeholder groups was suggested to develop valid quality indicators. As hospitals are complex, the measurement system should not oversimplify processes and outcomes, e.g., a star rating system may signal too simplistic messages.

New hospital performance indicators for public reporting were developed in the Netherlands (Berg et al., 2005). The indicators had to stimulate hospitals to improve their performance and enhance transparency. Combining some characteristics of internal performance indicators that managers and professionals used and external indicators that governments and patient organizations used to assess care quality was thought to be a possible solution to avoid misinterpretations of information and negative impacts on clinical behavior. Many criteria were set for new indicators. Outcome indicators should be favored instead of structure or process indicators, which should have a proven association with outcomes if used. Indicators should focus on high-frequency issues that enabled improving quality and were from areas with the potential for significant improvements. The indicators should be

administratively easily implemented. It was also reminded that information that is transparent to healthcare professionals may not be transparent to patients, and anything is never simply transparent or not – it is always more or less so compared to an earlier or a later assessment.

The transparency of composite measures that summarize a range of quality dimensions into a single indicator was questioned (Friebel & Steventon, 2019). Composite measures were used in ranking lists to enable an easy comparison among providers and to avoid information overload when only one indicator instead of many was presented. As patients did not know the weights or values of the individual quality dimensions, composite measures did not support their decision-making of a high-quality healthcare provider. Composite measures were also challenging for providers in identifying and evaluating quality areas that need improvement.

Procedure-specific quality measures for public reporting were required by the Society of American Gastrointestinal and Endoscopic Surgeons, which did not consider outcome measures with mortality and 30-day readmission rates relevant for surgical procedures that improved health-related quality of life (Romanelli et al., 2019). The attributes of relevance, scientific soundness, feasibility, and comprehensiveness were proper criteria for effective and efficient quality measures. The information had to be produced with approved data management techniques and be accessible to all stakeholders through ordinary information technology platforms. Specific outcome measures for public reporting on the clinical setting of mitral valve disease were also required (Wang et al., 2019). Existing patient-oriented rating systems on heart surgery did not provide accurate data on mitral valve surgery to make comparisons among providers offering this procedure, and data was most often provided at a hospital rather than a surgeon level. Patients did not understand rating systems, e.g., the difference between one and three stars. The prerequisite for successful public reporting was to use outcome measures that represented the care quality from the view of a patient. An interactive website was suggested as a tool to provide patient-specific information. After a patient had recorded personal information, the system would present comparative healthcare information customized to the patient.

The information contents of 40 report cards on long-term care facilities in the UK and the US found on the Internet were evaluated (Kast et al., 2023). All cards presented structural information. Consumer feedback was the next most frequently presented issue, followed by process quality and prices. Outcome quality was presented least. Inspection results were displayed with composite measures. The presented information did not correspond to consumers' preferences, consumers could not assess the trustworthiness of the information, and there were not enough tools to handle the complexity of reports in either of the countries. Another study in the US asked why patient-to-nurse ratios in acute care hospitals were rarely reported

publicly through inadequate registered nurse staffing linked to poor patient outcomes (de Cordova et al., 2019). The ratios were publicly reported only in eight states in the US during 2008 and 2015. There was no knowledge about whether the public utilized this data when selecting hospitals.

Lee et al. (2021) studied how the waiting times, waiting lists, and key performance indicator statistics for elective surgery were publicly reported in 15 English-speaking jurisdictions. The definition of waiting time varied as different starting and endpoints were used for the waiting time. In public reporting, waiting times were most reported using “completed waits” meaning the realized waiting times of patients already treated. Completed waits were presented as median waiting times for treatment in days/weeks/months. The median was preferred to the mean, not to allow outliers to affect results. “Ongoing waits” refers to waiting times and how long patients have been kept on a waiting list at a specific moment. Waiting lists were rarely reported, but only two of the 15 jurisdictions did not provide waiting time statistics. Also, the number/percentage of people waiting for treatment to begin was reported.

Time to treatment was considered a key performance indicator of the accessibility of health services (Lee et al., 2021). The information was reported on the extent to which health services met their waiting time targets (time to treatment) rather than on waiting list targets (volume of patients treated). The duration of maximum treatment time targets varied from days to months associated with the resources of the national health system. The realization of maximum waiting time targets was reported with the number/percentage of patients who received treatment within maximum wait time or with the number/percentage of patients waiting longer than X period to start the treatment with different statistics. Comparisons of waiting time and waiting list reduction strategies across national systems were challenging because of variances in definitions and measurements of waiting times, and there was a need for further international standardization in reporting waiting times. For patients, it is appreciable to have performance indicators that accurately reflect their total waiting times to access care.

In Italy, the usefulness of waiting time reporting websites was analyzed from the view of citizens (De Rosis et al., 2020). The public healthcare organizations had to report publicly waiting times for outpatient visits based on the National Regulatory Plan for waiting lists. Public reporting aimed to promote transparency in healthcare and to reduce waiting times. The waiting time statistics and the information contents on the websites varied considerably between the studied organizations. The websites did not provide relevant information to inform citizens effectively or to benchmark among the organizations. The weaknesses were due to low standardization and poor clarity of information.

Public care quality reporting was described in 11 high-income countries (Rechel et al., 2016). The description focused on reporting waiting times, overall ratings on care quality and safety, and patient experience. The study was based on a survey of 1–3 national informants from each of the 11 countries in 2015. Overall ratings for every major hospital were published only in England as an overall rating for a general practitioner practice. The overall ratings are challenging. The care quality of a hospital department may differ from the quality at the hospital level. Outcome measures at a general practitioner level were not reported in any of the countries. Waiting times referring to the period between referral and hospital treatment were reported in seven countries. In Germany, waiting times were not considered a problem and were not reported. Public waiting time reporting was often associated with policies to increase patient choice. In nine of the 11 countries, data on patient experience of hospital care was collected at a hospital level, but the information was reported publicly only in seven countries. Patient experience data was easy to collect, but there was no evidence of how public reporting of this information impacts the performance and quality of healthcare. In 2015, many studied countries worked to improve their public reporting systems to increase transparency. For multifaceted reasons, there was a reluctance to publish composite indicators of care quality and outcomes at a healthcare professional level.

Though only three articles handled public waiting time reporting, we think that the other articles also included important issues that should be considered in public waiting time reporting. In public primary care, the variation in waiting time definitions is minor (Martin et al., 2020), which makes comparisons between healthcare providers easier but not simple. For example, the mean and median can be used in statistics. The uniform definition does not guarantee the usefulness of publicly reported waiting time information for decision-making for different stakeholders, as managers, national authorities, and citizens require different waiting time information, such as completed or ongoing waiting times, to meet their information needs. Cooperation between stakeholder groups would be essential for deciding on the reported waiting time information so that the information is valid and to avoid misinterpretations of information and negative impacts on clinical behavior. We consider that the recommendation that outcome indicators should be favored instead of structure or process indicators was from the view of physicians. Patients base their decisions not only on outcome measures but on a variety of provider characteristics (Victoor et al., 2012). According to Donabedian (1988), structures, processes, and outcomes are all important in the quality of care. We agree that using approved data management techniques, including common coding practices, is necessary to process high-quality information, and the information should be delivered through ordinary information technology platforms to enable wide access to as many as possible. In 2015, several countries considered

implementing public reporting systems to increase transparency in healthcare. To increase transparency, reported information must be transparent to users of public reporting. Information that is transparent to healthcare professionals may not be transparent to patients. We should remember that increasing transparency may not include the objective to improve the quality of care.

3.2.4 Usage within Specialties

These articles described public reporting in three specialties: emergency care, cancer care, and solid organ transplantation. As the specialties have different characteristics, public reporting in these specialties is described separately.

3.2.4.1 Emergency Care

Six studies handled public reporting in emergency care. The issue was discussed in Australia (Greene & Hall, 2012), in Canada (Vermeulen et al., 2014), in the UK (Bevan & Hamblin, 2009), and in the US (Friedberg et al., 2009; Pines et al., 2012; Schuur et al., 2013). Short waiting times are centric in emergent situations, but different measures in reporting make comparisons between emergency services difficult.

In 2010, emergency departments provided 130 million patient visits in the US and were accountable for some waiting times to varying degrees through public reporting (Schuur et al., 2013). New evidence-based measures were required to measure care quality and resource usage. One had to decide how patients' symptoms and complaints would be defined to ensure diagnostic accuracy. Outcome measures were needed instead of process measures, such as whether a medicine was administered. Because teams provided care, unit-level measures were considered appropriate. There was also the question of the benefits on population health. Cooperation between emergency medicine organizations and health systems was suggested to develop relevant measures of outcome and efficiency.

In the UK, a goal was established for ambulances to arrive in emergencies within eight minutes after a call. Of the UK countries, only England, where the usage of the star rating system began in ambulance services in 2002, reached the target (Bevan & Hamblin, 2009). The system was effective as it induced reputational damage on those with poor performance. However, there were concerns about gaming. Response times were recorded manually, and assessments of life-threatening emergencies could be flawed. In Australia, it was also thought that better performance in emergency departments was achieved via gaming (Greene & Hall, 2012). Performance in emergency departments was publicly reported on the site MyHospitals. Performance was measured as the proportions of patients in each of

the five triage categories whose treatment had begun within the recommended time frame of the category. Emergency departments that reported proportionally more non-urgent patients had better performance than departments with fewer non-urgent patients. When a patient was assigned to a less urgent category than appropriate, the recommended time frames were longer and showed better performance, perhaps via gaming. It raised questions about the validity of the measurement and the need for adjusting measures to differences in hospital and patient characteristics. As emergency departments cannot control their exogenous factors, relevant predictors for public reporting and benchmarking were also tried to find in the US (Pines et al., 2012). There was a hypothesis that the emergency department's annual volume would be a relevant adjuster for a stratification system to enable valid comparisons in different strata, but this was not the issue. Using any other exogenous factor was considered too complicated, and it was supposed that a simple way to compare hospitals' emergency departments taking exogenous factors into consideration did not exist.

The study results from the US did not give evidence of gaming associated with public reporting on pneumonia antibiotic timing scores in emergency care (Friedberg et al., 2009). There were no adverse effects on care practices, such as changes in rates of pneumonia diagnosis, antibiotic administration, or patient prioritization in emergency departments. The study analyzed adult visits to emergency departments of different hospitals before and after public reporting of pneumonia antibiotic timing scores.

A study from Canada at emergency departments reminded us of the difficulties in evaluating the effects of interventions when several issues may impact evaluated outcomes (Vermeulen et al., 2014). To evaluate rigorously the effectiveness of the interventions using LEAN methods (Brandao de Souza, 2009), control hospitals were used. The time series analyses showed that waiting times had reduced at the emergency departments using the LEAN methods. However, the results diminished or disappeared when the waiting times were compared with those at the emergency departments of the control hospitals. The control hospitals and LEAN-intervention hospitals were exposed to system-wide initiatives, such as public reporting and pay-for-performance, which impacted waiting times.

The articles describing public reporting at emergency departments discussed the requirements to develop new evidence-based measures to report care quality. Comparing care performance between different emergency departments was considered difficult as characteristics of patients and exogenous factors affected the performance of emergency departments. We think that in all healthcare organizations, characteristics of patients and exogenous factors vary and affect healthcare performance. So also, the waiting time lengths for non-urgent oral care depend on these issues. Patients with a lot of oral disease require more treatment

resources than those with little need for treatment, and the usage of public healthcare services varies by region. Comparing the performance of different healthcare organizations with one measure is never a success, as the reasons behind the differences remain hidden. Maintaining a reputation was felt so important that showing good performance was pursued even through gaming. It was possible because of manual recording and flawed assessments of the status of a patient.

3.2.4.2 Cancer Care

Five articles handled public reporting in cancer care. One article described the development of system-level cancer care quality indicators for public reporting (Greenberg et al., 2005). An article described public reporting on waiting times for cancer surgery in Australia (Prang, Canaway, Bismark, Dunt, Miller, & Kelaher, 2021), and an article from the UK presented the usage of public reporting to improve access to cancer surgery (Aggarwal et al., 2022). Two articles evaluated the possibility of using specific hospital-level indicators in public reporting on the quality of cancer treatments (Aggarwal et al., 2021; Boyle et al., 2023).

System-level cancer care quality indicators that were scientifically sound and managerially useful were developed for public reporting in Canada using a modified Delphi panel method (Greenberg et al., 2005). There was a need for indicators from cancer prevention to end-of-life care and to measure progress against set goals over time. The system had to support different stakeholders to make informed decisions to improve care quality, such as to improve access to cancer care and to increase the transparency of the care system to the public. Finally, 36 indicators were identified for routine performance measurement of the cancer care system.

In Australia, all public hospitals were mandated to report their performance on the website MyHospitals. For private hospitals, reporting was voluntary. The impacts of public reporting on waiting times for breast, bowel, and lung cancer elective surgery in a public hospital were studied using routinely collected data on admissions and waiting times for cancer surgery (Prang, Canaway, Bismark, Dunt, Miller, & Kelaher, 2021). The indicators publicly reported during the study included elective surgery waiting times by urgency category, specialty of surgeon, and intended procedure. The study results indicated that following public reporting, there was a slight increase in the mean waiting times across all the cancer types and urgency categories studied. There were several explanations for the finding. Waiting times were reasonable before public reporting, and thus, reporting did not give incentives for any changes. The number of patients with cancer grew as the number of inhabitants grew. There was a lack of public knowledge on waiting time reporting, and the information was not worthwhile for physicians and patients, as waiting times were not reported by diagnosis, and the information was not timely. Altogether,

using waiting times for cancer surgeries was criticized because of the complexity of the disease and its care compared, e.g., to elective hip replacements.

Since 2006, patients in the UK have been able to choose where to go to hospital, and hospital care quality information has been reported publicly. The government decided in 2022 to give those cancer patients who had very long waiting times for cancer surgery the possibility of seeking care at the hospitals with the shortest waiting lists (Aggarwal et al., 2022). The covid-19 pandemic had retarded cancer diagnostic and treatment practices. The website My Planned Care was designed to provide information for these cancer patients. However, patients preferred treatment at hospitals with longer waiting times. They perceived that longer waiting times refer to better-performing hospitals which attract patients from outside the local area. Considering complex patient choices and complex cancer treatment pathways, it was argued that relying on patient choice to cut waiting times for cancer care was oversimplistic and likely to widen inequalities.

Hospital-level specific indicators, severe acute toxicity rates, were suggested as the national performance indicator in public reporting on the care quality associated with systemic anticancer therapy treatment across the English National Health Service (Boyle et al., 2023). The indicator had been validated with administrative hospital data. The variance of the toxicity rates was large between the hospitals. Public reporting might produce improvement initiatives, increase transparency about best practices, and support patients in informed choices. There were also plans to use hospital-level toxicity rates in public reporting on radiotherapy treatment of prostate cancer (Aggarwal et al., 2021). The reporting program was designed to report outcomes to identify outlying performance and good practice, not ranking individual hospitals. Patients, providers, and commissioners could access the information via a website.

We think studies on public reporting in cancer care showed the complexity of public reporting. At an individual patient level, complexity refers to patient choices that are not rational processes to select a healthcare provider whose waiting times are shortest. Patient choices depend on a variety of patient and healthcare provider characteristics (Victoor et al., 2012). A typical patient does not exist, as different patients make different choices in different situations. Patients use their own previous healthcare experiences or general practitioners' recommendations rather than comparative information. It is odd that politicians made their decision against this evidence. At a population level, the effects of public reporting are difficult to evaluate. Public reporting is a social phenomenon with several confounding factors to manage in research, and probably, not all of them may have even been identified.

3.2.4.3 Solid Organ Transplantation

Seven articles on public reporting on solid organ transplantation were from the US (Adler et al., 2021; Horslen et al., 2022; Kandaswamy et al., 2024; Rana et al., 2019; Schold et al., 2017; Stith & Hirth, 2016; Valapour et al., 2024), and one article was from Canada (Gill et al., 2019). Many studies originated in the US, as solid organ transplant processes and outcomes have been monitored and publicly reported in the US for a long time.

The National Organ Procurement and Transplantation Network and the Scientific Registry of Transplant Recipients have provided annual reports on solid organ transplantations in the US. The Scientific Registry of Transplant Recipients has published the information on its site. The 2022 report on lung transplantations (Valapour et al., 2024) described, among other things, the differences in clinical characteristics of adults on the lung transplant waiting list on December 31, 2017, and on December 31, 2022. The 2022 report on pancreas transplantations (Kandaswamy et al., 2024) included, among other things, a statistical table displaying the demographic characteristics of adults on the pancreas transplant waiting list on December 31, 2022. As an example of waiting list information in the 2020 report on intestines (Horslen et al., 2022), intestine transplant waitlist activity in 2020 can be mentioned. In addition to the waiting list information, annual reports presented information on such topics as donations, transplants, outcomes, and pediatric transplants.

Regulation and performance measures are necessary, but they may impact clinical behavior undecidedly and should be implemented with extreme care. The observer effect was demonstrated as the regulated measure of one-year post-liver transplant survival over the last three decades improved, and the non-regulated measure of one-year waitlist mortality remained stable (Rana et al., 2019). Regulation created observer effects by influencing clinical behavior to favor the regulated outcome measure. Another study also emphasized that the criteria for quality assurance in solid organ transplant centers should be set carefully (Schold et al., 2017). Performance criteria should meet intended clinical goals without having potential disincentives for clinical practices.

In the US, the quality of dialysis facilities has been assessed and reported publicly since 2000 with a star rating system (Adler et al., 2021). The system was based on clinical measures of dialysis adequacy and patient outcomes and was for informing patient choice about dialysis facilities. There had been concerns over the clinical relevance of star rating systems and gaming, as in a cohort study, it was found that patients at higher-quality dialysis facilities had higher odds than patients at lower-quality facilities of being waitlisted for kidney transplantation within one year. The prominent variation in this waitlisting was considered an essential development target for improving care quality. The star rating system should be

included with waitlisting rates for kidney transplantation to incentivize dialysis facility referral to transplant centers and to inform better patient choice along the care continuum.

Almost 300 kidney transplant centers were analyzed to study whether reported quality information alone or with regulatory enforcement improved outcomes or led to gaming (Stith & Hirth, 2016). Performance standards are for ensuring a basic level of quality and for encouraging providers to compete on quality through public reporting. In markets with substantial excess demand, enforcement may be needed to ensure high quality. However, quality may not improve in underperforming organizations even with enforcement if gaming is cheaper than improving quality. In transplant centers with excess demand caused by price controls, public quality reporting alone did not impact care quality, and enforcement might have increased market inefficiencies. Centers did not respond to costly quality requirements by improving quality but by reducing supply and cream skimming, increasing the numbers of patients assessed as too sick for transplant or transferred to other centers. The researchers supposed that providing information with or without enforcement will decrease welfare overall.

In Canada, deceased organ donation services were provided by provincial and regional organ donation organizations, and deceased donor kidneys were allocated by provincial and regional policies when a national system did not exist (Gill et al., 2019). An independent not-for-profit organization managed the Canadian Organ Replacement Register to facilitate national reporting of organ donation and transplant activity without the possibility of enforcing any healthcare policy. Submitting patient-level data to the registry was voluntary for individual hospitals and provincial organizations. Though the provinces would collect the information, they were not committed to reporting information publicly in a timely and standardized manner. If they did not submit the data, there were gaps in the national reports on organ donation and transplant activity. A national forum also recommended that individual provinces report data about organ donation policy to the public through websites and other means. This information was not easily accessed by the public in all provinces. Because of the lack of a national system, access to deceased donor kidney transplants and public reporting varied significantly by region.

The articles emphasized that regulation and performance measurement are necessary for healthcare, but the regulated measures should be chosen so that they do not impact clinical behavior. It is important that observer effects should not arise. Healthcare organizations should not focus their activities so that regulated targets will be received at the expense of important non-regulated targets. The observer effect is also possible in public primary oral healthcare when oral healthcare organizations want to reach the maximum waiting time target. The regulated target

will be reached by lengthening the period between appointments when several appointments are required for an episode, as the length of an episode is not regulated and monitored. National regulations and systems may be required to remove variations in practices between regions, and make public reporting more even all over a country.

3.2.5 Physicians as Users

Nine articles described the possible impacts of public reporting on physicians. Three articles evaluated how public reporting impacted prescription practices in primary care in China (Du et al., 2016; Tang et al., 2016, 2017). Two articles presented associations of public reporting and referral practices of general practitioners in Australia (Prang, Canaway, Bismark, Dunt, & Kelaher, 2018) and in the Netherlands (Ikkersheim & Koolman, 2013). Two articles analyzed the impacts of the physician rating website in Germany (Emmert et al., 2014; Emmert et al., 2017), and a patient feedback website was analyzed in England (Lagu et al., 2013). In addition, one article discussed medical managers' perceptions of physician-level information in public reporting (Canaway et al., 2020).

The impacts of public reporting on prescribing for bronchitis, gastritis, and hypertension were analyzed in primary care in China (Tang et al., 2016). Publicly reported indicators were calculated by the electronic hospital information management systems and presented in ascending order at an institution level and a prescriber level within each institution. The information was delivered using posters and handout brochures at each institution, and a report was submitted to the local health authority monthly over one year. Public reporting had some potential to encourage good prescribing practices, but in many cases, compensation mechanisms complicated to change prescribing practices.

The other study on primary care in China evaluated the association of public reporting with prescription practices of upper respiratory tract infections (Tang et al., 2017). A cluster randomized controlled trial was carried out. Physicians were classified into low, average, and high antibiotic prescribers based on their antibiotic prescribing rates of last month. The indicator rates were publicly reported over one year using similar methods as the study from China described earlier. The local health authority was also active in information dissemination. Prescribing antibiotics was reduced, mainly in average and high antibiotic prescriber groups. When physicians noticed that their antibiotic prescribing rates were not in the low range, they perceived pressure to lower their prescribing the following month. It was thought that reputation and political concerns triggered behavior changes in prescription patterns.

The third article from China described how physicians perceived public reporting with institution- and physician-level prescribing information and the methodological rigor, necessity, and impact of public reporting (Du et al., 2016). The perceptions of the physicians concerning the institution- and physician-level prescribing information reporting did not vary significantly. The physicians were not concerned about public reporting on prescribing information at a physician level, perhaps because of the limited rewards and penalties for low- and high-prescribing physicians. Instead, they were concerned about the methodological rigor of public reporting. Public reporting was considered necessary, and the physicians suggested that reporting should focus on process rather than outcome measures to facilitate acceptance of public reporting. Educating patients on data interpretation was perceived as essential to improve the efficiency of public reporting.

In many countries, patients need a referral for non-emergency hospital treatment from a general practitioner. In Australia, 40 general practitioners were surveyed on how they utilized public hospital performance information for referrals (Prang, Canaway, Bismark, Dunt, & Kelaher, 2018). Most general practitioners relied on their own or patients' previous experiences rather than using publicly reported information for referrals. One reason for the scarce usage was lacking awareness and accessibility of public reporting. Neither was reported information considered credible. There were also many system-level barriers, such as limited possibilities in choosing a hospital and lacking public reporting on private hospital performance.

In the Netherlands, 26 general practitioners were included in a study to analyze their referral patterns (Ikkersheim & Koolman, 2013). Of them, 17 used report cards to get information on medical effectiveness and patient experiences when they referred patients to hospitals for breast cancer treatment, cataract surgery, and hip or knee replacement. Nine physicians did not utilize report cards and were the control group. The results were mixed. Concerning breast cancer, general practitioners referred patients more to hospitals which had better scores on the report cards than the control group. Concerning other referrals, there were no significant associations between the referral patterns and the indicator scores on the report cards. The indicators on the report cards were mainly process indicators, except those on the report cards of breast cancer, which reported the outcome indicators with a clinically relevant difference. The general practitioners valued these outcome indicators.

In Germany, patients' narrative comments on physician care posted on the German physician rating website jameda were analyzed in 2012 (Emmert et al., 2014). Content analysis was used to categorize these patient comments into physician, staff, and practice-related issues. About 80% of all comments were positive. Three-fourths handled physicians and 15% practice, such as waiting time to get an appointment and waiting time within the practice. The professional competence of physicians was commented most frequently followed by their

friendliness. It was thought that patient narratives might help physicians improve their behavior and patients choose a physician. Another study examined physicians' responses to patients' comments on this website, Jameda (Emmert et al., 2017). For the study, more than one million patient comments from 2010 to 2015 were collected. Physicians responded to about 2% of all patient comments in 2015. The figure had increased over the years. To determine the topics that physicians responded to a sample of 600 patient comments and corresponding physician responses in 2015 was randomly selected. Physicians who responded to patient comments were more likely male and had better patient recommendations than physicians who did not respond to comments. Physicians responded likely to negative patient comments and to comments about the time the physician had spent with the patient. Comments about waiting time within the practice were also often responded to. It is probable that health policymakers should encourage physicians to respond to patient comments if this kind of feedback loop between patients and healthcare professionals that creates value for both parties is required.

Also, the National Health Service in England allowed patients to give narrative feedback about hospital care on the quality-reporting site NHS Choices. The data was collected for public reporting purposes and for complementing systematically collected patient experience data. For analyzing feedback, a sample of 200 feedback was taken in 2010 (Lagu et al., 2013). Comments on healthcare personnel were most common, and they were very positive. Feedback was also commonly given on perceived medical errors and food and parking facilities. Hospitals replied to about half of the patient feedback.

Medical managers were interviewed to find their thoughts about how public reporting on physician-level data would work (Canaway et al., 2020). The managers' perceptions of public reporting of physician-level data varied. However, most managers, who were explicitly asked for an opinion about public reporting on physician-level outcome data, supported it and thought it necessary to improve health system accountability. Some considered that reporting this level of information was most effective in motivating all physicians either to change their behavior or the whole system. The managers also saw problems in this reporting, such as working in teams, treating high-risk patients, and the perceived lack of robust and reliable data.

The impacts of public reporting on physicians' prescribing and referral practices were minor. As the number of prescriptions and referrals by dentists is much smaller than those by general practitioners, we presume that public reporting on these issues would have no effect on the quality of oral healthcare. Healthcare managers considered that the physician-level information in public reporting might be most effective in motivating physicians to change. In earlier research, the right level of measures for public reporting has also been discussed (Marshall et al., 2003). In

many cases, an organizational level, such as hospitals, was considered more appropriate for public reporting than individual physician-level reporting. It would be logical that the level used in public reporting is associated with the possibilities of patients' choices. In oral healthcare, reliable information at a dentist level would be possible to produce, and dentists in primary care rarely work in teams, but there are differences in clientele.

3.2.6 Patients as Users

One of the objectives of public reporting is to support patients in choosing high-quality healthcare providers. Seven of the articles handled patient choices for hospital treatment (Aggarwal et al., 2023; De Groot et al., 2011; Emmert et al., 2019; Fischer et al., 2015; Marang-van de Mheen et al., 2011; Prang, Canaway, Bismark, Dunt, Miller, & Kelaher, 2018; Yahanda et al., 2016), and one article consumer selection and switching of health plans (Kelaher et al., 2019). One article analyzed associations between patient satisfaction and several provider-level contextual factors in inpatient care (Tobler & Stummer, 2021). When Ciasullo et al. (2020) analyzed patient satisfaction with health services in Europe, they benefitted from a typology that used the degree of freedom of choice as one criterion of a healthcare type. The four healthcare types of the typology were supply and choice -oriented public systems, e.g., Germany, performance and primary care -oriented public systems, e.g., Finland, regulation-oriented public systems, e.g., the UK, and low-supply and low-performance mixed systems, e.g., Greece. In the first type, regulation is moderate, and citizens have large freedom of choice, and in the second type, regulation is pervasive, and citizens have some freedom of choice. The third type is characterized by strong access regulation and limited citizen choice. In the last-mentioned healthcare type, access to care is regulated strictly. The fifth type, supply and performance -oriented private healthcare, did not exist in Europe. Ciasullo et al. thought that enhancing patient choice in access to care improves the patient experience in health services, which may lead to greater participation of patients and better quality of care.

Patient choice in selecting surgical treatment was analyzed in a review based on 86 studies (Yahanda et al., 2016). Issues that influenced choices differed by sociodemographic, cultural, and other factors. Many patients chose surgical treatment using characteristics of hospitals rather than those of surgeons. Among these characteristics, hospital reputation and quality of care were of primary importance. Nonclinical factors, except travel distance and waiting time, were not influential. Surgeon reputation and competency were the most valued characteristics of surgeons followed by interpersonal skills. The information sources that most patients relied on were word-of-mouth information and physician referrals, though

online sources were becoming more popular. Patients were unsure of the credibility of the websites or overwhelmed by the amount of information presented. On health-related websites, patient narratives were the most searched information.

A study from Australia used a national cross-sectional postal questionnaire to assess whether persons using mainly private sector services had utilized public reporting when choosing a hospital for their elective cancer surgery in 2016 (Prang, Canaway, Bismark, Dunt, Miller, & Kelaher, 2018). Of the 243 respondents, 94% had attended a private hospital for surgery. Almost half had been able to choose the hospital for the surgery. The choice was based on their specialist's opinion and to a minor degree, on the reputation of a hospital, the distance from home to a hospital, or patients' previous experience. Public reporting was not utilized, and only a few knew about public reporting. Public reporting was considered important, and many respondents expressed interest in using the system in the future. The respondents wanted information about costs, complications, recovery rates, and patients' experience and satisfaction. Almost half suggested that quality indicators should be reported at a clinician level. Most respondents wanted to access and utilize public reporting information with their general practitioners or other healthcare professionals. One-third of the respondents preferred to access information through websites, and 3% through mobile phone applications. About 10% of the respondents did not want any public reporting.

A study in England analyzed the association between travel time, hospital quality measures, and patient characteristics with the location of a hospital in a colorectal cancer patient group when choosing a hospital for cancer surgery (Aggarwal et al., 2023). The study included about 44,000 patients using public services. Travel time was the most important determinant in choosing the hospital for surgery. Patients who were younger, more affluent, or living in rural areas were more likely to travel to more distant hospitals for surgery, and about 30% had bypassed the nearest hospital for their surgery. However, there was no association between the odds of the patients traveling to a particular hospital and the 2-year bowel cancer mortality outcomes. Patients did not use for the decisions specific disease-related outcome measures that would have impacted their treatment outcome. They utilized information on overall hospital quality and the availability of robotic surgery, though the benefits of robotic surgery technologies in all tumor types were not proven enough. Policies that allowed patients to choose the hospital for surgery increased costs and inequities rather than clinical outcomes.

As patients utilized public reporting to a minor degree in choices of hospital surgery, it was studied in the Netherlands whether it might be possible to increase the impact of public reporting in some patient groups (De Groot et al., 2011). In the study, 337 patients completed the questionnaire. Of the patients, 21% had compared hospitals before. There were no differences in age, gender, and level of education

between those who had compared hospitals and those who had not. Of those who had compared hospitals, only 13% answered that public information had impacted them. Own experiences, experiences from other people, and advice from general practitioners were more important. Of all respondents, about half were aware of public information on hospitals. Of those who were aware, three out of four knew where to find the information. All respondents valued the expertise of a physician and waiting time for an appointment at the outpatient clinic as the most important public information followed by the information about waiting time for surgery and a physician's positive communication. Patients who had compared hospitals also valued information on wound infections and respect for patients but not the distance to a hospital. It was concluded that choosing a hospital is probably not a rational process based on the cognitive assessment of information. Increasing the impact of public reporting on the choice of a hospital may be possible with a different type of information. The information could present, e.g., rating scores of other patients to explain reasons for low- or high-performance scores.

In 2017, the usage of health report cards in hospital choice was studied in Germany (Emmert et al., 2019). All who searched for hospital quality information or compared hospitals on a web portal were asked to participate in the study. The number of participants was 635. Those who used health report cards differed from the national online population and the national population, e.g., by educational attainment. Most of the respondents perceived that there were large care quality differences between hospitals, and about one-third were willing to travel 200 kilometers or more to receive treatment in a well-performing hospital. In turn, about one-third had never used health report cards in the hospital choice. Most respondents who had used health report cards confirmed that using them impacted their hospital choice, and they would likely use the information on their hospital choice in the future. The respondents were also requested to rate the importance of different hospital criteria on hospital choices. Patient safety and hygiene, procedure-related medical equipment, and the number of cases treated were most important. When the respondents were asked to order the hospitals, the number of cases treated was the most frequently selected criterion. The hospital choices became difficult when information complexity increased. Tailoring health report cards did not impact the quality of the hospital choice. Decreasing the level of complexity of health report cards to all was considered more important than tailoring them to various user groups.

In a web survey, two hospitals with six attributes containing two levels each were described to surgical patients (Marang-van de Mheen et al., 2011). The attributes presented general hospital information, such as atmosphere, care quality information, such as the percentage of patients with a textbook outcome, and surgery-specific information, like the possibility of a minimally invasive procedure.

Of the attributes, the respondents, regardless of their age, gender, and education, considered the surgery-specific information most important in choosing a hospital followed by quality-of-care information. General hospital information, such as waiting time, was considered the least important. However, decision-making probably differs in real-life and experimental situations, as patients frequently reported using hospital reputation, previous hospital experience, or waiting time in decision-making when choosing a hospital. It may be that patients want to have different information available in a choice of a hospital, though the information necessarily does not have a large impact on choice behavior.

The knowledge of how patients acquire and use information in hospital choice is scarce. To increase this knowledge, there are experimental research tools, such as computerized process tracing, to observe patient decision-making strategies in hospital choice in laboratory settings (Fischer et al., 2015). Knowledge of psychology and cognitive science might help understand hospital choice preferences and underlying cognitive mechanisms, complementing the traditional view that considers patients as rational decision-makers and decision strategies that support simplifying the decision process.

A systematic review and meta-analysis based on eight articles described the impacts of public reporting on consumer selection and switching of health plans (Kelaher et al., 2019). Public reporting improved health plan selection, as well as switching between employer-sponsored health plans. Large organizations spent lots of resources on designing and disseminating report cards to employees to support switching health plans. Public reporting had no effects among Medicare and Medicaid beneficiaries, and they switched health plans more rarely than employees using employer-sponsored health plans. In practice, the price might impact the selection or switching of health plans more than public reporting. Also, other factors, such as the consumer group, employer type, healthcare system, and health plan characteristics, impacted consumer decision-making.

Research on public reporting has often lacked frameworks, except for a study on public reporting from Switzerland (Tobler & Stummer, 2021). It used contingency theory (Fiedler, 1974) when analyzing the association between patient satisfaction and several provider-level contextual factors in inpatient care with publicly reported data.

To design proper information content for public reporting to support patient choices, we should know which criteria are important for patients in the healthcare area where patient choices should be supported. Surgeon reputation and competency were the most valued criteria of a surgeon, and hospital reputation and quality of care were important criteria of a hospital. Waiting time was also important in choosing a hospital. However, we cannot know whether these criteria are valid also in choices of a dentist and an oral healthcare unit. Based on the articles, public

reporting was utilized to a minor degree for getting information for patients' decision-making. As to Finland, we do not know whether the situation is equal. The article of Ciasullo et al. (2020) described the possibilities of patient choice in different healthcare systems in Europe and considered them minor in most countries. Some consider limited patient choice a system-level barrier to utilizing public reporting and to improving the quality of care (Canaway et al., 2017). Ciasullo et al. thought that enhancing patient choice in access to care is a possibility to improve patient experiences in health services, which may lead to greater participation of patients and better quality of care. The ideas resemble the ideas of Donabedian (1988) who thought that patients' activities in seeking care may promote patients' satisfaction with care, health behavior, and health status.

3.3 Discussion and Conclusions

Our literature review is a narrative overview of public reporting in healthcare. We chose a narrative overview instead of a more systematic review as we did not consider it possible to define a strict question on the effectiveness of public waiting time reporting in the context of public primary healthcare to synthesize findings from similar studies. We knew that the number of evaluations of public reporting was low (Cacace et al., 2019), and knowledge of the effectiveness of public reporting in primary care was scarce (Campanella et al., 2016).

We included 60 articles and reviews published between 2005 and 2024 in our overview to get an overall summary of public reporting in healthcare. Of the documents, about one-third were from the US, and more than five documents were from Australia, Canada, Germany, and the UK. The great number of documents from the US resulted from the longer history of public reporting in the US than in other countries (Hamblin, 2008). The number of documents by year of publication varied without any trend. In 2007, no articles were published. In 2019, the number of published articles was ten and dropped to four in 2023.

To analyze the documents, we categorized them into five classes following the ideas of communication systems that affect information receivers and their behavior in some way with the information (Mason, 1978). We consider public reporting systems as communication systems which deliver care-quality information for stakeholders in healthcare to impact their behavior. In the first class, we included documents that handled impacts of public reporting, mechanisms of impacts, and factors enabling impacts. The second category was for documents on the information of public reporting, and the other three categories were for various users of public reporting.

In the following paragraphs, we first discuss the possibilities of the different mechanisms of public reporting to improve the quality of care in public primary care

in Finland. After that, we present some issues, such as the implementation of public reporting, means used in public reporting, information needs of different users of public reporting, and information quality of public reporting, which issues should be taken into consideration when we explore the actionability of public waiting time reporting in public primary oral healthcare in Finland. To the best of our knowledge, there were no frameworks for analyzing the effectiveness of public reporting in public primary care.

The reputation mechanism was considered most effective to improve the quality of care by public reporting, e.g., (Bevan, 2010; Bevan & Hamblin, 2009; Chen & Miraldo, 2022; Greene & Hall, 2012; Tang et al., 2017). For example, the star-rating reporting system reduced waiting times for hospital care by the reputation mechanism in England (Bevan, 2010). The well-performing hospitals got rewards, and the poor-performing hospitals severe reputational damage by “naming and shaming” the hospital and its staff. The reputation mechanism was considered successful, also in emergency services, but there were concerns that better results were achieved with gaming (Bevan & Hamblin, 2009; Greene & Hall, 2012). In China, reputational and political concerns gave rise to changes in physicians’ prescription practices (Tang et al., 2017). It was also presumed that higher-rated healthcare providers could charge higher customer fees with reputation premiums (Chen & Miraldo, 2022). However, analyzing the impacts of public reporting in various healthcare contexts is demanding (Prang, Maritz, Sabanovic, Dunt, & Kelaher, 2021), and there may be concurrent system-wide initiatives impacting evaluated public reporting outcomes (Vermeulen et al., 2014).

From the view of Finnish public healthcare, we suppose that it is good that the reputation mechanism is considered the best mechanism to improve the quality of care by public reporting. It is the only mechanism of the three mechanisms that could work in the current Finnish healthcare system. The concept of market share has not been relevant in public healthcare, and patients have had only some possibility of choosing a healthcare provider. Generally, the limited possibility of patient choice has been considered a strategic, system-level barrier to the effectiveness of public reporting (Canaway et al., 2017; Prang, Canaway, Bismark, Dunt, & Kelaher, 2018). Increasing patient choice would be worth a try, as it may lead to greater participation of patients and better quality of care (Ciasullo et al., 2020). Public waiting time reporting has been associated with policies to increase patient choice in some countries (Rechel et al., 2016). However, the freedom of patient choice is not without problems. Patients may not be capable of using evidence-based clinical outcome information for their decision-making. For example, there was no association between the odds of the patients choosing a particular hospital and the 2-year bowel cancer mortality outcomes (Aggarwal et al., 2023).

Implementing successful public reporting systems is not easy, as changes are required in healthcare at many levels. For supporting system-level performance improvements, a model was planned (Song & Tucker, 2016) focusing on, e.g., determining and disseminating a system-level goal and creating an organizational engine for implementing and sustaining improvements. As resistant institutional cultures in healthcare organizations are perceived as barriers against public reporting (Canaway et al., 2017; Canaway et al., 2018; Timofeyev et al., 2023), it would be essential to involve healthcare professionals in implementing public reporting systems to change organizational cultures more positively towards public reporting (Canaway et al., 2018; Rousmaniere et al., 2020).

So that the reputation mechanism can succeed, publicly reported information has to be accessed widely and regularly so that everyone can know the providers performing well and those performing poorly (Bevan et al., 2019). In China, posters and handout brochures were used to deliver public performance information in primary care institutions (Tang et al., 2016, 2017). In many other countries, wide dissemination was tried to reach with implementing public reporting over the Internet, e.g., (Aggarwal et al., 2022; De Rosis et al., 2020; Emmert et al., 2019; Prang, Canaway, Bismark, Dunt, Miller, & Kelaher, 2021; Timofeyev et al., 2023; Valapour et al., 2024). Ordinary information technology platforms were requested for easy information access (Romanelli et al., 2019), and the solutions should be designed so that users do not have to utilize several websites to search for information on several providers to compare the providers (Chen & Miraldo, 2022).

In addition to wide access, the information content of public reporting must be relevant. The relevancy of information is associated with the information needs. For example, without understanding patient information needs, public reporting cannot be designed effectively for patient choices (Canaway et al., 2017; Canaway et al., 2018). There is evidence that in choosing a surgeon, the competencies and interpersonal skills of surgeons are highly valued criteria (De Groot et al., 2011; Yahanda et al., 2016). The importance of waiting time as a criterion has varied in different studies; waiting time for an appointment at the outpatient clinic and surgery was centric (De Groot et al., 2011; Yahanda et al., 2016), and not (Marang-van de Mheen et al., 2011). Some patients preferred hospitals with longer waiting times as they supposed that longer waiting times were associated with better performance in hospitals, and the hospitals attracted patients from large areas (Aggarwal et al., 2022). Altogether, it has been thought that patient choice is not a rational process based on the cognitive assessment of information (De Groot et al., 2011), and decision-making probably differs in real-life situations compared with experiments (Marang-van de Mheen et al., 2011). These issues have made designing the information for public reporting challenging and problematic. Patients have used public reporting rarely, as they have relied on information from other people nearby

and their physician's opinion (De Groot et al., 2011; Yahanda et al., 2016). This has been explained with several issues. The possibility of choosing a hospital has been limited (Prang, Canaway, Bismark, Dunt, & Kelaher, 2018). Several patients have not been aware of public reporting (De Groot et al., 2011). Patients have not trusted the information on websites or considered the amount too extensive (Yahanda et al., 2016), and the information that is transparent to a healthcare professional may not be transparent to laypeople (Berg et al., 2005).

Also, managers at different levels of healthcare need high-quality public reporting for their decision-making, and policymakers require aggregate indicators that measure healthcare activities in a transparent, valid, and robust way (Mason & Street, 2006). As to waiting time statistics, the valid information provided by public reporting can be completed or ongoing waiting times depending on users of public reporting (Lee et al., 2021). For developing valid measures, cooperation between stakeholders has been emphasized (Mason & Street, 2006; Schuur et al., 2013). Measures should not influence clinical behavior in an unwanted way and induce observer effects (Rana et al., 2019). In reporting, outcome indicators should be favored, and if process indicators are used, they should have a proven association with outcomes (Berg et al., 2005). However, according to Donabedian (1988), processes promote outcomes, and structures promote processes.

Also, the level of information in public reporting has been discussed. The medical directors thought that public reporting on physician-level information would be the most effective in incentivizing physicians to change their behavior or the whole system (Canaway et al., 2020). The managers also saw problems in this reporting, such as working in teams. Hospital-level overall ratings might be difficult as the care quality of a single department might differ significantly from the quality at the hospital level (Rechel et al., 2016). From the viewpoint of patient choice, it would be logical that the level used in public reporting is associated with the possibilities of patients' choices.

In addition, the information reported publicly must be relevant, it has to be also otherwise of high quality. The reported information has been incomplete, if there has been mis-coding and variation in coding practices when producing information (Mason & Street, 2006). There have been information gaps in national reporting when individual providers have not submitted data in the national register (Gill et al., 2019). It would be good that indicators are administratively easily implemented (Berg et al., 2005) and information processing for public reporting purposes is based on approved data management techniques (Romanelli et al., 2019). For example, electronic hospital information management systems have been used to process indicators (Tang et al., 2016).

Our literature review on public reporting in healthcare is not without limitations. We used only one database for searching. However, the chosen database is a multi-

scientific database providing research documents from several healthcare areas from different views of public reporting. For searching, three keywords were chosen “public reporting”, “waiting time*”, and “waiting list*”. Other concepts referring to waiting, like wait, were not used. The Medical Subject Headings (MeSH) include only “waiting lists”, and the interest was in public reporting on waiting times, not measuring and managing waiting times as in our literature review on waiting times in healthcare. We think that the choices did not fundamentally change the variety of the collection of the documents retrieved and reviewed for our narrative overview. Categorizing the articles was challenging as several documents described public reporting in healthcare from many views. Although we possibly made some invalid choices in the classification in someone else's opinion, we think that our review provides a thorough overview of previously published research on public reporting in healthcare, focusing on issues associated in some way with the actionability of public waiting time reporting in public primary oral healthcare in Finland.

To conclude, the results of the overview indicate that the studies on public reporting focused on hospitals, and research on public reporting in primary care is minor. In our narrative overview, we discussed several issues that have been important in public reporting on the quality of care in hospitals. Further research is required to study whether issues affecting the effectiveness of public waiting time reporting in public primary care are equal to those in public reporting on hospital performance.

4 Research Design and Methods

The chapter begins by presenting the conceptual framework we developed to explore the actionability of two public waiting time reporting systems. Before introducing this framework, we outline the features of its five components and the two subcomponents. The main components are Recording Data, Information System, Channel for Receipt, Utilization, and Action. The component IS consists of two subcomponents: System Quality and Information Quality. Additionally, the concept of actionability is presented. After detailing the conceptual framework, we explain the methodological choices of our research and the justifications behind them. All scientific research operates within a specific paradigm, which is defined by a set of interconnected assumptions about the world (Kuhn, 1996). In our research, we adopted a positivist epistemology (Lincoln & Guba, 1985) and a functionalist paradigm (Burrell & Morgan, 1979), which influenced all other research design choices. Finally, we address the methodological limitations before concluding with a summary.

4.1 Conceptual Framework to Explore the Actionability of Public Waiting Time Reporting Systems

4.1.1 Components and Subcomponents

Recording Data

In healthcare, data is recorded in ISs for both clinical and administrative purposes. Data recording can be done manually or automatically. It is a crucial capability in healthcare because we cannot assess the quality of care without proper documentation (Sundgren, 2001). Data recording involves the characteristics of individuals, tasks, and technology (Ammenwerth et al., 2006). According to literature, “patient-oriented” nurses (Tapp, 1990) often perceive data recording as a burdensome task that does not benefit patients (Olivares Bøgeskov & Grimshaw-Aagaard, 2019). This feeling is exacerbated when nurses are working under time

constraints, leading to inadequate documentation (Mamogobo et al., 2018). Additionally, nurses tend to have more negative attitudes towards administrative documentation compared to clinical documentation (De Groot et al., 2022). In telephone triage tasks, where nurses assess patients' treatment needs, the work environment is often busy and filled with interruptions. Completing data entry in structured formats can be very time-consuming. While structured formats are necessary for managerial purposes, they typically require more time to fill out and can be cumbersome to read during clinical tasks (Ash et al., 2004).

Information System

Buckingham et al. (1987, 18) define ISs as “a system which assembles, stores, processes and delivers information relevant to an organization (or to society), in such a way that the information is accessible and useful to those who wish to use it, including managers, staff, clients and citizens.” In addition to hardware and software, electronic ISs also consists of people, policies, procedures, data, meanings, and standards (Nunamaker & Briggs, 2011). It is important to note that ISs do not need to be electronic. Technical validity (Schultz & Slevin, 1979) – meaning that a system is developed correctly and functions as intended – is not enough for a successful implementation of an IS. The system must be used, and users need to understand that it addresses a specific problem and the reasons behind its implementation (Cooper & Zmud, 1990). Organizational changes must occur simultaneously with technical implementations (Blumberg et al., 2019; Dwivedi et al., 2015; Scott et al., 2019). To gain a comprehensive understanding of ISs, research into the nontechnical aspects should be considered just as important as studies on technology. Measuring the success of ISs is complex and elusive, as their impacts are often indirect and affected by human, organizational, and environmental factors (Petter et al., 2008).

System Quality

System quality refers to the quality of data processing within an IS (Gorla et al., 2010). It assesses the performance of the IS from a technical standpoint, focusing on how effectively the hardware and software work together. System quality can be evaluated from two perspectives: that of system designers, who consider system flexibility, and that of system users, who look at system sophistication (Gorla et al., 2010). Key aspects of system quality include the possible presence of bugs, the consistency of the user interface, ease of use, the quality of documentation, and occasionally, the maintainability of the program code (Seddon, 1997). System quality is measured using criteria such as functionality, integration, reliability, data quality, and ease of use (DeLone & McLean, 2003). In the context of the Internet,

system quality encompasses features like availability, adaptability, reliability, and usability (DeLone & McLean, 2003). Availability is a crucial characteristic, as decision-makers face social and economic costs when seeking information (O'Reilly, 1982). Additionally, system quality is positively associated with information quality (Gorla et al., 2010). A poor system (software or hardware) will likely produce inaccurate or poor-quality information output.

Information Quality

Information quality refers to the quality of outputs produced by ISs (DeLone & McLean, 1992). The quality of input data is crucial for information quality, as poor data quality leads to poor information quality (Redman, 1998). Key objective dimensions of data quality include accuracy, completeness, consistency, and currency (Huh et al., 1990). Accuracy indicates how well the data represents the issue it is intended to measure. Completeness assesses whether all relevant data regarding an issue is included. Two data sets are considered logically consistent if they do not contradict. Currency refers to the timeliness of the data, meaning it is up-to-date. Several factors contribute to poor information quality. Proper data entry is essential for data to evolve into accurate information (Bossen et al., 2013; Thiru et al., 1999). Issues may arise from the lack of relevant information or the presence of excessive irrelevant information, often due to poor system design (Ackoff, 1967). Some dimensions of information quality, such as understandability, are subjective (DeLone & McLean, 1992), and the causes of poor quality of these areas can vary. Historically, statisticians were the first to explore issues related to information quality (Batini & Scannapieco, 2016), followed by management researchers in the early 1980s. In the early 1990s, computer scientists began investigating how to define, measure, and enhance the quality of information stored in electronic databases. It is important to note that information quality is multidimensional and relative to its usage context (Smith et al., 2018). In most situations, the quality dimensions of accuracy, timeliness, and relevance are emphasized. Poor information quality can have detrimental effects on organizations at operational, tactical, and strategic levels (Redman, 1998).

Channel for Receipt

The concept of a receipt refers to the process of receiving information through various media from a technical perspective. Media transmits signals between an information-producing system and the receiver (Mason, 1978). Over time, media has evolved from paper documents to the Internet, which has become crucial for disseminating information in society (Morales-Vargas et al., 2023). Web availability

indicates that information is accessible on websites. However, merely having good availability and accessibility is not enough if people are unaware of these websites. To enhance website visibility, it can be achieved through both online and offline strategies (Drèze & Zufryden, 2004). Social visibility can also heighten awareness, depending on how individuals share their experiences either face-to-face or via social media (Bronner & de Hoog, 2021). Usability measures how easy it is to use an interface, and Jakob Nielsen's (1993) work on usability has greatly influenced website design. Users' perception of an organization's website usability is directly linked to their satisfaction and trust in that organization (Flavián et al., 2006). It is important to acknowledge the barriers that may prevent different user groups from accessing and utilizing web content. According to estimates from WHO in 2023, roughly 16% of the population encounters disabilities, a number that is expected to grow due to demographic changes (WHO, 2023).

Utilization

An IS is considered utilized when its output is integrated into the decision-making process of an individual (Barkin & Dickson, 1977). This utilization can be divided into two subsystems, the data selection system and the human information process system. The effective utilization of an IS can predict its impact on performance and behavior, and establishing a crucial connection between IS and the outcomes it influences (Trice & Treacy, 1988). Tracing a theoretical connection between IS and performance and behavior through utilization is challenging. However, it is impossible to establish the connection without utilization. While utilization is a necessary component, it alone is not sufficient to predict performance and behavior. The relationships between utilization and IS are referred to as backward linkages, while forward linkages connect utilization to performance and behavior. Backward linkages include factors related to design and implementation, characteristics of IS, individual differences, and task characteristics. Forward linkages occur when the utilization of an IS positively affects performance and behavior. Additionally, there are other factors that can influence performance and behavior beyond just utilizing information related to performance- and behavior in decision-making.

Action

The concept of action refers to goal-directed human activity (Funke, 2017). It represents the intentional aspects of behavior. Actions are driven by goals, and achieving those goals requires appropriate means. Developing a solution to move from a current state to a desired goal state is often challenging. This process is information-rich, as it involves searching for, integrating, and applying information

from both internal and external sources to formulate an effective action plan (Mumford et al., 1996). Public reporting serves as a tool to provide information to this process. Actions taken in this context aim to enhance the quality of care, which is the primary reason for implementing public reporting. There are four key actions in relation to public reporting (Cacace et al., 2011, xiii). 1. Patients can select high-quality healthcare providers. 2. Healthcare providers can improve their care quality. 3. The transparency of the healthcare system can be increased. 4. Healthcare providers can communicate their care quality to their payers.

4.1.2 Actionability

The concept of actionability is relevant across various fields, such as management, data mining, and patient education. Although the definition of actionability can differ depending on context, it generally refers to the ability to use information for defined purposes or actions. Actionable knowledge can influence the decisions of stakeholders, modify behaviors and strategies, and enhance the design or implementation of public policies (Palmer, 2012). This perspective represents a pragmatic approach to knowledge creation and application to achieve specific outcomes (Carlile, 2002).

In management, actionability is vital for connecting research with practical applications. It reflects how research findings can be transformed into concrete decisions or actions within organizations (Shrivastava, 1987). From a critical realist perspective, significant management research should include a dependent variable of interest for managers and independent variables that are actionable in the managerial context (Syed et al., 2010). In data mining, the term actionable has been used more recently to describe patterns that suggest specific and profitable actions for decision-makers (He et al., 2005). This notion aligns with the pragmatic concept of actionability seen in management research.

In healthcare, care-quality indicators established as actionable can significantly enhance decision-making processes aimed at improving the quality of care and health outcomes (Carinci et al., 2015). The information on these indicators is fit for use and purpose (Barbazza et al., 2021). Fit for use means that the right information is accessible by the appropriate personnel at the right time, while fit for purpose ensures that the information supports the intended decision-making functions.

Within the realm of patient education, actionability evaluates educational materials. These materials are deemed actionable when individuals with diverse backgrounds and levels of health literacy can identify what they can do based on the provided information (Shoemaker et al., 2014). This interpretation is more limited than defining actionability as the property that enables and motivates individuals to make behavioral decisions based on the intervention content, which should include

at least one contextually appropriate behavioral recommendation while fostering the individuals' willingness and capacity to act on it (Albarracín et al., 2018). Actionable information must be relevant to the task at hand, and users should be able to translate that information into effective, goal-directed actions having control over the context of the message (Vakarelov & Rogerson, 2020).

Actionable knowledge is argued to be successfully developed through action research, which emphasizes change focus, collaboration capabilities, and systematic process (Sexton & Lu, 2009). Argyris et al. (1985) assert that action research concurrently enhances basic social science knowledge and promotes social action in everyday life.

4.1.3 Conceptual Framework

We developed a conceptual framework to explore the actionability of public waiting time reporting systems. Our literature review revealed that there were no existing frameworks designed for this purpose. An effective framework should encompass the entire scope of the subject being studied and be based on a clear and logical structure (Bariff & Ginzberg, 1982). The concepts within a framework should be mutually exclusive, and the overall number of concepts should be minimal to ensure manageability. It is important to note that a framework can significantly influence research outcomes.

As public reporting systems function as communication systems, we developed our conceptual framework to explore the actionability of public waiting time reporting systems using the Shannon–Weaver model (1964) and Mason's levels of information output in communication systems (1978). The Shannon–Weaver model is a central communication framework. According to Shannon (Shannon & Weaver, 1964), a communication system consists of five basic components: an information source, a transmitter, a channel, a receiver, and a destination. 1. The information source produces a message to be communicated. 2. The transmitter processes the message into a signal suitable for transmission over a channel. 3. The channel is simply the medium that transmits the signal from the transmitter to the receiver. 4. The receiver reconstructs the message from the signal. 5. The destination is a person or entity for whom the message is intended.

In adapting Shannon (Shannon & Weaver, 1964), our framework consists of the following components: Recording Data, Information System, Channel for Receipt, Utilization, and Action. 1. Recording Data represents the information source. 2. IS corresponds to the transmitter. 3. Channel for Receipt refers to the channel. 4. Utilization pertains to the activities of the receiver, who attempts to reconstruct the message from the signal for decision-making. 5. Action is the intended outcome for which a public reporting system is implemented. Within the IS component, we

identified two subcomponents: System Quality and Information Quality. Table 2 provides a description of these five components in the two public waiting time reporting systems we explored from the perspectives of two user groups.

Table 2. Components of public waiting time reporting systems.

Component	National system from views of managers	National system from views of authorities	Organizational system from views of patients	Organizational system from views of citizens
Recording data (Information source)	Triage dental nurses and their data recording in electronic patient ISs	Triage dental nurses and their data recording in electronic patient ISs	Triage dental nurses and their data recording in electronic patient ISs, other ISs, or memory	Triage dental nurses and their data recording in electronic patient ISs, other ISs, or memory
IS (Transmitter)	Electronic IS	Electronic IS	Oral healthcare manager, manual calculation, or electronic patient IS	Oral healthcare manager, manual calculation, or electronic patient IS
Channel for receipt (Channel)	One website for use	One website for use	Several websites for use	Several websites for use
Utilization (Receiver)	Oral healthcare managers' decision-making purposes to manage waiting times	National authorities' decision-making purposes to monitor access to care	Patients' decision-making purposes to choose a dentist	Citizens' decision-making purposes to assess the legitimacy of public services
Action (Destination)	Managing waiting times	Monitoring access to care	Supporting patient choice	Increasing transparency

The information sources for public waiting time reporting systems included triage dental nurses and their data recording practices. Depending on the specific reporting system used, data was recorded in electronic patient ISs, administrative ISs, or simply remembered by the triage dental nurses. The algorithms within the transmitter, IS, processed the data input for signals. In the case of the national system, this IS belonged to the national system. For the organizational system, oral healthcare managers processed the output data based on their experiences, or electronic patient or administrative ISs were used for data processing, which often involved manual calculations. Signals were transmitted through various channels: the national system had a single channel, while the organizational system had a number of channels equal to the number of primary oral healthcare organizations. Utilization of these systems meant that representatives from user groups selected specific information from the signals to support their decision-making regarding

intended actions. The purpose of a public waiting time reporting system was to fulfill its intended action. For instance, from the perspective of oral healthcare managers, the intended action of the national system was to manage waiting times in oral healthcare organizations to enhance the quality of care provided. However, in most cases, other factors beyond the utilization of public reporting also influenced the achievement of the intended action.

According to Shannon and Weaver (1964), communication involves three main types of challenges: technical, semantic, and effectiveness problems. Technical problems focus on the appropriateness with communication symbols transmitted. Semantic problems deal with how effectively these transmitted symbols convey the intended meaning. Lastly, effectiveness or influence problems refer to how well the received meaning influences behavior in the desired manner. Mason (1978) viewed communication systems as production systems, where the primary output is information that impacts the behavior of its recipients. For example, Mason identified information systems within statistical centers of government as production systems that generate various statistics, such as social indicators, targeted to different information users. The information production process comprises four key elements:

- information-producing systems
- media that transmits data to receivers
- utilization of information in a decision-making context
- resulting in changes in behavior.

Mason measured the information outputs of communication systems at four distinct levels. 1. Functional Level Output. This level measures the information generated by information-producing systems as they process data systematically from received input. 2. Technical Level Output. This involves measuring the number of physical data units transmitted within a specified period. 3. Semantic Level Output. This level refers to the number of meaningful units handled by the producing unit over a given period. 4. Influence Level Output. This evaluates the results and overall value that the output of an information system has on its recipient. In our framework, we incorporated four levels of information output, along with an additional level called actionability. 1. Functional Level Output refers to the data signals processed by IS from the input data. 2. Technical Level Output pertains to the fit of channels to facilitate the receipt of signals. 3. Semantic Level Output relates to how well the information signals fit for the purpose of recipients' decision-making. 4. Utilization Level Output involves decisions made for intended actions based on information that is fit for use and purpose. 5. Actionability represents the realization of the intended action of public reporting. Figure 6 illustrates our framework, depicting the components, levels of information output, and actionability. Our framework is based on the assumptions of

a process model (Markus & Robey, 1988). Process models assert that an outcome can only occur under certain necessary conditions but may also fail to occur if those conditions are not sufficient for the outcome to happen. For example, while utilization level output is necessary for achieving actionability, it is not sufficient on its own, as other factors may also influence whether the intended outcome is realized.

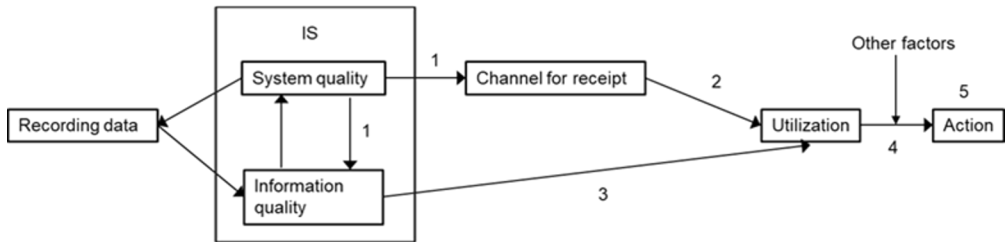


Figure 6. Conceptual framework to explore public waiting time reporting systems adapted from the Shannon–Weaver model (1964) and Mason (1978). (Functional level output=1, Technical level output=2, Semantic level output=3, Utilization level output=4, Actionability=5)

4.2 Philosophical Assumptions

For our research, we had to consider some fundamental philosophical assumptions. Table 3 presents philosophical questions under the main fields of philosophy: metaphysics, epistemology, rationality, and axiology which are important in IS research (Hassan et al., 2018). The foundation of IS research is in social science research (Orlikowski & Baroudi, 1991).

Table 3. Important questions in IS research in the main fields of philosophy modified from (Hassan et al., 2018).

Main field	Some important issues relevant to IS
Metaphysics	Ontology - what exists and what properties do they have? Causation - what is the nature of causality? Technology - what is the relation between social and technological? Information - does it exist and what is its nature?
Epistemology	What is the nature of knowledge? What is truth? Are there fundamentally different paradigms of research? What methodologies produce knowledge?
Rationality	Logic - how should we reason and make valid arguments? Philosophy of science - how should science be conducted?
Axiology	Value - what is good and to be valued? Politics - how should we govern and regulate our communities?

Ontology examines whether material and social worlds are objective and exist independently of humans or are subjective and exist only through human action (Orlikowski & Baroudi, 1991). It also addresses the assumptions about how we perceive the world, such as whether it is primarily characterized by social order or continuous change (Burrell & Morgan, 1979). In our research, we considered that public waiting time reporting systems represent an objective social world where social order is predominant.

In the context of ISs, we can talk about the nature of causality through three approaches: the technological imperative, the organizational imperative, and the emergent perspective (Markus & Robey, 1988). The technological imperative suggests that technology is an external force that dictates the behavior of individuals and organizations. The organizational imperative posits that information technology is the dependent variable caused by the information processing needs of an organization and the choices of managers to meet these demands. The emergent perspective indicates that the consequences of information technology arise unpredictably from complex social interactions. We concluded that the combination of the emergent perspective with the organizational imperative was the most appropriate in our research in public healthcare, considering the various stakeholders, such as citizens, national authorities, healthcare managers, and healthcare professionals, and their different information needs, which should be addressed when designing public reporting systems.

Chua (1986) categorized research epistemologies into three types: positivist, interpretive, and critical epistemology. Positivism has its roots in the works of the French philosopher Auguste Comte during the early nineteenth century (Rolfe, 2013). Comte tried to unite the natural and social sciences under a common philosophy and scientific method. The goal of social research is to identify the natural laws that govern human behavior by collecting and analyzing empirical data. Today, positivism refers just to collecting quantitative data through scientific methods (Rolfe, 2013).

Positivism assumes that the studied phenomenon is tangible and can be broken down into distinct aspects (Lincoln & Guba, 1985). The researcher and the studied phenomenon are independent, meaning that the researcher does not influence or is not influenced by the studied phenomenon. Consequently, observation reports and theory statements are strictly separated. The concepts used are precise and have fixed meanings allowing law-like generalizations that are independent of time or context. It assumes a uni-directional cause-effect relationship that can be tested via hypothetic-deductive logic and analysis. In IS research, studies that use a positivist epistemology typically focus on traditional hypotheses testing or are descriptive studies perhaps with simple descriptive statistics (Orlikowski & Baroudi, 1991). However, the positivist approach has faced criticism (Richards, 2003, Chapter 1).

While objective methods are effective for studying natural objects, they may not be suitable for social phenomena. The laws governing individuals and their relationships with other individuals, organizations, and society are complex compared with the order and regularity one finds in the natural world. Despite these criticisms, we adopted a positivist epistemology, predominantly employing descriptive studies alongside some predictive analyses. The concepts of public reporting and waiting time are clearly defined, and importantly, the researcher and the studied phenomenon are independent. Our aim was not to influence or be influenced by public waiting time reporting in our study.

Burrell and Morgan (1979) stated that ontology and epistemology shape how social science researchers view and study social phenomena. Using these assumptions, they categorized social science research into four paradigms: functionalist, interpretive, radical humanist, and radical structuralist. We selected the functionalist paradigm for our studies, as we aimed to analyze behavioral patterns using an objective approach within a context where social order prevails. The functionalist paradigm suggests that social patterns can be understood through their functional components, and social phenomena can be studied by breaking them down into smaller parts and using objectivist research methodologies, such as surveys. Theories should serve as the logical basis for formulating hypotheses that are empirically tested. They should align with the target problem, and their assumptions must be consistent. Based on the functionalist paradigm, we deconstructed public reporting systems into smaller components to better understand the actionability of public waiting time reporting. To study these components, we employed the observations of our surveys grounded in applicable theories to get rigorous evidence.

The deductive approach in research starts with a theory from which hypotheses are derived, and these hypotheses are then tested using collected data (Blackstone, 2012, Chapter 2). Inductive reasoning involves making predictions about novel situations based on existing knowledge (Hayes et al., 2010). These predictions are inherently probabilistic. Induction includes cognitive activities such as categorization, probability, scientific inference, and decision-making. The inductive approach starts with empirical observations, seeks to identify patterns in those observations, and then formulates theories based on those patterns (Blackstone, 2012, Chapter 2). Although deductive and inductive approaches may seem different, they are actually complementary (Blackstone, 2012, Chapter 2). When used together, they provide a more comprehensive understanding of a phenomenon. In our study, we employed deductive approaches to analyze the components of the public reporting systems. We utilized inductive approaches to explore the social patterns related to the actionability of public waiting time reporting.

Rationality is an essential aspect of reasoning (Sosis & Bishop, 2014). Philosophers typically distinguish between practical and theoretical rationality (Sosis & Bishop, 2014). Practical rationality pertains to the reasoning behind actions and intentions to act. In contrast, theoretical rationality focuses on beliefs (Audi, 2004). Beliefs that are true and well-founded constitute knowledge, and achieving knowledge is widely regarded as a success in theoretical reasoning. Theoretical rationality is concerned with reasoning and acceptance, with the assumption that the goal of reasoning is often to arrive at the truth (Lehrer et al., 2017). Reason is viewed as a tool for achieving this end, and this instrumental perspective view on theoretical rationality is a topic of philosophical debate. Some argue that explanatory power and informative content are more valuable objectives than truth itself. While false explanations and misinformation are often unworthy of our reasoning and acceptance, this is not always the case. Therefore, it is inaccurate to simplify theoretical rationality to merely reasoning and acceptance aimed at truth.

One significant achievement in the social sciences over the past two or three generations has been clarifying the concept of rationality, which is central to understanding human behavior (Simon, 1980). However, this does not imply that actual behavior is always or typically rational in every aspect. Given that human behavior is directed toward goals and the fulfillment of wants and needs, rationality must be considered in terms of its appropriateness. Although our research did not primarily focus on understanding human behavior, practical rationality is closely related to public reporting, particularly regarding whether individuals act as rational decision-makers when utilizing public reporting. The perspective on causality that we chose in our research acknowledges that human behavior is not always rational.

Axiology examines the role of values, typically distinguishing intrinsic and extrinsic values (Biedenbach & Jacobsson, 2016). Intrinsic value refers to the inherent worth of something, meaning that it holds value in and of itself. Extrinsic value, on the other hand, is the value that is not intrinsic. Thus, intrinsic goods have a non-derivative positive worth in addition to any extrinsic value they may have (Baylis, 1958). Instrumental goods are extrinsic, with their value stemming from their contribution to something deemed valuable. The criteria for assessing extrinsic goods are primarily scientific. Instrumental goods are considered to be causally productive of something good, and causal relationships are prime examples of what scientific methods study. Choosing among values becomes more informed when we have probable knowledge about them. Values are intertwined with research. They influence both researchers' decisions on research topics and the underlying assumptions regarding study methodologies (Machamer & Wolters, 2004). Furthermore, values also affect how scientific results are applied. These assertions

hold in the context of positivist epistemology, which we applied in research, suggesting that studying is devoid of values (Lincoln & Guba, 1985, 37).

The evidence-based approach does have limitations in policymaking (Carter, 2010). There may be situations where relevant evidence is simply unavailable. For instance, knowledge about the effectiveness of public reporting in primary care is limited (Campanella et al., 2016). However, to allocate resources to where the greatest benefit is probable, obtaining evidence about the effectiveness of new ideas prior to their full-scale implementation is essential (Venkataramani et al., 2020). While research and rigorous evidence can clarify what works, acquiring evidence often takes some time. Controversial issues frequently influence policy decisions, posing a challenge regarding to the extent to which high-quality evidence can affect decision-making (Carter, 2010). Conversely, evidence may seem unnecessary if public reporting is implemented due to its intrinsic value in promoting transparency regarding public goods (Marshall, Shekelle, Brook, & Leatherman, 2000, 74). In our study, we aimed to collect evidence about the actionability of public waiting time reporting and to develop a conceptual framework for evaluating the actionability of other public reporting systems in various contexts.

4.3 Research Type

Our research included three primary research types. They were exploratory, descriptive, and explanatory research (Bhattacharjee, 2012, Chapter 1). Exploratory research aims to study new areas of interest to understand the extent of the phenomenon being studied and to generate initial ideas about it. Descriptive research, on the other hand, is necessary to understand the detailed characteristics of studied phenomena based on careful observations. Explanatory research seeks to explain the observed phenomena. We chose explorative research to generate ideas for analyzing the actionability of public waiting time reporting. Descriptive research was necessary to understand the perceptions of oral healthcare managers and citizens regarding public waiting time reporting. Additionally, we used explanatory research to study dental nurses' use of electronic patient ISs during telephone triage and the determinants influencing this usage. Exploration and inductive reasoning were essential for investigating public waiting time reporting, as deductive logic alone is insufficient to cover new ideas (Stebbins, 2001, Chapter 1). Exploratory and confirmatory research share fundamental similarities and represent the positivist tradition in social sciences. The primary goal of social science exploration is to provide valid generalizations about phenomena, such as activities or processes. Concatenated exploration refers to a research process where a series of field studies are linked to lead to a cumulative grounded or inductively generated theory (Stebbins, 2001, Chapter 1). This approach has increasingly resulted in the

development of conceptual frameworks, often complemented by fully structured measuring instruments. We assumed that our three surveys addressed interrelated social aspects of public waiting time reporting, and that the combination of the observations of these surveys enabled us to explore the actionability of public waiting time reporting systems using the developed conceptual framework.

4.4 Research Strategy

There are two primary research strategies: qualitative and quantitative. In quantitative models, the world is understood through incidence, while qualitative research focuses on distinctions (Barnham, 2015). In our study, we opted for a non-experimental quantitative design strategy rather than a qualitative design strategy, such as case study (Creswell & Creswell, 2007, Chapter 4). Quantitative studies can be classified as descriptive, descriptive comparative, or correlational (Sousa et al., 2007). We primarily employed a descriptive approach, using descriptive statistics to represent public waiting time reporting from different users' perspectives. Additionally, we described and compared the differences among variables related to oral healthcare managers without formulating hypotheses about those differences. We also utilized correlational designs, in a broad sense, to explore the associations between various factors in the usage of electronic patient ISs by triage dental nurses.

Quantitative research draws on methods of the natural sciences (Ahmad et al., 2019). Its goal is to generalize the nature of phenomena (Takahashi & Kobayashi, 2022). Objective data is collected and analyzed statistically to clarify associations, including causality and probability between a factor of interest and other factors within a population. This type of research can test hypotheses or predict potential phenomena. Generalization occurs through statistical testing and estimation of values. However, since we employed convenience sampling and cross-sectional studies, the possibilities of generalizing empirical findings to the broader population or demonstrate causality was limited.

In our research, the analysis of waiting time information on the websites is categorized as qualitative research (Takahashi & Kobayashi, 2022). This analysis employs two approaches: the inductive approach, which generates abstract concepts by summarizing similar textual data, and the deductive approach, which organizes textual data based on a conceptual model consisting of multiple categories, which approach we applied. Generally, qualitative research aims to understand, explain, and interpret phenomena that cannot be quantitatively expressed through observation, with the inductive process often used to formulate theories or hypotheses.

4.5 Time Horizon

Our study employed a cross-sectional design. In a cross-sectional study, measurements are taken once for each unit of the study, allowing for the assessment of each variable at the same point in time (Menard, 2002). This approach was suitable for our research, which focused on concrete and externally oriented constructs (Rindfleisch et al., 2008), such as waiting time. We sampled informed respondents, including triage dental nurses, and utilized various measurement formats and scales, such as nominal and ordinal scales (Rindfleisch et al., 2008). Additionally, our study was based on established theories, notably the DeLone and McLean IS success model. Cross-sectional studies served our purposes well because they are relatively quick and resource-efficient to conduct. They are useful for both descriptive and analytical objectives, though interpreting observed associations can be challenging, and making causal inferences is often difficult (Wang & Cheng, 2020).

We acknowledged that cross-sectional studies are prone to various biases (Wang & Cheng, 2020). Surveys, in particular, are susceptible to common method variance, which refers to systematic measurement errors that arise when data is collected from a single source at one point in time (Rindfleisch et al., 2008). To mitigate the risk of common method variance, we considered several data collection strategies. These include obtaining data from multiple respondent sources, using various types of data, or possibly collecting data over several periods. By doing so, we aim to attribute variance to the measurement method rather than the constructs being measured. These strategies can help differentiate between independent and dependent variables, theoretically reducing the risk of common method variance and enhancing causal inference (Podsakoff et al., 2003). Additionally, we recognize that there are statistical techniques available to control for common method biases.

4.6 Sampling Strategy

Choosing a sampling technique depends on several factors, including the study methodology, the type of research (confirmatory, exploratory, descriptive), the type of inference (statistical, analytical), knowledge about the population of interest, the size of the population, and the time and financial resources available (Berndt, 2020). Initially, we planned to conduct a census study in public primary oral healthcare intending to include all oral healthcare managers and triage dental nurses. In a census study, there is no sampling as the entire population is included in the research (Tyrer & Heyman, 2016). However, since 22% of the public primary healthcare organizers did not approve of the research permit, we could not proceed with a census study. As a result, we needed to consider either probability or non-probability sampling for our study. Probability sampling involves randomly selecting participants, ensuring that everyone in the population has an equal chance of being selected in the sample

(Shorten & Moorley, 2014). This method helps to eliminate the possibility of sample selection bias. However, implementing probability sampling would have been too labor-intensive for the oral healthcare organizations and the researcher. Therefore, we decided to use non-probability sampling. Non-probability sampling refers to techniques that select participants in a non-random manner. One common approach is convenience sampling, where participants are chosen based on their availability. In this method, a researcher announces the study, and participants self-select if they wish to take part (Stratton, 2021). Convenience sampling is widely used also in clinical research due to its simplicity and cost-effectiveness (Elfil & Negida, 2017). For these reasons, we decided to use convenience sampling in all our surveys. It was our initial choice for the citizen survey. Despite its advantages, non-probability sampling carries the risk of the sample not accurately representing the entire population (Tyrer & Heyman, 2016). Participants in the study may differ from those who do not participate for various reasons. Consequently, the results of research using non-probability sampling can only be generalized to the participants involved (Stratton, 2021). Inferences about the broader population cannot be made, but non-probability sampling can be valuable for theory development or exploring individual experiences (Tyrer & Heyman, 2016), which met our needs for this research.

4.7 Data Collecting

We collected data for our study through a literature review and three electronic surveys. A literature review involves a thorough examination of previous research findings (Lluch, 2011; Okoli, 2015). The goals of our review were to identify, classify, and summarize existing research on healthcare waiting times, as well as to identify areas and opportunities for future research. We chose the multi-scientific database Scopus for our search. Our query aimed to find English-language journal articles with titles that included “wait*” or “access to” while excluding “emergency”. Additionally, the title, abstract, or keywords needed to include “health*”. We excluded the concept of “emergency” because we were not focused on accessing emergency healthcare. The search was limited to ten subject areas, such as medicine, nursing, management and accounting, business, and computer science, while other areas like arts and humanities, engineering, neuroscience, psychology, and veterinary were deemed irrelevant. We did not impose a time limit on the search.

A survey is a research method that uses questionnaires or interviews to systematically collect data (Bhattacharjee, 2012, Chapter 9). Surveys can serve exploratory, descriptive, and explanatory research purposes. They are particularly effective when individuals are the units of analysis and when research seeks to collect information on attitudes, opinions, and perceptions. Surveys also allow researchers to collect data on unobservable issues. They are relatively economical in

terms of effort, time, and costs, especially when conducted online through interactive forms. Participants can be contacted via email with a link to the online survey. However, surveys carry the risk of biases, such as non-response bias and recall bias. Non-response bias occurs when a systematic reason prevents a significant portion of participants from responding, potentially compromising the validity of the study's results. This could lead to an overrepresentation of respondents who are dissatisfied with the phenomenon under study, resulting in outcomes that may not be generalizable. Conversely, participants are often more inclined to respond to surveys on topics that interest them. Participation rates can be roughly 40% higher for such topics (Groves et al., 2004). Recall bias, on the other hand, arises when respondents fail to accurately remember their motivations or behaviors or when their memories have changed over time and are no longer reliable (Bhattacharjee, 2012, Chapter 9). Despite these challenges, questionnaires maintain a level of rigor within the information systems discipline (Lund, 2023). Between 2000 and 2019, studies that used questionnaires typically reported a median number of 217 respondents. Response rates varied between 17% and 50%, with a median rate of 28% (Lund, 2023).

We collected data for our study using questionnaires, as they were deemed sufficiently rigorous for the IS discipline. This method was appropriate since individuals were the units of analysis, and we aimed to understand respondents' perceptions of public reporting. Additionally, we appreciated that questionnaires were an economic choice. We opted for electronic questionnaires, utilizing survey links on websites to facilitate anonymous responses. In oral healthcare organizations, organizational email lists were used to reach all oral healthcare managers and triage dental nurses working in public primary oral healthcare organizations for our study in the spring of 2021. To inform citizens about the study, electronic newsletters were published on the websites of the public primary healthcare organizers at the beginning of May 2021 in Southwest Finland. These newsletters included a link to the survey website. Furthermore, if the healthcare organizers preferred, they could also use alternative means, such as social media, to deliver information about our research.

For all three surveys, we created our own questionnaires, as no validated options were available. The questions were formulated based on previous studies that utilized the theoretical framework we adapted for each study. The questionnaires were translated into Finnish and pre-tested on small groups of volunteers representing the respondent groups (n=6 for citizens, n=6 for oral healthcare managers, n=10 for dental nurses). During these tests, we identified issues with clarity and understanding in the questionnaires and made necessary adjustments.

The Ethics Committee for Human Sciences at the University of Turku had approved our study proposal in February 2021 (Permit 7/2021). This ethical permit

mandated that eligible participants be 18 years or older and provide informed consent to participate in the study. Consequently, each participant was asked to give their consent at the beginning of the electronic questionnaire. Additionally, we required research permits from all public primary healthcare organizers for the manager and dental nurse surveys. Applications for these research permits were submitted to 135 organizers in March 2021. Of those, 52% served small populations of up to 20,000 people. We obtained permits from 105 organizers: with 54% serving larger populations of over 20,000 people. Regarding the citizen survey, we received a research permit from all 15 public primary oral healthcare organizers of Southwest Finland.

Manager Survey

In our manager questionnaire, we adapted the theoretical framework from the original IS success model developed by DeLone and McLean (1992), as well as from the IS-impact measurement model proposed by Gable et al. (2008). DeLone and McLean concluded that IS success cannot be measured by a single measure, rather, it encompasses multiple interrelated and interdependent measures, forming a comprehensive IS success model. They categorized these measures into six dimensions: system quality, information quality, use, user satisfaction, individual impact, and organizational impact. This classification was influenced on the concepts put forth by Shannon and Weaver (1964) and Mason (1978). The DeLone and McLean model has since become a widely referenced framework within the IS discipline (Lowry et al., 2007). Gable et al. (2008) redefined IS success as a formative, multidimensional index, identifying four essential dimensions – system quality, information quality, individual impact, and organizational impact – deemed necessary and sufficient for their IS-impact measurement model. We adopted these four dimensions in our model to maintain clarity and conciseness.

To measure these dimensions, we identified a total of 15 attributes. We assessed organizational impact using three attributes and the other dimensions with four attributes each. For system quality and information quality, we selected attributes that are commonly used in their measurement (DeLone & McLean, 1992). The attributes chosen for system quality were access, ease of use, response time, and visual clarity. For information quality, we selected accuracy, comparability, timeliness, and understandability. The attributes related to individual and organizational impact were tailored to the context of waiting time management. Modifying attributes to fit the specific study context is crucial for effective evaluations (Petter et al., 2012). For individual impact, we focused on decision-making, making comparisons, problem identification, and self-monitoring, referring to the effects on oral healthcare managers within the studied context. Organizational

impact was evaluated through data entry, process development, and staff requirements. Data entry is a vital capability within a healthcare organization; without proper documentation, we cannot effectively discuss the quality of something (Sundgren, 2001). Within the data entry attribute, we included elements such as dental nurses' IS instructions, helpdesk activities, leader support for nurses, and nurse orientation.

Each attribute was assessed with one item, except for data entry, which contained four items. Additionally, we asked managers about the accuracy of the waiting time information in the national waiting time reporting system relative to their organizations, as well as their opinions on waiting time information within oral healthcare on general. We also included six questions regarding managers' perceptions of various waiting time measures for monitoring purposes, three questions about their backgrounds, and six questions concerning the significance of public waiting time reporting for citizens. In total, our questionnaire encompassed 35 questions for the oral healthcare managers, along with informed consent of participants involved in the study (Appendix 2).

Citizen Survey

In the citizen survey, we adapted a theoretical framework based on signaling theory (Spence, 1973) and agency theory (Eisenhardt, 1989; Ross, 1973). We asked five questions regarding the importance of waiting time as a criterion in selecting a dentist, as well as the sources respondents used to seek for information for this decision. These questions were modified from similar surveys (Coe & Qian, 2013; Gray et al., 2021; Kim et al., 2012). Additionally, we included six questions about awareness of public waiting time reporting on the websites of public primary oral healthcare organizations and the significance of this reporting. We also asked five questions related to the digital competencies of the respondents, their access to the Internet, and their usage of health information online. Finally, we collected background information with five questions, which included participants' gender and year of birth, education level, and use of oral health services. In total, there were 21 questions for citizens participating in this study, along with the informed consent form for participants (Appendix 3).

Dental Nurse Survey

The third questionnaire was designed for triage dental nurses. The theoretical framework for examining their use of electronic patient ISs was based on the UTAUT (Venkatesh et al., 2003). We aimed to explore the usage of electronic patient ISs by triage dental nurses for three key purposes: I) Supporting decision-making in

triage, II) Recording data for dentists, and III) Recording data for national authorities. Utilizing the system for the first purpose assisted triage dental nurses in making informed decisions regarding the need for treatment. The second purpose provided essential information for dentists' decision-making, while the third purpose delivered data for national authorities to monitor access to care.

In the UTAUT (Venkatesh et al., 2003), the constructs of effort expectancy, performance expectancy, and social influence are used to determine the intention to use a technology. Additionally, facilitating conditions are considered to influence actual usage behavior. In our study, we focused on actual usage behavior as the outcome rather than intention to use. We adopted four determinants – perceived effort, perceived performance, social influence, and facilitating conditions – to directly influence usage behavior. Each determinant was characterized as its equivalent in the UTAUT framework. Perceived effort is defined as the ease of learning and using the system, while perceived performance refers to the extent to which the system enhances job performance. Social influence is defined as the extent to which key individuals encourage the user to utilize the system, and facilitating conditions refer to the availability of infrastructure that supports its usage.

We included age and experience as moderators for facilitating conditions, mirroring how they were used in the UTAUT (Venkatesh et al., 2003). Experience was defined as the dental nurses' proficiency in telephone triage. Research from other healthcare areas has emphasized the special skills required to effectively serve patients via the telephone (Derks et al., 2009; Pettinari & Jessopp, 2001; Snell & Grimwood, 2022). Significant learning occurs while working on these tasks (Pettinari & Jessopp, 2001; Snell & Grimwood, 2022), although sufficient time is essential (Derks et al., 2009). We hypothesized that these observations would also apply to telephone triage tasks in oral healthcare, suggesting that experience may influence usage behavior.

For each determinant construct, we utilized three items adapted from Venkatesh et al. (Venkatesh et al., 2003)^{p.460}. We included one item for the actual usage related to providing data for dentists, one for providing data for national authorities, and three for supporting decision-making in triage. These three items asked for respondents to evaluate system usage for analyzing a patient's health problem, improving the effectiveness of treatment assessment decisions, and enabling personalized care. Additionally, respondents were asked to assess their competencies in evaluating patients' abilities to describe their symptoms and treatment needs, their own competencies in assessing treatment necessity, and their digital competencies. The questionnaire also included five items regarding the backgrounds of triage dental nurses, such as their year of birth and work experience as dental nurses. In total, the study included 25 questions for triage dental nurses, in addition to the informed consent form for participants (Appendix 4).

4.8 Data Analysis

4.8.1 Analyzing the Collected Data

The questionnaires we used consisted of closed-ended items with predefined answer options. Additionally, the manager survey included one open-ended question to allow the oral healthcare managers to elaborate on reporting waiting times in oral healthcare. Some items were measured on a nominal scale, such as gender in the citizen survey, degree in the manager survey, and electronic patient information system in the organization in the triage dental survey. Several items utilized a 5-point Likert scale, with options including: strongly disagree (1), disagree (2), neither agree nor disagree (3), agree (4), and strongly agree (5). Another 5-point scale used options such as: not at all (1), a little (2), somewhat (3), much (4), and a great deal (5). Likert scales are commonly used in many disciplines, including social sciences, to assess participants' attitudes by asking whether they agree or disagree with presented statements (Awang et al., 2016). Data from these scales is primarily analyzed using summary statistics and parametric or non-parametric tests, depending on the normality of the distribution of item variables (Toy & Daly Guris, 2023). A common methodological question is whether Likert scale data should be treated as ordinal or interval. There is no universally accepted standard within the scientific community regarding the correct interpretation and analysis of such data (Göb et al., 2007). Generally, attitude measurement scales are acknowledged as ordinal, yet many studies utilize interval statistics, such as sample means, sample variances, and t-tests, to analyze attitude data. Ordinal approaches are less common. In our analysis, we used interval statistics, as empirical literature dating back nearly 80 years supports this approach without fear of leading to incorrect conclusions (Norman, 2010). It is important to note that the distances between response options in these scales are not assumed to be equal. Despite this lack of equality, the impact on the statistical conclusions of studies is minimal, even when applying parametric statistics (Cohen, 2013, Chapter 1).

We conducted our statistical analyses using IBM SPSS Statistics for Windows, Version 28.0.0.0. In SPSS, missing data was managed with listwise deletion. To illustrate the locality and spread of certain variables, such as oral healthcare managers' perceptions of the success attributes of the digital national waiting time IS, we employed boxplots. Relationships between categorical variables, such as the electronic patient IS in the organization by dental nurse groups, were analyzed using contingency tables and Chi-Square statistics (van der Ark et al., 2005). We compared the means of variables related to dental nurse groups, such as age, using two-tailed Student's t-tests with the assumption of unequal variances. The four use behavior determinant variables and one actual use behavior variable from the triage dental

nurse survey were aggregated to create sum variables from their respective three-item variables. To evaluate the internal consistency of these sum variables, we applied Cronbach's alpha, with a threshold of 0.6 deemed acceptable (Hulin et al., 2001). Binary logistic regression was used to examine the associations between the use behavior determinant variables and the actual use behavior variables. Independent variables were treated as continuous when a linear relationship existed between any continuous independent variable and the logit transformation of the outcome variable, and we tested this linearity using the Box-Tidwell procedure (Box & Tidwell, 1962). Additionally, we included two moderators on one use behavior determinant within our binary logistic regression models.

We also analyzed secondary data in our research, specifically the waiting time information available for public reporting. A deductive approach was used to classify this textual data into multiple categories (Takahashi & Kobayashi, 2022) based on earlier literature regarding waiting time reporting, such as waiting time measures and the organizational level of measurement (Lee et al., 2021; Rechel et al., 2016).

In our literature review on healthcare waiting times, we similarly employed a deductive approach to categorize previous studies. For instance, we categorized studies based on the healthcare area being examined, such as elective surgery and cancer care. Furthermore, we created a classification of seven classes to understand the reasons behind the study of waiting times. These classes included: 1) clinical outcomes, 2) patient satisfaction, 3) description of waiting time, 4) explanatory factors for waiting time, 5) social equity, 6) intervention, and 7) prioritization. We also analyzed how waiting times were defined, the measures of central tendency, and the methods of data collection in healthcare regarding waiting times.

4.8.2 Exploring the Actionability

Table 4 presents the definitions and measurements of different levels of information output and actionability. For instance, functional level output refers to the data signals generated from input data by IS. There were four types of output data signals based on the quality of recorded data and the algorithms used by the IS. Output signals can be classified as accurate and retrospective when the recorded data is both accurate and complete, and the algorithms process this input data into retrospective waiting time signals. In contrast, the signals are deemed inaccurate and prospective when the recorded data was inaccurate and incomplete, and the algorithms processed prospective waiting time signals. Technical level output pertains to how user groups perceive the suitability of the channel used for receiving signals. This channel can be categorized as fit for use, partially fit for use, or not fit for use at all. For example, a channel is considered to fit partially for use when some users in the group are unable to receive signals through it. Semantic level output evaluates whether the

content of the signals meet the information needs of the user group and supports their decision-making processes. Signals can fit for purpose, partially fit for purpose, or not fit for purpose at all. Utilization level output assesses whether the information signals fit for use and purpose and can be employed in decision-making regarding intended actions in public reporting. The possibility of utilizing these signals in decision-making is classified as impossible, improbable, uncertain, fifty-fifty, and probable, corresponding to numerical probabilities of about 0, 0.15, 0.25, 0.5, and 0.8, respectively (Witteman et al., 2007). Actionability refers to the successful achievement of the intended actions in public reporting. The probability of actionability is measured as utilization level output. As we use the assumptions of a process model, the probabilities of utilization level output and actionability may not be the same. The probability of utilization level output can be influenced by other factors before reaching the actionability level.

Table 4. Measuring outputs and actionability.

Dimension	Definition	Measure	Scale	Values
Functional level output	Functional level output refers to output data signals processed from input data by IS	Quality of processed output signals	Nominal	Accurate and retrospective Inaccurate and retrospective Accurate and prospective Inaccurate and prospective
Technical level output	Technical level output refers to the fit of channels to enable the receipt of signals	Quality of channels to fit for use	Ordinal	Fit for use Partially fit for use Not fit for use
Semantic level output	Semantic level output refers to the fit of the information content of received signals for the purpose	Quality of received signals to fit for purpose	Ordinal	Fit for purpose Partially fit for purpose Not fit for purpose
Utilization level output	Utilization level output refers to decisions for which transmitted information has fit for use and purpose in relation to the intended action	Probability to fit signals in decision-making associated with the intended action	Ordinal	Probable Fifty-fifty Uncertain Improbable Impossible
Actionability	Actionability refers to the achievement of the intended action of public reporting	Probability of achieving the intended action of public reporting	Ordinal	Probable Fifty-fifty Uncertain Improbable Impossible

Table 5 presents how the values of the technical and semantic level outputs were integrated into the utilization level output.

Table 5. Integrating values of technical and semantic level outputs into values of utilization level output.

Value/Utilization level output	Value/Technical level output	Value/Semantic level output
Probable	Fit for use	Fit for purpose
Fifty-fifty	Fit for use	Partially fit for purpose
Uncertain	Partially fit for use	Fit for purpose Partially fit for purpose
Improbable	Fit for use Partially fit for use	Not fit for purpose
Impossible	Not fit for use	

4.9 Methodological Limitations

There are two major limitations in research: threats to internal and external validity (Price & Murnan, 2004). A research design with high internal validity yields accurate results because it correctly measures what it intends to measure. External validity refers to the generalizability of the results from the sample to the broader population from which the sample is drawn.

External validity can be compromised by errors such as non-coverage, non-response, and item-nonresponse errors (Price et al., 2004). To reduce non-coverage errors, appropriate sample selection techniques and a sufficient sample size are essential. In our cross-sectional research, we had to rely on convenience sampling due to the non-participation of all oral healthcare organizations and the lack of resources for probability sampling. While nonprobability sampling may decrease the validity of our study results, it is a suitable method for exploratory research (Henry, 1990, Chapter 2). We assessed the risk of non-coverage error in the manager and triage dental surveys and determined it to be small. Intra-organizational email lists were used to send cover letters and links to questionnaires to all potential survey participants. In the citizen survey design, we acknowledged that convenience sampling posed a clear risk of non-coverage error.

We aimed to minimize this risk by effectively informing citizens about the survey to increase participation. For probability sampling, we would have needed a sampling frame, which is a list of all members of the study population (Omar, 2014). Once the sample was selected, we would have contacted each person using the media informed by their contact information in the sampling frame, however, this would have been too resource intensive. We also explored the actionability of the national waiting time reporting system based on the perspectives of national authorities,

although these authorities were not included in our empirical studies. The analyses were derived from our empirical surveys and our literature review of waiting times in healthcare.

A notable threat to the internal validity of our research was that respondents might not respond truthfully to the questionnaire items. Response bias occurs when individuals provide self-assessed measures of some phenomenon (Rosenman et al., 2011). For example, respondents may portray their behaviors in a more positive light than is accurate, even in anonymous surveys. In our research, it would have been more effective to measure the actual use of the electronic patient IS using logs rather than relying on nurses' self-evaluation. However, questions formulated using Likert scales are particularly susceptible to response bias. To reduce the risk of non-response error, we sought to motivate participants to complete the questionnaire by including a cover letter and a brief questionnaire. We aimed to avoid item-nonresponse error by testing the clarity and comprehensibility of the questionnaires with small groups of volunteers representing the respondent groups.

In the context of surveys, four main types of validity must be considered: face validity, content validity, construct validity, and criterion validity (Taherdoost, 2016). Face validity involves a subjective judgment regarding how well the operationalization of constructs appears and evaluates the questionnaire based on feasibility, readability, consistency of style and formatting, and language clarity. Content validity assesses the extent to which a measurement instrument includes all relevant and representative items of the target construct. Evaluations of content validity are crucial when developing new survey instruments. Construct validity pertains to how well the theoretical constructs are measured in relation to reality. Criterion validity examines the extent to which a measure correlates with an outcome, assessing how well one measure predicts an outcome for another. Since we primarily used questionnaire items derived from similar English questionnaires, we did not test content and construct validity, despite needing to translate the questionnaires into Finnish. At times, we omitted certain items from our questionnaires because we believed that shorter questionnaires would yield higher response rates compared to longer ones. In terms of face validity, we assumed there would not be significant issues because we used testers who were representatives of the respondents. We aimed to enhance criterion validity by adapting frameworks from rigorous theoretical models, choosing to use the UTAUT model (Venkatesh et al., 2003), even though it does not consider macro-level determinants of the usage of information systems. In healthcare, a macro level understanding of political decision-making and information is essential to balance societal benefits against expenditures for population advantages (Sutherland & Till, 1993). The information necessary for such decision-making originates from lower levels of healthcare organizations.

Lastly, there was a risk of researcher bias, which refers to the tendency of a researcher to have preconceived notions (Buetow & Zawaly, 2022). Such biases can influence the researchers' questions, how they address questions, their interpretation of the findings, and how the results are utilized. To minimize this risk, we collected data using questionnaires that included items previously employed in similar studies, ensuring we also included items that did not align with the researchers' assumptions. The data was analyzed statistically, aiming for objectivity. In quantitative studies, the risk of substantial researcher bias is generally low. We opted for a quantitative approach rather than a qualitative one to better understand public waiting time reporting, as waiting times and their measurements are objective and quantifiable concepts. The researcher had a strong understanding of the study context, eliminating the need to observe oral healthcare activities or conduct interviews to gain further insights.

4.10 Concluding Summary

We selected the functionalist paradigm to explore the actionability of public waiting time reporting systems. This paradigm is grounded in the work of Burrell and Morgan (1979), which highlights how ontology and epistemology shape social science researchers' perspectives on studying social phenomena. It assumes that an objective approach can be employed to examine behavioral patterns in a society characterized by social order. Further, the functionalist paradigm posits that social patterns can be understood through their functional components, allowing researchers to break these patterns down into smaller components for analysis using objectivist research methodologies, such as surveys. Consequently, we decided to decompose public waiting time reporting systems into components based on Shannon's foundational components of communication systems (Shannon & Weaver, 1964) and Mason's levels of information output in communication systems (1978).

Our research plan included exploratory, descriptive, and explanatory studies (Bhattacharjee, 2012, Chapter 1). The descriptive research aimed to examine the perceptions of oral healthcare managers and citizens regarding public waiting time reporting. The explanatory research focused on the use of electronic patient ISs by dental nurses in telephone triage and the determinants of this usage. We interconnected the study results within a conceptual framework, inspired by the concept of concatenated exploration (Stebbins, 2001, Chapter1). This was necessary to explore the actionability of public waiting time reporting systems.

We opted for quantitative research methods, which aligned with our descriptive and correlational research objectives (Sousa et al., 2007). Our descriptive approach sought to portray public waiting time reporting from the perspectives of various

users, comparing differences among oral healthcare managers without formulating hypotheses. The correlational designs, in a broad sense, were intended to study the associations between variables related to the usage of electronic patient ISs by triage dental nurses. Typically, correlational studies are cross-sectional, making this design suitable for our surveys, which relied on concrete and externally oriented concepts grounded in theory (Rindfleisch et al., 2008). Cross-sectional studies were advantageous for our purposes as they are relatively quick and resource-efficient to conduct (Wang & Cheng, 2020).

Data for our study was collected through a literature review and three electronic surveys. We employed questionnaires to systematically collect data for the surveys (Bhattacharjee, 2012, Chapter 9). Surveys can serve exploratory, descriptive, and explanatory research purposes. Specifically, web-based surveys are effective in terms of effort, time, and cost. Although surveys may introduce biases, such as non-response bias and recall biases, questionnaires are generally regarded as sufficiently rigorous in the field of information systems (Lund, 2023). Since there were no validated questionnaires available in Finnish, we adapted items from similar English questionnaires based on widely accepted theories, such as the UTAUT model (Venkatesh et al., 2003) for the survey targeting dental nurses.

We primarily used summary statistics to analyze the data. In the questionnaires, we employed 5-point Likert scales for measurement and utilized interval statistics in our analyses, as empirical literature supports this approach without leading to incorrect conclusions (Norman, 2010). We also analyzed some secondary data using a deductive approach to categorize textual data based on multiple classifications (Takahashi & Kobayashi, 2022).

Our research faced challenges regarding internal and external validity (Price & Murnan, 2004). While we had to rely on convenience sampling, which can limit external validity, this method was deemed appropriate for exploratory research (Henry, 1990; Chapter 2). Nevertheless, we made efforts to address potential threats to the internal validity of our study and mitigate the risk of researcher bias (Buetow & Zawaly, 2022) as thoroughly as possible.

5 Results Summary of the Original Publications and Answers to Research Questions 1, 2, and 3

This chapter presents the results of the four original publications included in the dissertation and addresses Research Questions 1, 2, and 3. We organize the results of the publications in a sequence that we believe is easiest for the reader to understand public waiting time reporting in public primary oral healthcare in Finland. Article I is our literature review on waiting times in healthcare, which helps to understand how waiting times can be used as a quality measure for healthcare. Article I also answers Research Question 1. Articles II, III, and IV are based on our surveys on public waiting time reporting in public primary oral healthcare in Finland. In 2021, when we collected the data, there were two public waiting time reporting systems. One system, referred to as the national system, reported publicly retrospective waiting times on the website of a national authority. The other system, named the organizational system, provided prospective waiting times on the websites of each public primary oral healthcare organization. Article II describes the perceptions of oral healthcare managers of the national system. Article III presents the organizational system from the perspectives of citizens and oral healthcare managers. It also includes an evaluation of the quality of the waiting time information provided by the organizational system. Article IV focuses on how dental nurses record data in electronic patient ISs during telephone triage, specifically when assessing the need for treatment. This data recording process is central to the quality of waiting time information within the national system, as the information in this system originates from the electronic patient ISs of oral healthcare organizations.

After presenting Articles II, III, and IV, we respond to Research Questions 2 and 3 and provide an analysis of the actionability of the national and organizational public waiting time reporting systems. We explored the actionability of the national system from the perspectives of national authorities and oral healthcare managers, while the organizational system was explored from the viewpoints of patients and citizens. We define an actionable public waiting time reporting system as a system that collects, processes, and delivers relevant and accurate information about waiting times to stakeholders for utilization in action-related decision-making to realize

intended actions. The framework for exploring the actionability was adapted from the Shannon–Weaver model of communication (1964) and Mason’s levels of information output in communication systems (1978), as public reporting systems can be considered both information and communication systems.

5.1 Research Question 1/Article I: Waiting Times in Healthcare: a Literature Review

Article I was a literature review focused on enhancing our understanding of waiting times in healthcare. The goal was to clarify how waiting times are defined and measured, as well as the purposes for which waiting time information is utilized across different healthcare areas. The findings presented in Article I address Research Question 1 of the dissertation.

A total of 95 articles were included in the review, revealing that waiting times have been most extensively studied in the US. Other countries of interest included the UK, Australia, Canada, Norway, Germany, and Italy. Notably, the trend in the number of published articles on this topic has been increasing over the years.

Waiting time was defined as the interval between two specific points: a starting point and an endpoint. These points were defined differently across various healthcare areas, leading to variations in the definitions of waiting time. In hospital care, an episode might involve multiple waiting times. For instance, in cancer care, three distinct waiting times could be identified: the waiting time for diagnosis, which starts from the suspicion of cancer, the waiting time for the treatment starting from diagnosis, and the total waiting time, which spans from the initial suspicion to the treatment. Additionally, waiting time can refer to the duration a patient spends in a waiting room before meeting the healthcare professional or the period when a patient is left waiting for a return call after reaching voicemail when contacting a healthcare service.

Based on the review, waiting times were mainly reported using mean and median values, with the mean being slightly more common. Categorizations of waiting times were also employed, such as short waiting time (≤ 180 days), medium waiting time (181–270 days), and long waiting time (> 270 days). Five articles specifically examined waiting times with designated target times.

About two-thirds of the articles focused on waiting times for surgical procedures, hospital care, or hospital clinics. Research on waiting times for oral healthcare appeared in two articles. The other article addressed waiting times for dental care under general anesthesia in a pediatric hospital, and the other described waiting lists within public dental services in Australia. Notably, there were no articles on waiting times for visits to a general practitioner. Most articles focused on health policy and management issues related to waiting times. One-sixth of the articles dealt with

clinical outcomes or patient satisfaction. The information on waiting times primarily originated from clinical or administrative healthcare data. Although some articles cited issues with the quality of waiting time data, none specifically addressed information management problems.

The results of this literature review corroborated previous research, indicating that waiting times for surgical operations are the most frequently studied. One reason for this focus could be the maximum waiting time guarantees established for certain surgical operations, such as hip and knee replacements and cataract surgery. The varying definitions of waiting times complicated comparisons among healthcare providers, highlighting the need for harmonization of definitions for consistent purposes. Furthermore, we suggest that using the mean for statistical representation may not be appropriate when the distribution of waiting times is skewed. The median would be a better choice in those cases.

There was a lack of studies on waiting times in primary care and the information management aspects of waiting time data. Since primary care appointments often mark the beginning of most patients' healthcare journeys, obtaining data on waiting times in this area is essential. To effectively manage waiting times across all healthcare areas, healthcare managers and policymakers require current and reliable data for informed decision-making. Further research into sophisticated information management strategies for waiting time data is critical. Given that patients' health records and administrative healthcare systems are central data sources, it is vital to plan and implement these tools adequately to ensure high-quality information on waiting times.

5.2 Article II: Digital National Waiting Time Information System – View of Finnish Public Oral Healthcare Managers

Article II depicts the study on public waiting time reporting in public primary oral healthcare in Finland in 2021 from the perspective of oral healthcare managers. The national waiting time reporting system which provided retrospective waiting times of all public primary oral healthcare organizations on one website of the national authority served as the focus of the study. The waiting time information of the national system was processed from the data recorded in electronic patient ISs of public primary oral healthcare organizations and transmitted from these systems automatically for the national system.

The study had 159 potential manager participants, with 98 managers responding to the survey. Of the managers, 60% had a licentiate degree in dentistry, 20% were specialist dentists, and 20% had other qualifications. Of them, eight were dental hygienists. Half of the managers worked in small organizations serving populations

of up to 20,000 inhabitants. Three out of four managers with specialist dental backgrounds were employed in larger organizations with populations exceeding 20,000 inhabitants. No correlation was found between the number of years in management positions and the population base of the organization.

Oral healthcare managers found that while the national reporting system was technically clear, the quality of the waiting time information was poor. The reported retrospective waiting times were irrelevant for managing current waiting times and were often inaccurate. Only half of the managers agreed that the waiting time information was accurate for their specific organizations, with this sentiment being more prevalent among those managing smaller organizations. The difference between the groups of the managers was statistically significant. The perceptions of the timeliness of the information varied, which is explained with the view of their evaluation. Retrospective waiting time information published once a month is timely to observe in which organizations maximum waiting times were according to the law, but not timely and relevant for current waiting time management.

Despite the low-quality information, the national reporting system did promote transparency in public oral healthcare, as it consolidated waiting time information in one location. Previously, there was no possibility of accessing this information. The definition of waiting time was clear, allowing managers to identify which organizations provided timely access to non-urgent care as mandated by law. Although the information was flawed, managers utilized it to some extent to justify process improvements and the need for additional resources within their organizations.

The inaccuracies in the national system led to a misleading representation of waiting times for other oral healthcare organizations and national authorities overseeing access to care. Managers attributed some of this inaccuracy to inadequate recording practices by triage dental nurses who assessed treatment needs. Many of these nurses struggled with data recording, especially those who infrequently assessed treatment needs or newly graduated staff. Frequent updates to the electronic patient ISs and a lack of up-to-date recording instructions exacerbated the issue. Managers expressed concerns about the functionality of the CE-marked electronic patient ISs. To enhance data quality, some organizations increased orientation for triage nurses and developed better recording instructions, efforts likely influenced by the health and social services reform that heightened public interest in waiting time information. In certain instances, the quality of the information was so poor that laypeople would question its accuracy.

Managers were also asked how the waiting time information should be presented in the national reporting system. Those managing large organizations expressed a desire to report not only waiting times but also the number of individuals entitled to treatment or the number of patients who had utilized services. There is a relatively

significant difference if 20 patients have not been able to access treatment based on the care guarantee in a small or large organization. Although oral healthcare managers found it challenging to use retrospective waiting time information for management, they did not consider it necessary to timely present the number of patients waiting for treatment and the mean or median of prospective waiting times. There was no statistical difference in the opinions of managers overseeing small versus large organizations. This suggests a reluctance to disclose the current situation to others. They were content that the retrospective waiting time information indicated compliance with the care guarantee regarding access to non-urgent care in the public primary health care organizations they managed.

The impact of the national waiting time reporting system was minimal. The retrospective information on waiting times is not useful for managing current waiting times, however, the increased transparency assisted oral healthcare managers in benchmarking their performance. Unfortunately, the waiting time information in the system was proven to be inaccurate. Since this information originated from the electronic patient ISs of public primary oral healthcare organizations, managers began to develop data recording practices for telephone triage tasks. This initiative aimed to improve the accuracy of data in the national waiting time reporting system and enhance the monitoring of access to care.

Further research is necessary to determine whether the effectiveness of the national waiting time reporting system could be improved by involving a broader range of healthcare stakeholders in its development. Additionally, the data collected could facilitate the processing of prospective waiting time information, which would help in managing current waiting times more effectively.

5.3 Article III: Signaling Waiting Times to Citizens on Public Oral Healthcare Providers' Websites

Article III discusses the study on public waiting time reporting in Finland from the perspectives of citizens and oral healthcare managers. It also describes the quality of the reported waiting time information. The public reporting system referenced in this article is the organizational waiting time reporting system, which publicly reported prospective waiting times on the websites of each public primary oral healthcare organization.

The study included 411 citizen respondents. Among them, 65% visited a dentist regularly, 28% used services irregularly, and 7% only sought care when experiencing toothache or other oral health issues. Of the respondents, 53% utilized only public oral healthcare services, 7% used only private services, and the remainder accessed services of both sectors. The backgrounds of the manager respondents have been described in connection with Article II.

The citizen respondents identified the professional competence of dentists and the waiting time to access care as the most important criteria when choosing a dentist for non-urgent care. Other factors considered included the dentist's interaction skills, service price, distance of the service, and service hours. Notably, 73% of the respondents stated that they intended to book an appointment with a dentist they had previously visited, indicating the information for choosing a dentist was rarely sought online. However, 62% indicated they would see any dentist for non-urgent treatment if the waiting time was short.

Regarding awareness of public reporting, 57% of respondents knew that public primary oral healthcare organizations reported information on waiting times for non-urgent care on their websites. Among those who were aware, 71% had visited the relevant website, which accounted for 40% of all respondents. Approximately 70% expressed that they could use the reported waiting time information in the future to choose a dentist or to verify the legitimacy of accessing care. While 93% found public waiting time reporting useful, 17% believed that no one would be interested in this information. Additionally, only three respondents indicated that they did not have Internet access at home. The respondents generally considered their digital competencies good, and more than half searched for health information online at least once a month. Less than 10% reported not searching for health information on the Internet.

The quality of the waiting time information reported on the websites of 15 public primary oral healthcare organizations in Southwest Finland was found to be poor on September 15, 2021. Some websites displayed waiting time information that was older than four months or lacked a date altogether, making it impossible to assess the timeliness of the information. It was also noted that some organizations reported waiting times inaccurately, claiming a waiting time of two to three months. Various units, such as calendar days, days, weekdays, and 24 hours, were used inconsistently. The information was presented either at a unit or an organizational level. Nonetheless, it was challenging for the researcher to locate waiting time information on the websites of various oral healthcare organizations.

One-fifth of the public primary oral healthcare managers responded that the reported waiting time information on the organization's website was based on speculation. More than 60% stated that information on waiting times was manually processed using either T1 or T3 calculations (Murray & Berwick, 2003). Only 10% indicated that the electronic patient IS processed the information automatically. Seven managers were unsure how the information was generated. Nonetheless, all managers agreed that the electronic patient IS should be responsible for processing the information. Almost all oral healthcare managers found it beneficial to publicly report waiting time information. Additionally, about 40% of the managers felt that the website should also provide the average duration of different treatment packages.

The goal of public waiting time reporting is to reduce information asymmetries between citizens and healthcare providers. However, from the standpoint of choosing a dentist, this reporting did not provide significant benefits, as users of public oral healthcare services had limited options for selecting a dentist in the spring of 2021. While reporting increased transparency in oral healthcare, the quality of the information was generally poor. To assess the legitimacy of accessing care, information on retrospective waiting times is necessary.

Further research is needed regarding the objectives of public waiting time reporting from patients' perspectives. In 2021, public waiting time reporting was mandatory, oral healthcare organizations lacked incentives for compliance, and patients had limited opportunities to choose a dentist within the public healthcare system.

5.4 Article IV: National Waiting Time Monitoring in Oral Healthcare – The Role of Triage Dental Nurses

Article IV focuses on the use and use behavior determinants of electronic patient ISs by dental nurses in telephone triage within public primary oral healthcare in Finland. The usage is particularly interesting because the waiting time information in the national waiting time reporting system was derived from data transmitted by the electronic patient IS of each public primary oral healthcare organization.

A triage dental nurse assesses each patient's dental care needs in telephone triage before a patient can access care. In 2014, nurses received the rights to the electronic patient IS to access patients' dental histories to support their treatment-priority decision-making in triage. Nurses could record their findings, such as patients' symptoms and reasons for seeking treatment, into the system and subsequently available to dentists. The data concerning the triage contact of the patient was recorded into electronic patient ISs manually by nurses or automatically. The data was automatically submitted to the Institute. We focused on studying these three primary usage purposes. Four determinants were used to explain this usage: perceived efficiency, perceived effort, social impact, and facilitating conditions. Perceived efficiency refers to users' perception of how their performance improves with system use. Perceived effort indicates the ease of use associated with the system. Social impact encompasses the influence of how others – especially those significant to the person – believe that the person should use the system. Facilitating conditions pertain to users' perceptions of the organizational and technical infrastructure that supports system usage.

In May and June 2021, there were 915 dental nurses involved in triage tasks in the public primary oral healthcare organizations which participated in our study. Of

the nurses, 294 responded to our survey. Among the respondents, 44% reported working in telephone triage frequently (daily or almost daily), while the remainder worked less often. There were no significant differences in these proportions between small and large oral healthcare organizations. Dental nurses who frequently engaged in telephone triage rated their ability to assess patients' treatment needs and their digital competencies higher than those who infrequently worked in triage.

During telephone triage tasks, dental nurses primarily used the electronic patient IS to record clinical patient information for dentists. There were no significant differences in this usage between frequently and infrequently in-triage-working nurses. However, notable differences were observed between the two groups in their use of electronic patient ISs to support decision-making on patient treatment priorities and to record data for national purposes, specifically monitoring and reporting the waiting times for non-urgent oral care. All nurses reported using the electronic patient IS the least for recording data for national purposes.

We analyzed the effect of the four determinants on the usage of electronic patient ISs for the three purposes using logistic regression. The changes in the usage attributable to the four determinants were not substantial, with Nagelkerke R^2 values of 8.3, 24.0, and 24.3. The lowest value was observed when predicting the recording of data for national purposes. Perceived performance and social influence were predictors of the electronic patient IS usage to support nurses' decision-making in triage, while social influence also predicted usage for recording data for dentists.

The inadequate data recording for national purposes resulted in the waiting time information failing to provide authorities with a reliable picture of access to non-urgent care in different public primary oral healthcare organizations. The national authority's decision to digitalize data collecting did not enhance data quality. Previously, this information had been collected via questionnaires twice a year, but concerns were raised about bias in self-reported information. Although the national authorities opted to digitalize the system, there were few incentives within oral healthcare organizations to invest in a new IS and prepare for organizational changes. There was minimal demand for information on realized waiting times, as the relevance of retrospective waiting time information in decision-making differs at national, organizational, and individual levels. Management in oral healthcare organizations requires information on prospective waiting times to understand current situations, while at the national level, retrospective information is necessary to monitor access to care. For dental nurses and dentists, the most relevant information remains the clinical dental record of individual patients. During the implementation of the national system, which also required organizational changes, dental nurses were not adequately informed about the importance of recording data for national decision-making. Furthermore, they did not receive sufficient guidance to establish recording practices. As a result, nurses did not view the recording data

for population-level purposes as essential, especially while striving to provide optimal care for individual patients.

Further research is needed on how to encourage changes in public healthcare and motivate healthcare professionals to adopt new practices when implementing ISs. The staff values both quality of care and patient satisfaction. To enhance the quality of care, we need data for non-clinical decision-making. Healthcare professionals engaged in clinical tasks should find it meaningful to input data for this purpose and have sufficient time to do so properly.

5.5 Research Questions 2 and 3: Actionability of Two Public Waiting Time Reporting Systems

Research Questions 2 and 3 of this dissertation focus on the actionability of two public waiting time reporting systems in public primary oral healthcare in Finland. To explore the actionability of these systems, we developed a conceptual framework based on the theories of Shannon and Weaver (1964) and Mason (1978). This framework has five components: Recording Data, Information System, Channel for Receipt, Utilization, and Action. The IS component is further divided into two subcomponents: System Quality and Information Quality. Additionally, the framework outlines four various levels of information output and the actionability of the system. The analyses were derived from the findings presented in the four articles referenced above.

Table 6. Analyses of the actionability of public waiting time reporting systems.

Dimension	National system from views of managers	National system from views of authorities	Organizational system from views of patients	Organizational system from views of citizens
Destination	To support oral healthcare managers in managing waiting times in their organizations	To support the national authorities in monitoring access to care	To support patients in choices of a dentist	To support citizens in assessing the legitimacy of public services
Functional level output	Accurate and retrospective Inaccurate and retrospective	Accurate and retrospective Inaccurate and retrospective	Accurate and prospective Inaccurate and prospective	Accurate and prospective Inaccurate and prospective
Technical level output	Fit for use	Fit for use	Partially fit for use	Partially fit for use
Semantic level output	Not fit for purpose	Partially fit for purpose	Partially fit for purpose	Not fit for purpose
Utilization level output	Improbable	Fifty-fifty	Uncertain	Improbable
Actionability	Uncertain	Fifty-fifty	Improbable	Improbable

The actionability of the national system and the organizational system was explored from the perspectives of two different user groups. Table 6 presents the results of our analyses. The national system reported retrospective waiting times of all public primary oral healthcare organizations on one website maintained by the national authority. This system was explored from the viewpoints of public oral healthcare managers and national authorities. In contrast, the organizational system reported prospective waiting times on the websites of each public primary oral healthcare organization, and we explored this bunch of systems from the perspectives of patients and citizens.

In the national system, the information source was the triage dental nurses and their data recording in electronic patient ISs. According to Article IV, triage dental nurses recorded data sparingly in electronic patient ISs, resulting in partially inaccurate and incomplete input data. The algorithms of IS of the public reporting system converted this input data into functional-level output, producing a mixture of accurate and inaccurate retrospective waiting time signals. These signals were transmitted via a chosen channel: one website, which fit for use and provided a suitable technical-level output for users. Based on Article II, the oral healthcare managers perceived the system quality of the national website as good. However, the content of the signals received did not meet the information requirements necessary for managing current waiting times at an organizational level, indicating that the semantic-level output was not fit for purpose. While the signals could be received, they were inappropriate for the intended purpose. Thus, the signals fit for use but not for purpose. Nevertheless, as Article II outlined, the national system aided the managers by allowing them to view all the waiting time information across public primary oral healthcare organizations on one website. Managers utilized this information to justify process development and the need for additional resources.

Thus, we assessed the probability of the actionability of the national system from the managers' perspectives as uncertain rather than improbable due to various other factors. Although the system could not directly be used to manage current waiting times, it enabled information utilization for other purposes perhaps potentially impacting waiting times and improving the quality of care. Before the implementation of the national system, waiting time information across public primary oral healthcare organizations was not reported publicly on one website.

Research Question 2 focused on the actionability of the national waiting time reporting system, which we also explored from the perspectives of national authorities. We determined the probability of actionability to be fifty-fifty. The functional-level output of the national system was described previously. The chosen channel fit for use and provided technical level output for the authorities updated once a month. The information was timelier than before. With the questionnaires, data was gathered twice a year. While the retrospective waiting time signals met the

information needs of the national authorities, their inaccuracy meant that the semantic level output fit for purpose only partially. The probability that national authorities would utilize these signals in their decision-making to monitor reliably access to non-urgent care was fifty-fifty. Although they received the signals and their content met their information needs, the inaccuracy of those signals posed a risk of making incorrect inferences based on unreliable waiting time information. The input data did not accurately reflect waiting times in organizations due to sparse data recording. Consequently, poor-quality input data led to poor-quality waiting time information. We assumed that there were no significant factors other than their decision-making impacting the authorities' monitoring.

In the organizational system, the primary information sources were the triage dental nurses and their data recording in electronic patient ISs or other ISs, which included human memories. According to Article III, IS of the organizational system was primarily other ISs than electronic patient ISs. In one-fifth of the organizations, the IS involved the human information processing systems of oral healthcare managers. The functional level output provided signals regarding prospective waiting times, which could be accurate or inaccurate. Each public primary oral healthcare organization reported its waiting times through its channel, specifically on its website, meaning the number of channels was equal to the number of organizations. However, the technical level output only partially fit for use, as all citizens could not access these signals via the Internet. Some individuals were unaware of the websites. It was difficult to locate the waiting time information online. Some individuals are unable to use the Internet due to disabilities. At the semantic level, the output partially fit for purpose. While the information content about prospective waiting times met the information needs and would help in selecting a dentist, it was often inaccurate and not timely based on Article III. The utilization level output was assessed as uncertain due to its partial fit for use and purpose. Nonetheless, waiting time was an important criterion in choosing a dentist. From the perspectives of patients, the actionability of the organizational system was improbable as there were limited options for choices for dentists in public primary oral healthcare in 2021. Although the potential for utilization for public reporting would have been better, the characteristics of the healthcare system hindered the effective use of the utilization level output.

Research Question 3 focused on the actionability of the organizational waiting time reporting system. The actionability of the system from citizens' perspectives was similarly assessed as improbable. While the technical level output provided prospective waiting times – some accurate and some not – this information did not meet citizens' information needs for evaluating whether access to care within public services complied with legal standards. Consequently, the possibility of the utilization level output was deemed improbable. We also assessed the overall

actionability as improbable – not impossible – because the technical level output partially fit for use, allowing access to the waiting time information. Although the information did not fit the purpose of assessing realized waiting times, it offered partial insights into access to non-urgent care in public primary oral healthcare organizations.

We found that the conceptual framework effectively explored the actionability of the two public waiting time reporting systems from the perspectives of the two user groups. The actionability of the systems ranged from improbable to fifty-fifty. The functional level output exhibited poor quality in all analyses due to inadequate data recording and low system quality. The poor input data led to inaccurate waiting time information, while the low system quality resulted in irrelevant waiting time content updated rarely. The poor-quality output of this level adversely affected the overall actionability of public waiting time reporting.

To enhance actionability, we found three critical issues. First, the information source associated with data recording was of low quality, leading to poor-quality input data for IS of public reporting, and consequently, inferior information for its utilization. Second, the algorithms of IS of the national system should have been designed to process timely both prospective and retrospective waiting times to meet different information needs, which would have yielded relevant semantic-level outputs for all user groups, thereby allowing for a single public reporting system. Third, the healthcare system in Finland provided limited options for patients to choose a dentist, making it impossible to support patient choice through public reporting within such a constrained system.

6 Discussion and Conclusions

This chapter begins with a summary of the main findings from our study on the actionability of public waiting time reporting systems in public primary oral healthcare within Finland. We then discuss how these results compare to the limited existing literature on public the topic. Following this discussion, we address the theoretical implications of our findings, as well as the practical implications. Finally, we outline the limitations of our study and present some suggestions for further research, concluding with our overall insights.

6.1 Summary of Main Results

This dissertation explored public waiting time reporting in public healthcare and focused on three research questions. Research Question 1 studied how waiting times were defined and measured across different healthcare areas, as well as the purposes for which waiting time information was utilized, based on previous literature. Research Questions 2 and 3 explored the actionability of two public waiting time reporting systems in public primary oral healthcare in Finland in 2021. The Finnish healthcare system was a mix of tax-funded and private services. Within public services, waiting times serve as a form of rationing. To maintain reasonable waiting times, the care guarantee, which sets maximum waiting times, was implemented in 2005 (Laki kansanterveyslain muuttamisesta 1:15b.2 §). Before 2014, national authorities monitored compliance with the care guarantee by collecting information through questionnaires from public primary healthcare managers twice a year. Since 2014, the monitoring process has been digitalized, requiring public primary healthcare organizations to submit data from their electronic patient ISs to the electronic ISs of the Institute meaning the Finnish Institute for Health and Welfare (Asiakastietolaki 2:7.1 §; Laki Terveysten ja hyvinvoinnin laitoksesta 1:2.1 §, 1:5.1 §; Mölläri & Saukkonen, 2020; Chapter 1). This new data acquisition method necessitated that each public primary healthcare organization, including oral healthcare, implement a new module in its electronic patient IS. The data collected automatically from these systems was processed by the ISs of the Institute into monthly summary reports on retrospective waiting times. These reports from all public primary oral healthcare organizations were made accessible on one website

of the Institute. This bunch of systems is referred to as the national system, which we explored from the perspectives of oral healthcare managers and national authorities. The second bunch of reporting systems we explored, named the organizational system, involved each public primary oral healthcare organization reporting waiting times on its website. This reporting was mandated by the Healthcare Act (TervHL 6:55.1 §). Typically, the third next available non-on-call dentist appointment time was used in these systems (Salkinoja et al., 2022). The information must be updated every fourth month. We explored this public reporting system from the perspectives of patients and citizens.

In 2021 to our knowledge, there were no established conceptual frameworks to evaluate the actionability of public waiting time reporting systems. Evaluations of public reporting remained limited (Cacace et al., 2019), and there were few studies on the effectiveness of public reporting in primary care (Campanella et al., 2016). Our research utilized the functionalist paradigm (Burrell & Morgan, 1979), which allows for the breakdown of social patterns, such as public reporting systems, into smaller components for study, typically through surveys. To disassemble public reporting systems, we developed a conceptual framework based on the Shannon–Weaver model of communication (1964) and Mason’s levels of information output in communication systems (1978). Our framework identified five key components: Recording Data, Information System, Channel for Receipt, Utilization, and Action. Within the IS component, we included two subcomponents: System Quality and Information Quality. We also incorporated functional, technical, semantic, and utilization level outputs, in addition to actionability. We defined an actionable public waiting time reporting system as a system that collects, processes, and delivers relevant and accurate information about waiting times to stakeholders for utilization in action-related decision-making to realize intended actions.

To address our three research questions, we collected data using three electronic questionnaires and conducted a literature review on waiting times in healthcare. One questionnaire was targeted at oral healthcare managers to find their perceptions of the national public waiting time reporting system and the organizational waiting time reporting system. We adapted the theoretical framework of this study from the original IS success model of DeLone and McLean (1992), along with the IS-impact measurement model of Gable et al. (2008). In the questionnaire aimed at citizens and patients, we asked about their choice of a dentist and their awareness and usage of public waiting time reporting, also in assessing the legitimacy of access to non-urgent oral healthcare. This theoretical framework was adapted from agency theory (Eisenhardt, 1989; Ross, 1973) and signaling theory (Spence, 1973). The third questionnaire was directed at triage dental nurses, who were crucial information sources for providing input data for the national waiting time reporting system. We inquired about their use of electronic patient ISs during telephone triage tasks and

the factors influencing this usage, employing the UTAUT framework (Venkatesh et al., 2003). The collected data mainly used 5-point Likert scales and other similar scales, and we primarily conducted descriptive statistics for the analysis. To analyze the associations between use behavior determinants and actual usage behavior in the dental nurse study, we applied binary logistic regression.

Results from the manager survey indicated that the poor quality of the waiting time information in the national system prevented managers from effectively utilizing it. The information was neither relevant nor accurate enough for decision-making regarding managing current waiting times in oral healthcare organizations. The statistics were based on data recorded in electronic patient ISs in oral healthcare organizations, and oral healthcare managers reported inaccuracies of waiting times in the national system due to sparse data recording by dental nurses in electronic patient ISs during telephone triage tasks. Many managers considered assessing the need for oral treatment to be overly complicated, particularly for dental nurses who rarely handled triage tasks or were novices. The triage dental nurse survey confirmed that the data recording was indeed incomplete. Triage dental nurses reported infrequent use of electronic patient ISs for recording data relevant to the purposes of the national waiting time reporting system. They perceived data entry as time-consuming amid busy triage responsibilities.

In the citizen survey, participants identified waiting time as a high-priority criterion in selecting a dentist. The waiting time information available was regarded as relevant for making patient choices. Respondents felt that using the Internet to report care-quality information was an effective approach. The citizens rated their digital competencies as good, most had Internet access at home and actively searched for health information online. However, the Finnish healthcare system offered limited options for choosing a dentist in the public sector, diminishing the incentive of patients to utilize waiting time reporting websites of oral healthcare organizations. Over half of the respondents were aware of public waiting time reporting provided by oral healthcare organizations. Respondents believed that they could use the system in the future to choose a dentist and to assess the legitimacy of access to public primary oral healthcare. Nonetheless, we found it challenging to locate waiting time information on the websites of various oral healthcare organizations, and the accuracy and timeliness of the reported information was low. One-fifth of the managers indicated that the reported waiting time information was based on their experience.

The literature review addressed Research Question 1. The findings of the review revealed that most studies on waiting times in healthcare focused on elective surgeries and hospital care. These studies examined waiting times from management and health policy perspectives. Definitions and measurements of waiting times varied between and within countries, complicating comparisons of waiting times.

While two studies addressed waiting times in oral healthcare, none of the articles concentrated on the information management of waiting time data. However, some reviewed articles highlighted issues related to the data quality on waiting times.

The answers to Research Questions 2 and 3 regarding the actionability of the national and the organizational public waiting time reporting systems in public primary oral healthcare were derived from our three surveys and the literature review described above. The actionability of these public reporting systems was analyzed using the assumptions of a process model and varying probabilities, acknowledging that numerous factors can influence actionability beyond those outlined in our conceptual framework. The probabilities were categorized as impossible, improbable, uncertain, fifty-fifty, and probable. The probabilities of actionability ranged from improbable to fifty-fifty, depending on the specific public waiting time reporting system and the user group whose perspective was analyzed.

The probability of actionability for the national waiting time reporting system from the perspectives of the national authorities was analyzed as fifty-fifty. The Internet was deemed a suitable channel to receive information. It fit for use by national authorities. The information fit partially for the purpose. The retrospective waiting time information was relevant for the information needs of national authorities to monitor access to care but the waiting time information of the system was inaccurate. It was ultimately inaccurate due to incomplete data from oral healthcare organizations. From the perspective of the oral healthcare managers, the probability of actionability was regarded as uncertain rather than improbable. The existing information did not adequately support the management of current waiting times; it did not fit the purpose. Despite this, we found retrospective waiting time information from all public primary oral healthcare organizations on one website serving other purposes. For instance, managers could use it to justify process development and request additional resources, potentially improving access to care and the quality of care. The system fit for use.

For patients, the actionability of the organizational waiting time reporting system was analyzed as improbable, primarily because there were limited options for selecting a dentist within public primary oral healthcare in 2021. The system fit partially for use since not all citizens could access the information through the reporting channel. The information also fit partially for the purpose. The information was relevant, but it was inaccurate and not timely. From the perspectives of citizens, the actionability of the organizational system was also deemed improbable. The system fit partially for use like from the viewpoints of patients. The prospective waiting time information did not fit the purpose. It did not effectively support assessing whether access to care was as regulated, and again, the information was inaccurate. Nonetheless, we did not consider the situation impossible since publicly

reported prospective waiting time information provided some insight into access to care and increased transparency.

We identified three major issues to address to enhance the actionability of public waiting time reporting systems. First, we need to determine whether public reporting should have an instrumental value or serve to promote transparency in public services. If we aim for instrumental value, the use of public reporting systems must have forward linkages that facilitate the performance and behaviors intended through public reporting. This indicates that no barriers should exist in the environment of public reporting systems that could hinder intended actions. For example, in the Finnish healthcare system, where patient choice for a dentist was limited, public reporting could not effectively support patient choice. Second, the quality of information in public reporting systems heavily depends on the source of the information. Poor-quality input data leads to unreliable information, possibly resulting in misguided decisions. In this case, national authorities did not obtain a trustworthy picture of access to care, and their monitoring efforts were superficial due to the scarcity of recorded data on telephone triage tasks. Third, the input data for IS of the national system could have facilitated the processing of timely prospective and retrospective waiting times. This would have required the algorithms of the IS to be designed collaboratively with various healthcare stakeholders to enable the processing of data for both types. Consequently, the national and organizational systems could have been integrated into one system that timely provides all prospective and retrospective waiting time information of all public primary oral healthcare organizations on one website, accessible to national authorities, oral healthcare managers, patients, and citizens. Under these circumstances, the probability of actionability for the combined system would likely be assessed as probable from the perspectives of the national authorities and oral healthcare managers, provided that the quality of input data is improved. From the viewpoint of citizens, the actionability of the combined system could be estimated as fifty-fifty. However, it remains only partial fit for use, as all citizens cannot use the Internet. From patients' viewpoints, actionability appears improbable, especially since there were limited options for choosing a dentist within the public sector.

6.2 Our Results Compared to Earlier Literature

This dissertation enhances our understanding of public waiting time reporting in public primary oral healthcare. There are relatively few studies on the effectiveness of public reporting in primary care (Campanella et al., 2016). In many countries, public reporting has been mandatory for hospitals, as the state has played a significant role in hospital care (Cacace et al., 2019). Physician practices have been mainly private in most European countries and without compulsion for public

reporting. In 2021, Finland's healthcare system consisted of public and private services, with public reporting being mandatory for all public healthcare services, including hospitals and primary care. The role of public services in oral healthcare in Finland is more substantial than in many other countries, where such services are predominantly offered by the private sector (WHO, 2022, Chapter 3). In Finland, private dentists have accounted for about half of all adult visits (Sotkanet, 2021a).

Our cross-sectional study aimed to explore the actionability of public waiting time reporting. The quality of information provided in public reporting is crucial for its actionability (Barbazzza et al., 2021). The information must suit its intended use and meet users' needs. It has to fit for use, meaning that users have access to the information at the right time, while fit for purpose ensures that the information satisfies users' requirements. Furthermore, at least one of three major mechanisms – selection (Berwick et al., 2003), change (Berwick et al., 2003), and reputation (Hibbard et al., 2005) – should be effective in enabling public reporting to enhance the quality of care. It is important to note that public reporting can also serve the purpose of maintaining transparency about public services (Marshall, Shekelle, Brook, & Leatherman, 2000, 74). This reporting lacks clear strategic aims and may have little impact on the quality of care. It has been suggested that political motives often drive government-initiated public reporting programs rather than a genuine intention to improve care (Greenhalgh et al., 2017). For instance, in 2015, many countries sought to enhance their public reporting systems to increase transparency (Rechel et al., 2016). Our study results indicate that the public waiting time reporting systems in Finland have also been established to ensure transparency rather than to enhance the quality of care, though there were some impacts on oral healthcare organizations to improve the care quality. The impacts of the transparency from the perspectives of patients were limited. Waiting times were long, but patient complaints about access to non-urgent care in public primary oral healthcare remained low (R. Kytä, AVI HAKE Information Service, Regional State Administrative Agency for Southern Finland, personal communication, February 27, 2024). It may be that patients were not well informed by healthcare providers about the waiting-time guarantee because the idea of waiting-time guarantees received a broad positive response only among citizens and policymakers (Rönnerstrand & Oskarson, 2020). In China, they have discussed the importance of educating patients on public reporting and interpreting the information content (Du et al., 2016).

Evidence that public reporting on waiting time effectively reduces waiting times is minimal (Kreindler, 2010). Public reporting has not significantly motivated healthcare providers or influenced patient choices to reduce waiting times (Kenis, 2006; Stoop et al., 2005). For example, in Italy, reporting websites did not provide relevant information to inform citizens or to facilitate benchmarking among organizations, and it appeared that public reporting was more about legal compliance

(De Rosis et al., 2020). In our study, public waiting time reporting had some positive effects on oral healthcare managers' decision-making. They used the information to justify process development and request additional resources, which activities may improve access to care. Public reporting on quality issues other than waiting time has also driven quality improvements through providers' initiatives rather than through patient choice, and these initiatives are often linked to the potential for reputational damage (Hamblin, 2008). This trend is quite evident in public healthcare. The mechanisms of selection and change (Berwick et al., 2003) are associated with an organization's desire to maintain or increase its market share. However, in public healthcare, especially in systems that aim to minimize patient visits (Song & Tucker, 2016), this market share focus is less applicable. Thus, the reputation mechanism appears to be the only one likely to have a positive impact on care quality, such as reducing waiting times, particularly in countries with publicly funded healthcare. For instance, the National Health Service in England used a "star rating" system that effectively reduced waiting times for hospital care by imposing reputational consequences (Bevan, 2010). Waiting times for each hospital were made public, and well-performing hospitals were rewarded, while poor-performing ones faced significant reputational penalties. However, concerns arose regarding gaming practices aimed at avoiding reputational damage (Greene & Hall, 2012). In emergency care, manually recorded response times could lead to flawed assessments of life-threatening situations. Additionally, the observer effect has been shown to influence public reporting, and regulated activities have received more attention than non-regulated ones in clinical practices (Rana et al., 2019). In our study, data recording was sparse in electronic patient ISs. We do not know whether this was partly because of gaming to succeed in complying with the care guarantee. Without proper documentation, it was not possible to evaluate the legitimacy of access to care (Sundgren, 2001). Additionally, prioritizing the regulated measure of access to care has been easy in Finland as the intervals between appointments and the duration of treatment episodes have not been regulated.

Evaluating the impacts of public reporting is challenging due to numerous confounding factors in the environment. A study conducted in Australia indicated that following the implementation of public reporting, there was a slight increase in the mean waiting times for elective cancer surgeries (Prang, Canaway, Bismark, Dunt, Miller, & Kelaher, 2021). One possible explanation was that the number of cancer patients increased alongside the general population growth. Conversely, some argued that public reporting had no effect because there was a lack of public awareness regarding waiting time reporting, and the information content did not support users' decision-making processes. Additionally, it was noted that waiting times were already reasonable before the implementation of public reporting, suggesting that reporting did not incentivize any changes. A study from Canada

highlighted the difficulties in evaluating the effects of interventions, given that multiple issues can influence the outcomes being assessed (Vermeulen et al., 2014). However, we have to acknowledge that public reporting on waiting times or any other care-quality measure is not enough alone to manage and understand the quality of care in healthcare. There have been criticisms especially when composite measures (Friebel & Steventon, 2019) or simple symbols (Anhoj & Hellesoe, 2017) have been used to present the quality of care as their transparency is minimal.

Reports on the care guarantee in Finland indicated that, in the spring of 2013, the number of patients waiting more than six months for non-urgent dental care had decreased, while those waiting more than three months increased compared to the autumn of 2012 (Pelttari & Kaila, 2014, Chapter 3). The observed performance improvements possibly resulted from gaming the system or an observer effect. Questionnaires were utilized to collect this information. A report on the care guarantee in the spring of 2021 indicated that access to care had improved, and approximately 55% of patients waited less than three weeks to see a dentist for non-urgent care in the public sector, while about 10% experienced waiting times longer than three months (Mölläri et al., 2021). However, this finding may have been influenced by poor data coverage, although the situation had improved since 2020. Based on our manager survey results in 2021, around half of the oral healthcare managers indicated that waiting time information in the national waiting time reporting system did not accurately reflect their organizations. When the care guarantee system was implemented in 2005, its necessity was justified by fairness, equality, and cost savings (National Audit Office of Finland, 2008, Chapter 2). While the care guarantee system aimed to enhance care quality, we believe that public waiting time reporting was primarily intended to provide transparency. Although the information may lack rigor when reported for transparency purposes (Marshall, Shekelle, Brook, & Leatherman, 2000, 74), we contend that the quality of the waiting time information was insufficient for any purpose. A major reform of public health and social services was scheduled for 2023, which aimed to improve the availability and accessibility of public primary services (Kangas & Kallioma-Puha, 2022). It is essential to have timely trustworthy information to achieve these goals.

We argue that oral healthcare managers in Finland were concerned about the reputation of their organizations. Managers from large oral healthcare organizations desired the national waiting time reporting to be fair. They considered it more important than managers from small organizations to present realized waiting times in proportion to the population size or the number of patients served. The proportional share significantly differed when comparing large organizations with small ones if 20 patients had waited longer than 180 days for access to non-urgent care. Moreover, oral healthcare managers took the initiative to improve data recording practices during telephone triage after reviewing their organizations'

waiting time figures in the national reporting system. Some inaccuracies were so pronounced that even laypeople could identify them. We believe these concerns and the subsequent changes in practices were undertaken to mitigate reputational damage (Bevan, 2010). Previous literature suggests that the need to avoid reputational damages has been a significant driver for improving the quality of care by public reporting (Bevan, 2010; Bevan & Hamblin, 2009; Chen & Miraldo, 2022; Greene & Hall, 2012; Tang et al., 2017).

To improve the quality of care through public reporting, the information must be timely accessible to the right people for effective decision-making. This requires a public reporting channel that enables easy access to the information. In many countries, public reporting is implemented online to ensure widespread availability, e.g., (Aggarwal et al., 2022; De Rosis et al., 2020; Emmert et al., 2019; Prang, Canaway, Bismark, Dunt, Miller, & Kelaher, 2021; Timofeyev et al., 2023; Valapour et al., 2024), but for example, in China, posters and brochures were used to deliver information in primary care institutions (Tang et al., 2016, 2017). Similarly, we studied two public reporting systems that utilized the Internet as a reporting channel. Based on our citizen survey, many citizens reported they could access waiting time information provided online. They could access the Internet at home, rated their digital competencies as good on average, frequently searched the Internet for health information, and utilized health applications such as MyKanta. However, it is crucial to acknowledge that not everyone possesses the skills to use the Internet due to various reasons. According to WHO (2023), the number of individuals without such capabilities is expected to grow due to demographic changes.

Research by Bhandari et al. (2019) identified several reasons why customers rarely utilized public reporting. Many relied on informal information sources and might have been unaware of public reporting options. In our citizen survey, approximately 60% of respondents knew about public reporting, and around 40% had visited the relevant websites. In a study in Australia, only a small number of respondents were aware of public reporting in 2016 (Prang, Canaway, Bismark, Dunt, Miller, & Kelaher, 2018). There was also a lack of awareness regarding waiting time reporting in cancer care (Prang, Canaway, Bismark, Dunt, Miller, & Kelaher, 2021). In the Netherlands, half of the surveyed citizens were aware of public hospital information, and among those aware, three out of four knew where to find the information (De Groot et al., 2011).

Even among those aware of public reporting, it was not frequently used to aid decision-making. In our study, three of four citizen respondents indicated that they did not seek any information when choosing a dentist, as they booked appointments with dentists they had seen previously. If information was needed, it was usually obtained from family and friends or via the websites of public or private oral healthcare providers, while social media was rarely utilized. These findings align

with previous research on oral healthcare. Patients tend to be loyal, with only about one in six willing to change dentists unless circumstances, such as location or service rights, change (Lucarotti & Burke, 2015). Informal sources including family, friends, and other dentists are centric for choices regarding dental services (Chakraborty et al., 1993; Kim et al., 2012). Word of mouth has historically been a crucial source of information (Mangold et al., 1990) and continues to be relevant (Ungureanu & Mocean, 2015). Dental clinics' websites are also used (Clow et al., 2008; Kim et al., 2012). Their usage has remained relatively low compared to the number of these websites. Earlier literature indicates a diversity in the role of social media. Patients often rely on their own experiences, recommendations from others, and advice from general practitioners (De Groot et al., 2011). Although online sources have gained popularity, word-of-mouth information, and referrals from physicians are still the most common sources in hospital choices (Yahanda et al., 2016). However, users often find it challenging to search for and utilize comparative quality information across multiple websites (Chen & Miraldo, 2022). We can conclude that the information sources used for patient choices did not vary significantly within specialties.

The information provided in public reporting systems can include extensive details about the structures, processes, and outcomes in care (Cacace et al., 2019), but for instance, the Swedish website *vantetider.se* only reports waiting times (Rechel et al., 2016). In many high-income countries, waiting times for public hospital treatment are among the most frequently reported indicators of care quality (Rechel et al., 2016), although it is argued that outcome indicators should take precedence over structure or process indicators in public reporting (Berg et al., 2005). While waiting time is a process measure, it may be associated with costs, health outcomes, and patient satisfaction (Fielden et al., 2005; Reichert & Jacobs, 2018; Rönnerstrand & Oskarson, 2020). According to Donabedian (1988), generally structures promote processes, and processes promote outcomes. Waiting times are also among the most used performance measures in healthcare (Beks et al., 2023; Gartner & Lemaire, 2022; Viberg et al., 2013), and reasonable waiting times for non-urgent care and the ability to choose a provider are expectations from patients that need to be met (WHO, 2000, Chapter 2).

In our study, the citizen respondents identified the competence of a dentist and waiting time as the most important criteria when choosing a dentist for non-urgent care. The finding aligns with previous research in oral healthcare (Crane & Lynch, 1988; Kim et al., 2012; Lamprecht et al., 2020; Ungureanu & Mocean, 2015). When it comes to choosing surgical treatment, hospital characteristics have been prioritized over those of the surgeons (Yahanda et al., 2016). Among the hospital characteristics, hospital reputation and quality of care are deemed most critical. Non-clinical factors, aside from travel distance and waiting time, have not significantly

influenced patient choices. Regarding surgeons, surgeon reputation and competency are the most valued traits, followed by interpersonal skills, with waiting time being a significant non-clinical factor in patient decisions (De Groot et al., 2011; Yahanda et al., 2016). Interestingly, patients have preferred treatment at hospitals with longer waiting times (Aggarwal et al., 2022). They perceived such waiting times as indicative of better-performing hospitals that attract patients from outside the local area. Against this finding, citizen respondents in our survey reported that they could visit any dentist for non-urgent care if the waiting time is short. There is evidence that the traditional view, which sees patients as rational decision-makers, needs to be reassessed (Fischer et al., 2015). Additionally, decision-making may vary between real-life and experimental situations (Marang-van de Mheen et al., 2011). For instance, the significance of waiting time as a criterion can vary among study participants, depending on how they are asked about the criteria important to them in selecting a hospital. So far, it has appeared that the criteria for patient choice are consistent across healthcare areas.

We explored public reporting related to the information provided about waiting times. In our study of waiting times in primary care, we found no significant challenges arising from various definitions of waiting times compared to hospital care. The definition is generally consistent across all primary care services, referring specifically to the duration between the date obtained an appointment and the date a patient sees a healthcare professional (Martin et al., 2020). Although these definitions do not complicate comparisons in primary care, variations in measurement methods and statistics related to waiting time information create challenges for users in how reported waiting time information fits their decision-making purpose.

Different measures can be categorized as retrospective or prospective. In public reporting, waiting times are most often reported as completed waiting times, which reflect the realized waiting times experienced by patients who have already been treated (Lee et al., 2021). The national waiting time reporting system we explored reported realized retrospective waiting times. These retrospective waiting times are fit for monitoring waiting-time targets (Dixon & Siciliani, 2009). However, to manage current waiting times effectively, information on prospective waiting times is necessary. For patients, it is important to have performance indicators that accurately reflect their total waiting times to access care (Lee et al., 2021). The organizational waiting time reporting system we explored utilized prospective waiting times. For instance, the Swedish public waiting time reporting system provided information on prospective waiting times for appointments in primary care and elective surgery, allowing patients to choose their providers (Cacace et al., 2011, Chapter 8). This system also indicated whether referrals were under the care guarantee. In Denmark, waiting time information was reported for public and private

hospitals, detailing the maximum expected waiting time for a typical patient (Cacace et al., 2011, Chapter 3).

When presenting waiting times, various statistical key figures are used, including the mean, median, number of patients waiting, number of patients waiting per inhabitant, and the number of patients waiting within specific time intervals (Viberg et al., 2013). In public reporting, completed waiting times are usually presented as median waiting times in days, weeks, or months (Lee et al., 2021). The median is preferred over the mean to prevent outliers from skewing the results. In Finland, in the spring of 2021, the national waiting time reporting system displayed waiting time information by categorizing patients into six groups based on waiting times for non-urgent care. The categories were 0 days, 1–3 days, 4–21 days, 22–90 days, 91–180 days, and more than 180 days. These figures were also presented relative to every 10,000 inhabitants. The information was organized at four levels: area of regional state administrative agency, province, organization, and unit.

There has been discussion regarding the optimal level – hospital, unit, physician – at which to publicly report the information on care quality. Medical managers believe that using physician-level outcome data would be most effective in changing physicians' behavior and improving the overall system (Canaway et al., 2020). However, they also recognize the challenges associated with team-based care, treating high-risk patients, and the lack of robust and reliable data. In China, physicians indicated that public reporting on prescribing information at a physician level could be feasible, possibly due to the limited rewards and penalties for low- and high-prescribing physicians (Du et al., 2016). When care is provided by teams, unit-level measures are deemed appropriate (Schuur et al., 2013). It has also been noted that hospital-level ratings can be problematic, as the care quality in a specific department may vary significantly from that of the entire hospital (Rechel et al., 2016). The national waiting time reporting system we explored presented waiting times at the unit and organizational levels, which were useful for oral healthcare managers for benchmarking different oral healthcare organizations and units. These levels allowed national authorities to monitor access to care effectively. For national authorities, the levels of regional state administrative agencies and provinces fit the purpose of gaining a broader understanding of the situation. From a patient's perspective, waiting time information at the level of a dentist is crucial for making informed decisions about their care. The unit-level information is required to assess whether access to care complies with laws, as access to care can vary significantly between units in an oral healthcare organization.

The actionability of the explored systems varied depending on users' perspective. We believe actionability could have been improved with better design and implementation of these systems. The waiting time information would have been relevant for different users, and the accuracy of the information better. However, we

do not know if public waiting time reporting systems with higher-quality waiting time information could have reduced waiting times for non-urgent oral healthcare in Finland. So far, only in England, public waiting time reporting has reduced waiting times, primarily through the reputation mechanism (Bevan, 2010). Additionally, public reporting can be implemented for a public responsibility to ensure transparency regarding public services without the specific goal of reducing waiting times (Marshall, Shekelle, Brook, & Leatherman, 2000, 74).

In Finland, the decision to digitalize the monitoring of access to non-urgent care and to implement a national waiting time reporting system in public primary healthcare was made at the national level. Within oral healthcare organizations, there was no pressing need for a national system to report realized waiting times. Successful implementation of IS requires significant organizational changes (Blumberg et al., 2019). Technical validity (Schultz & Slevin, 1979) – meaning the development of a functional IS – is not enough. The system must be effectively utilized, and users must recognize it as a solution to a problem (Cooper & Zmud, 1990). This recognition necessitates concurrent organizational changes (Blumberg et al., 2019; Dwivedi et al., 2015; Scott et al., 2019). Dental professionals were not fully convinced about the benefits of the national system. Triage dental nurses did not receive adequate guidance to institutionalize the new practices, even though their data recording was critically important as the primary information source for the national waiting time data. Consequently, dental nurses' data recording in electronic patient ISs for national purposes was insufficient, leading to inaccuracies in the waiting time information in the system. Mason and Street (2006) discussed issues, such as incomplete data, miscoding, and variations in coding practices, which can result in incorrect inferences and dysfunctional consequences. We assume that speculations about bias in self-reported information were replaced after the digitalization of the monitoring system with the statements that data collected with electronic patient ISs can be biased, aligning with findings in the Swedish healthcare system (Ebbevi et al., 2021).

Earlier literature emphasizes that changes in healthcare are challenging as they require adjustments at multiple levels. To achieve better outcomes, the model of transformational performance improvement (Song & Tucker, 2016) was introduced. This model highlights the importance of establishing and communicating system-level goals, developing and using system-level performance measures, and creating organizational engines for implementing and sustaining improvements. It has been recommended that individual healthcare professionals are motivated in public reporting to prevent poor implementations, which could lead to invalid data, poor administrative decisions, and confusion among patients (Rousmaniere et al., 2020). Investing in organizational changes when implementing public reporting systems is crucial, as institutional cultures of healthcare providers have often resisted public

reporting (Canaway et al., 2017; Timofeyev et al., 2023). Healthcare providers have not adequately informed patients about, for example, the waiting-time guarantee (Rönnerstrand & Oskarson, 2020). Despite these findings from the literature, nearly all manager respondents in our study of public primary oral healthcare deemed it useful to provide citizens with publicly reported waiting time information. Although the managers recognized the importance of reporting, one-fifth responded that the publicly reported waiting time information was based solely on their personal experiences. In Denmark, the reported waiting time information was also based on approximations (Cacace et al., 2011, Chapter 3).

In Canada, the submission of patient-level data to the Canadian Organ Replacement Register was voluntary for individual hospitals and provincial organizations (Gill et al., 2019). The lack of data submission resulted in gaps in national reports on organ donation and transplant activities. In contrast, the transmission of data from electronic patient ISs to the national system in Finland was mandatory and automatic. Despite this, waiting time information in the national waiting time system was often inaccurate due to incorrect data recording practices. The information was of poor quality both in the voluntary and mandatory systems. There has been a push to increase the usage of electronic health records as input data in public reporting (Marshall et al., 2003). However, technical tools are not enough for higher accuracy of information without motivation and incentives to use these tools appropriately.

6.3 Theoretical Implications

Research on public reporting has often lacked theoretical frameworks (Tobler & Stummer, 2021). In Australia, a conceptual framework for developing public reporting was generated based on interviews with various healthcare stakeholders (Canaway et al., 2018). The framework considered the public reporting users, desired objectives, outcomes, and impacts, information needs, data collecting and reporting mechanisms, as well as barriers to utility. However, we did not utilize this framework in our research because we aimed to employ a conceptual framework based on the assumptions of a process model (Markus & Robey, 1988). This approach helps us to identify which factors are necessary for outcomes to occur, even though these factors alone may not be sufficient for the outcomes to take place. We believe this perspective fits within the context of IS in healthcare, where the consequences of IS often emerge unpredictably from complex social interactions and causality is seen as emergent (Markus & Robey, 1988). Additionally, we found the organizational imperative relevant when considering the diverse information needs that should be addressed in the design of public reporting systems. To explore actionability, we developed a conceptual framework that combined the Shannon–Weaver model

(1964) and Mason's levels of information output in communication systems (1978) into a straightforward process model tailored for our purposes.

In our research, we adopted a functionalist paradigm (Burrell & Morgan, 1979). We posited that public reporting systems can be deconstructed into smaller components that can be studied using objectivist research methodologies, such as surveys. Following Shannon's framework (Shannon & Weaver, 1964), we broke public reporting systems into five components: Recording Data, Information System, Channel for Receipt, Utilization, and Action. Specifically, Shannon categorized components as an information source, a transmitter, a channel, a receiver, and a destination. The information source generates messages intended for the receiver. The transmitter modifies messages for transmission across the channel, which serves as the medium for sending the signal to the receiver, who reconstructs the message from the signal. The destination is the intended target of the message.

When comparing our framework components with those outlined in the framework for developing public reporting systems (Canaway et al., 2018), we identified several similarities. Recording Data aligns with data collecting. Probably data collecting also included processing the data into the reported information form, which process we referred to with the component of IS. The Channel for Receipt corresponds to reporting mechanisms. Utilization refers to information needs and the public reporting users, while Action pertains to desired objectives, outcomes, and impacts of public reporting. Barriers to utility encompass other factors that affect whether the utilization of public reporting leads to intended actions. We conducted three surveys to collect data for analyzing these five components of public waiting time reporting systems. The dental nurse survey concentrated on the component of Recording Data, which was also addressed in the manager survey. The four other components – Information System, Channel for Receipt, Utilization, and Action – were included in both the manager and citizen surveys.

In our surveys, we utilized frameworks that we considered rigorous, as they have been widely applied in various contexts to study information systems. For the manager survey, we adapted the framework from the original IS success model of DeLone and McLean (1992) and the IS-impact measurement model of Gable et al. (2008). The former is among the most cited frameworks in the IS discipline (Lowry et al., 2007). The citizen survey drew from signaling theory (Spence, 1973) and agency theory (Eisenhardt, 1989; Ross, 1973). Signaling aims to reduce the information asymmetry between the signaler and the receiver, positively influencing the receiver to achieve the signaler's desired outcomes (Connelly et al., 2011). Thus, signaling serves as a form of communication where one system attempts to impact another using various signals. Our third survey targeted triage dental nurses because of their central role as information sources when recording data in electronic patient ISs, which data was processed into waiting time information in the national waiting

time reporting system. For this survey, we adapted the framework from the Unified Theory of Acceptance and Use of Technology, UTAUT (Venkatesh et al., 2003).

The survey results of various components were aggregated to explore the actionability of two public waiting time reporting systems. Our conceptual framework included not only the five components of the Shannon–Weaver model of communication (1964) but also modified Mason’s levels of information output in communication systems (1978). Public reporting systems serve as means of communication, where one system influences another through various signals. In the context of public reporting, the sender of care-quality information seeks to impact the receiver with the publicly reported information. When the receiver is a patient, the goal is to assist the patient in selecting high-quality healthcare providers (Cacace et al., 2011, xiii). Conversely, if the receiver is a healthcare provider, the aim is to encourage changes in practice to enhance the quality of care they deliver. Healthcare providers may also communicate quality indicators to payers. The information can also be directed toward a broader user group to promote transparency within the healthcare system. Public reporting systems also function as information systems, that collect, process, and deliver information to be accessible and useful to all who wish to use it (Buckingham, 1987). The quality of information processing and delivery is crucial for achieving the intended effects of public reporting. Successful communication requires that the information is received effectively, fits for use, and the information content meets the information needs of receivers of public reporting, fits for purpose. Our definition of actionable public reporting systems refers both to the characteristics of information systems that process information and the characteristics of communication systems, which try to have effects on information. We define an actionable public waiting time reporting system as a system that collects, processes, and delivers relevant and accurate information about waiting times to stakeholders for utilization in action-related decision-making to realize intended actions.

By incorporating Mason’s levels of information output in communication systems (1978) alongside our initial five components, we assessed that our conceptual framework is functional for rigorous analyses of the actionability of the two public waiting time reporting systems. Within the framework, we identified the four output levels and an actionability level. The four output levels include functional, technical, semantic, and utilization levels. The functional level output reflects the systematic processing of input data by ISs. The quality of this output relies on the algorithms used in information processing and the quality of the input data. These aspects, namely data quality and functionality, serve as attributes of system quality (DeLone & McLean, 2003), which is one dimension in the DeLone and McLean IS success model (1992). System quality as other dimensions of the IS success model has been derived from the Shannon–Weaver communication model

(1964) and Mason's levels of information output in communication systems (1978). It is important to note that we do not view data quality as solely a technical characteristic of a system. When manual data recording is necessary, the usability of a system influences the quality of recorded data. However, the individual inputting the data plays a significant role in the overall quality. For instance, communications between healthcare professionals and patients are often unstructured and may require structured recording in electronic patient ISs. Tuomi (1999) highlighted the importance of re-evaluating the hierarchy of data, information, knowledge, and wisdom, a perspective frequently discussed in information systems literature (Rowley, 2007). It is traditionally assumed that knowledge is derived from its raw components, but knowledge must also be reduced to a raw form in electronic patient ISs, allowing it to be transformed into meaningful knowledge later. We believe this transformation represents a challenge for healthcare professionals in their clinical practices.

With the semantic level output, we refer to the interpretation of the functional level output. According to Mason (1978), the semantic level output pertains to the number of units of meaning that a producing unit handles over a given period. Our definition was from the perspective of the receiver, and the semantic level output reflects how well the information fits the purpose of the decision-making process. In other words, it considers whether the information content meets the information needs of the receivers. The semantic level output can be equated with the dimension of information quality in the DeLone and McLean IS success model (1992). To measure the quality of information, for instance, the attribute of timeliness is used. Against this, Barbazza et al. (2021) consider timeliness rather a system quality than information quality, as fit for use refers to the accessibility of information at the right time. We see that information not accessed timely does not meet information requirements in decision-making due to the characteristics of the system that collects, processes, and delivers the information.

The data content at the functional level output and the information content at the semantic level output are equivalent. However, the semantic level output is presented in a form that receivers can understand and utilize. In public reporting, the receiver represents the user for that reporting. It has been argued that some attributes of information quality, such as understandability, are subjective (DeLone & McLean, 1992), but we believe that the quality of the information is relative to its context (Smith et al., 2018). That is why the information content in public reporting must be designed to meet the information needs of the targeted users of public reporting. It is important to note that information that is transparent to healthcare professionals may not be transparent to laypeople, and transparency is not a binary concept, it is always relative and can vary compared to earlier or later assessments (Berg et al., 2005).

According to Mason (1978), the influence level output refers to the results and ultimate value that the output of an information system impacts on a receiver. This influence can be measured both at an individual and a system level. We did not include the influence level output in our framework as we found it too broad. It encompasses the evaluation of the information, its application, and subsequent changes in recipient behavior and system performance. Instead, we focused on the utilization and actionability levels. With the utilization level output, we analyze whether users of public reporting can effectively use the reported information in decision-making regarding the intended actions of public reporting. For the information to be utilized, it must fit for use and purpose of users of public reporting. Thus, the utilization level combines the technological and semantic level outputs. We assert that the utilization of publicly reported information is not the goal, but it is to realize the intended actions that follow this utilization. The relationship between ISs' utilization and performance and behavior is crucial (Trice & Treacy, 1988). While utilization is necessary, it may not be sufficient to predict performance and behavior following the use of IS. Other factors also influence performance and behavior, which is why we chose to focus on both utilization and actionability levels instead of the influence level. For example, a patient may use public reporting to decide on a healthcare provider, but the actionability of public reporting requires that the patient chooses the healthcare provider and schedules an appointment with the provider. However, in many countries, patient choice is often restricted (Ciasullo et al., 2020).

Additionally, our definition of the technical level output differed from that of Mason (1978), who evaluated it from the perspective of the sender of signals, measuring it by the number of physical data units transmitted over time. In our framework, the technical level output is evaluated from the perspective of public reporting users. The technical level pertains to fitness for use and is measured by how well the channels used enable the receipt of signals. Therefore, merely sending signals is insufficient, and users must also have access to these signals. Users must be aware of public reporting and possess the digital competencies and technical means to access the information provided.

The original IS success model proposed by DeLone and McLean (1992) included six dimensions of the success of IS: system quality, information quality, use, user satisfaction, individual impact, and organizational impact. However, Gable et al. (2008) argued that only four dimensions – system quality, information quality, individual impact, and organizational impact – are necessary and sufficient for measuring IS impact. They excluded the dimensions of use and user satisfaction in their model, believing that these are antecedents and consequences of IS impact rather than dimensions of it. In the DeLone and McLean IS model, the dimension of system use is viewed as the most objective and easiest to quantify, at least

conceptually, whereas the impacts – both individual and organizational – are typically more difficult to define non-ambiguously. In our framework, we replaced the dimensions of use, user satisfaction, and individual impact, with the dimension of utilization. An information system is considered utilized when its output becomes part of the human information processing system of a decision-maker (Barkin & Dickson, 1977). We believe that utilization evaluates the quality of usage, assessing whether the information content of public reporting meets the information needs of its users. This perspective aligns with the concept of individual impact in the IS success model, which considers whether an information system enhances the user's understanding of the decision context (DeLone & McLean, 1992). The notion of use tends to lean towards a quantitative assessment and is often measured with frequency (DeLone & McLean, 1992). For example, measuring the absolute frequency of public reporting use, such as patient choices by the individual, would not be a rational measure, as the primary goal of public healthcare is not to increase patient visits and the frequency of patient choices.

Additionally, we did not include the dimension of organizational impact in our framework. Instead, we introduced actionability as a criterion for evaluating public reporting from the perspectives of various users of public reporting. If public reporting is deemed actionable by a specific user group, the ultimate objective of public reporting for improving care quality can be achieved. Although utilization is necessary for enhancing care quality, it is not sufficient. For instance, in the context of public waiting time reporting, the goal of improving care quality translates to reducing waiting times. If oral healthcare managers find the utilization of the reporting valuable, they have greater potential to manage existing waiting times. However, factors, such as insufficient resources, may hinder efforts to reduce waiting times, and by extension, to improve the quality of care. Consequently, analyzing the impact of public reporting on care quality can be challenging due to various confounding factors influencing the evaluated outcome.

In our analysis of the component of Recording Data, we employed the United Theory of Acceptance and Use of Technology (Venkatesh et al., 2003) as our framework. The UTAUT has been utilized to study the intention to use and acceptance of various technologies in healthcare among different user groups (Alqudah et al., 2021), although its application in analyzing the actual use of nursing information technology remains limited (Ovwasa, 2020). The UTAUT comprises constructs: performance expectancy, effort expectancy, social influence, facilitating conditions, behavioral intention, and user behavior. Since we focused on the actual usage of a system, we integrated the determinants of perceived effort, perceived performance, social influence, and facilitating conditions to predict the use of electronic patient ISs for different purposes. These determinants relate to both individual and organizational issues, but they do not consider broader environmental

or population-level contexts. While our model fit the data, the determinants predicted to a minor degree the usage. We propose that additional determinants are required regarding the environmental context, available resources, and individual beliefs about consequences.

The quality of information plays a fundamental role in public reporting. Public reporting is defined as quality-related information about identifiable healthcare organizations, which is based on systematically collected comparative data (Cacace et al., 2019, 332). Information quality refers to the quality of outputs from information systems (DeLone & McLean, 1992). The quality of this output is directly linked to the quality of input data, and poor data quality leads to poor-quality information (Redman, 1998). In our survey of triage dental nurses, we studied how they recorded in electronic patient ISs data which was processed into waiting time information provided through public reporting. The data recording defined the accuracy and completeness of the input data in the public reporting system. The input data further defined the accuracy of the waiting time information when the input data evolved during its life cycle (Liu & Chi, 2002). We found it crucial to evaluate the quality of the input data. For instance, Wixom and Todd used the concept of information interchangeably with the concept of data, but they considered accuracy and completeness important as antecedents to information quality (Wixom & Todd, 2005). Some studies have measured system quality through data quality (DeLone & McLean, 2003). However, in telephone triage, data recording cannot be deemed a technical feature of system quality. Triage dental nurses must interpret and understand patients' descriptions of their symptoms before they can accurately record data in electronic patient ISs. Tuomi (1999) highlighted the importance of reversing the traditional hierarchy of data, information, knowledge, and wisdom found in information systems literature (Rowley, 2007). The requirement for this reversal may explain why less experienced dental nurses recorded data less thoroughly than their more experienced counterparts.

Our conceptual framework proved effective. Recording data is critical for ensuring the accuracy of information output at the functional level. The algorithms of the system determine how the recorded data is processed into waiting time information for public reporting systems. The semantic level output assesses how well the information fulfills the needs of various users of public reporting. The utilization level output involves ensuring that the technical level output fits for use, while the semantic level output fits for the intended purpose. The utilization level output and other factors define whether the public reporting system achieves its intended action, and we define the system as an actionable public reporting system. This system collects, processes, and delivers relevant and accurate information on waiting times making it accessible timely to stakeholders for utilization in action-related decision-making to achieve intended actions. Our framework was a process

rather than a variance model (Markus & Robey, 1988). We believe that the consequences of a public reporting system emerge unpredictably from complex social interactions in healthcare. Additionally, the organizational imperative is essential so that the information content of public reporting meets the information needs of public reporting users.

6.4 Practical Implications

We identified three major practical problems in public waiting time reporting. First, the recording of data for public waiting time reporting through electronic patient ISs was limited. Second, the use of public reporting was minimal. Finally, environmental factors inhibited the realization of the intended actions behind public reporting. We propose solutions to these issues specifically for national actors in public healthcare, including politicians, authorities, and managers of healthcare organizations. This topic may also interest healthcare professionals involved in clinical work and citizens.

The collection of data for the national waiting time reporting system through electronic patient ISs was insufficient because triage dental nurses did not fully understand the importance of this data for the information needs of national authorities and other external users, such as other public primary oral healthcare organizations. The waiting time information provided in the national reporting system did not meet the decision-making needs of triage dental nurses. Instead, they required access to clinical patient histories within electronic patient ISs. Triage work was often complex and demanding, particularly for novice dental nurses or those who infrequently engaged in triage tasks. During triage, all nurses documented patients' symptoms for the dentists. However, dental nurses who frequently worked in triage were more likely to utilize clinical patient histories from electronic patient ISs to support their decision-making in assessing the need for treatment. They also recorded data in electronic patient ISs for national reporting purposes more consistently than their less experienced counterparts. Those who frequently performed triage tasks felt more confident in their desk- and patient-oriented skills compared to other nurses. This disparity could be due to differences in characteristics when they began their roles, the development of competencies while working in triage (Pettinari & Jessopp, 2001; Snell & Grimwood, 2022), or a combination of both.

In the short term, a straightforward yet not ideal solution for enhancing the quality of data input for the national waiting time reporting system and the accuracy of assessments would be to reorganize work shifts for telephone triage tasks in oral healthcare services. This organization should minimize the number of dental nurses who work infrequently on these tasks. While work rotation is necessary, it should

not happen too quickly, as employees' skills develop over time through practice. Additionally, it is important to consider the personal skills and attributes of employees as far as possible when assigning dental nurses to telephone triage roles.

Improving the quality of input data in electronic patient ISs can be achieved through technical changes and more efficient organizational processes when implementing new systems. Technical improvements should focus on minimizing manual data entry. National authorities have considered whether using a single automatically recorded timestamp rather than three separate timestamps for a triage contact could enhance the comprehensiveness of input data (Mölläri et al., 2021). When manual recording is necessary, the usability of the systems must be optimized to ensure that triage dental nurses can complete their tasks quickly with minimal stress and errors. During telephone triage, conversations with patients are often unstructured, making it challenging for nurses to record data in a structured form in electronic patient ISs while managing busy workloads. Structured information supports management needs, but filling out forms in a structured format typically requires more time, and structured formats can be cumbersome to read during clinical activities (Ash et al., 2004).

To successfully implement new ISs, it is crucial to accompany technical investments with necessary organizational changes. In public primary oral healthcare, organizational considerations were overlooked when the national waiting time reporting system was introduced. The system was implemented following a national mandate, but organizations lacked internal justification for the changes. Employees were trained in the new system and provided with some instructions, and there was some help and support for problems when needed. Their motivation to use it was low. They were not informed of the reasons for adopting the system or its importance, which would have been essential for accepting and using the system. As healthcare data is increasingly needed for purposes beyond clinical decision-making, we have to take care that healthcare professionals on clinical tasks understand the importance of recording data for these purposes. Failure to ensure that healthcare professionals understand the importance of accurate recording can lead to poor decision-making based on incomplete information. In our study, national authorities utilized inaccurate information, resulting in an unreliable understanding of access to care. Consequently, decisions regarding access to non-urgent oral care were flawed.

Another issue with public waiting time reporting was the low utilization among oral healthcare managers, patients, and citizens. The low utilization might stem from users being unaware of the public reporting system, facing barriers to use public reporting, or finding that the information content of public reporting did not meet their needs. Awareness of public reporting can be improved through online and offline means (Drèze & Zufryden, 2004). Online strategies could include promoting public reporting on websites, linking from other websites, or utilizing search engines.

Offline methods could involve advertising in printed media or television. While most citizens can navigate the Internet to seek health information, we must ensure that those unable to use it can still access reported information through alternative methods.

Furthermore, the information provided by public reporting must align with users' needs. The national waiting time reporting system processes and delivers information on retrospective waiting times, while managers require prospective waiting time information to manage current waiting times in their organizations. Thus, the information in the national system did not meet their information needs. The input data in the system could have been processed to provide timely retrospective and prospective waiting time information if appropriate algorithms were applied. A valuable approach would be to publicly report retrospective and prospective waiting times of all public primary oral healthcare organizations on one website. In 2021, managing data across multiple systems, including the national system and the systems of each public primary oral healthcare organization, was not economically viable.

The third practical issue related to public waiting time reporting involves environmental factors that hinder the realization of the intended actions of public reporting, such as supporting patient choice in utilizing public sector services. In many European countries, patient choice options are limited, as seen in Finland, where patients have few choices (Ciasullo et al., 2020). Interestingly, despite the strong consumer culture in the US, patients have not utilized publicly reported information in healthcare as consumers (Bevan, 2010). However, the notion that enhancing patient choice might improve the patient experience of health services, and increase patients' participation in care (Bevan, 2010) is quite compelling. Engaging in activities to seek care and carry it out is positively associated with better health outcomes (Donabedian, 1988). Improved health outcomes, which refer to the better health status of patients and populations, as well as advancements in patients' knowledge and health behaviors, are ultimately the primary goals of healthcare.

When planning to implement public reporting systems, we must determine the purpose of public reporting. We should consider whether the goal is to increase the transparency of public healthcare services or whether we want public reporting to have instrumental value with practical benefits. There is speculation that governments may have introduced public reporting more for political reasons than for improving care quality (Greenhalgh et al., 2017). For public reporting to have instrumental value, it must lead to behavior and performance outcomes that align with its intended use, while also recognizing the potential environmental factors that could inhibit these outcomes. After establishing the intended purpose of public reporting, the emphasis should shift to the content of the reported information. Different user groups have varying information needs and require specific

information to aid their decision-making. When public reporting is tied to regulating and monitoring healthcare performance, such as access to non-urgent care, it is crucial to be cautious when selecting regulated measures for reporting so that they do not induce observer effects (Rana et al., 2019). We do not want to unintentionally influence clinical behavior to prioritize the regulated measure at the expense of other significant, non-regulated goals. For instance, in Finnish public primary oral healthcare, there has been a tendency to prioritize the regulated measure of access to care by extending the non-regulated intervals between appointments and the duration of treatment episodes.

6.5 Limitations of the Study

The study explored public reporting on waiting times in public primary oral healthcare in Finland in 2021. We focused on waiting times as the information content in public reporting, even though the care-quality information used in public reporting can encompass the structures, processes, and outcomes in healthcare (Cacace et al., 2019). This limitation to waiting times was made for practical reasons, as public reporting of waiting times was mandatory for public primary healthcare in Finland in 2021, ensuring that information on the issue was accessible. Additionally, waiting times are of significant interest. They have been used in rationing in Finnish public healthcare, and policies have been implemented to establish maximum waiting times. A major reform of public health and social services was scheduled for 2023, aiming to improve the availability and accessibility of public primary services (Kangas & Kallioma-Puha, 2022). Waiting times are regarded as a key indicator of the accessibility of health services (Lee et al., 2021). Our study focused on public primary care, where research on the effectiveness of public reporting is limited (Campanella et al., 2016). Within this context, we chose to study oral healthcare, as the specialty was familiar to the researcher, thereby acknowledging and mitigating the risk of researcher bias (Buetow & Zawaly, 2022). Since the study was quantitative, the likelihood of significant researcher bias was low. We collected data using questionnaire items that had been previously employed in similar studies, including items that did not necessarily support our assumptions, and the analysis was conducted with a focus on statistical objectivity.

Initially, we intended to conduct census studies involving oral healthcare managers and triage dental nurses. However, 22% of the 135 primary oral healthcare organizers were unable to permit us to survey their organizations. Consequently, census studies were not possible, and we resorted to convenience sampling being the least employable method for the oral healthcare organizations taking part and for the researcher. This sampling method typically yields poor external validity and the results may not be generalizable (Price et al., 2004). We assume that the non-

coverage error in the surveys of managers and nurses was minimal and that those interested in participating were aware of the survey. Links to the questionnaires were sent to the contact persons in the participating oral healthcare organizations, who then distributed the survey links to the relevant professionals of their organizations via intra-organizational email. The response rate for the manager survey was 62%, while the response rate for the triage dental nurse survey was 32%. In the field of information systems, response rates for questionnaires have been deemed sufficiently rigorous, typically ranging from 17% to 50% (Lund, 2023). It is important to note that those who did not respond to the survey may differ in some way from those who participated. We were unable to analyze the differences between respondents and nonrespondents. Although we would have used probability sampling, the possibility to generalize the study results to other environments is restricted. The healthcare systems and social and cultural aspects differ remarkably by country. However, we consider the external validity of our survey on oral healthcare managers to be good, while the validity of the survey on triage dental nurses is deemed sufficient.

In the citizen survey, we utilized convenience sampling for different reasons. Probability sampling would have required a complete sampling frame, which is a list of all members of the study population along with their contact information (Omair, 2014). We deemed this too resource-intensive, so instead, we opted for a low-cost questionnaire on a website, despite the high risk of non-coverage and self-selection biases this method entails. By using an electronic questionnaire, we acknowledged that not all citizens had an equal opportunity to participate, negatively impacting the coverage. Participants likely had a heightened interest in healthcare policies since electronic newsletters about the survey highlighted an upcoming reform of public health and social services. We believe that respondents' digital competencies and access to the Internet influenced the coverage, and the issue, that the survey was conducted only in Finnish and within one Finnish county. Informing a broader group across multiple counties seemed unfeasible, as raising awareness within one county proved challenging. Because the citizen survey employed an open invitation posted on a website, the nonresponse rate remains unknown. However, the effects of limited coverage on the use of public waiting time reporting are not substantial, as other factors, such as patient choice possibilities, significantly influence the actionability of the organizational waiting time reporting system from the perspectives of patients.

One potential weakness of our research is that we did not survey national authorities, even though our analysis explored the actionability of the national waiting time reporting system from their perspectives. Our analyses were informed by literature regarding information requirements necessary to monitor maximum waiting time targets. We believe this method was sufficiently rigorous for this explorative research.

Our research was cross-sectional, preventing us from establishing causality between the phenomena studied. Given the limited knowledge regarding the effectiveness of public reporting, we think that a cross-sectional design was the most appropriate choice for our study. The results from the study provide preliminary evidence (Wang & Cheng, 2020) of public waiting time reporting in Finnish public primary oral healthcare. Through our research, we could describe the perceptions of oral healthcare managers and patients regarding public waiting time reporting and analyze the relationship between triage dental nurses' data entry in electronic patient ISs and the quality of waiting time information in public reporting systems. The analyses were feasible in our cross-sectional study because we utilized concrete and externally oriented constructs rooted in theory, and our respondents were well-educated (Rindfleisch et al., 2008). Nevertheless, we acknowledge that the emergent perspective of IS (Markus & Robey, 1988) in healthcare complicates the establishment of causality, even in longitudinal studies.

We acknowledge that our surveys have several validity challenges, similar to most surveys that often face challenges with face validity, content validity, construct validity, and criterion validity (Taherdoost, 2016). In our survey, the challenges with face validity are considered minor since we pre-tested the questionnaires on small groups of participants to ensure their clarity. However, we believe there were more significant issues related to the other three types of validity. We did not assess content and construct validity. Instead, our questionnaires mainly included items derived from similar English questionnaires, which were then translated into Finnish. This translation may have introduced unintended changes. In some cases, we chose not to include all items from the original English questionnaires, as we believed that shorter questionnaires would yield higher response rates compared to longer ones. Additionally, we could not determine whether the original questionnaires were valid in different contexts or encompassed all relevant factors we were studying. Our surveys also incorporated self-assessed measures that carry a risk of response bias (Rosenman et al., 2011). Respondents may wish to present themselves in a favorable light, even in anonymous surveys. For instance, citizen respondents perhaps overestimated their digital competencies. Moreover, the validity of reported usage of electronic patient ISs for telephone triage tasks could have been more robust if actual usage had been measured through logs rather than with nurses' self-assessments.

We have discussed the limitations of our surveys, but we also conducted a literature review on waiting times in healthcare. In the review, we utilized only one database. Although we chose Scopus, a multi-scientific database, the review would have been more comprehensive if we had included additional databases, such as Web of Science and JSTOR, in our search for relevant articles. More biomedical databases, like Cochrane or Medline, might contain numerous studies addressing the

associations between waiting times and clinical outcomes. During our search, we used the keywords “waiting time” and “waiting lists”, which may not have been the most effective choice. Specifically, we chose the singular form “waiting time”, and the MeSH keywords include only the plural form “waiting lists”. If we had also considered other variations of the term, such as “waiting times”, “wait time”, and “wait times”, our search could have yielded a greater number of studies. Nevertheless, we believe that the choice of database and keywords did not significantly alter the variety of articles retrieved and reviewed.

Lastly, we do not view using a quantitative approach in our research as a limitation. Generally, employing a qualitative research approach enhances our understanding of a phenomenon with limited existing knowledge. We argue that our familiarity with the studied oral healthcare context rendered it unnecessary to observe oral healthcare activities or to interview personnel for a deeper understanding. Additionally, we focused on public waiting time reporting and the lengths of waiting times, and their measures are objective mathematical figures.

6.6 Implications for Further Research

We recommend further research on three key phenomena related to public reporting in healthcare. First, public reporting should be described and analyzed across all areas of public healthcare in Finland. Second, it should be studied whether participatory system design and co-creation could lead to more actionable public reporting systems. Third, the conceptual framework we developed to explore the actionability of public waiting time reporting should be studied and refined from a theoretical perspective.

Our analysis of public waiting time reporting in public primary oral healthcare revealed that the impacts of public reporting were minimal. The impacts were found to be more significant on the activities of public primary oral healthcare organizations than on patient choices. A major issue identified was the low quality of the waiting time information within the public reporting systems. Public reporting needs to be examined in other areas of public primary healthcare, such as physician practices, as there is limited research and knowledge regarding public reporting on these practices. Public reporting has not been mandatory for private services in many European countries, and physician practices have predominantly been private (Cacace et al., 2019). Although interest in public reporting has increased in Europe, evaluations of its effectiveness in primary care remain scarce (Campanella et al., 2016). Research should address questions related to information sources and data collection for public reporting, the information content of public reporting, the impacts of reporting, and how public reporting can enhance the quality of care. Since primary oral healthcare is a part of primary care, changes in public reporting within

this domain could be analyzed over time, especially in comparison to the data collected in 2021 for this study.

Second, we propose studying whether participatory system design and co-creation can lead to more actionable public reporting systems. Our study showed significant challenges in implementing public reporting systems within oral healthcare organizations. Decisions regarding public waiting time reporting were made at the national level, leading to a lack of internal justifications for these implementations at the organizational level. This gap resulted in low-quality input data in electronic patient ISs and inaccurate waiting time information in public reporting. The algorithms used processed from the input data retrospective waiting time information. The input data could have been adapted to provide timely prospective and retrospective waiting time information to meet the needs of national authorities, oral healthcare managers, patients, and citizens. Addressing information quality challenges may be possible if participatory system design and co-creation were used.

To explore the actionability of public waiting time reporting, we created a conceptual framework based on the Shannon–Weaver model of communication (1964) and Mason’s levels of information output in communication systems (1978). Given the scarcity of existing frameworks for analyzing public reporting, our framework may inspire further studies aimed at developing methodologies to analyze the actionability of public reporting systems across various healthcare contexts, focusing on multiple information contents beyond just waiting times from the perspectives of different user groups. Whether the information content of public reporting is structures, processes, or outcomes in healthcare, evidence of the impacts of public reporting on patient behavior or healthcare improvement processes is essential to inform policies, as the evidence has been scarce (Metcalf et al., 2018). This should be remembered especially since estimates suggest that up to 30% of healthcare budgets may be allocated for various information management purposes (Health Information and Quality Authority, 2013, Chapter 1).

6.7 Conclusions

The study explored the actionability of two public waiting time reporting systems in Finland’s public primary oral healthcare. Public reporting is a strategy to improve care quality by providing information about healthcare providers’ performance to various stakeholders (James, 2012). We defined an actionable public waiting time reporting system as a system that collects, processes, and delivers relevant and accurate information about waiting times to stakeholders for utilization in action-related decision-making to realize intended actions.

Research and frameworks related to public reporting were limited in 2021 when we collected data for this study. As a result, we developed a conceptual framework based on the Shannon–Weaver model of communication (1964) and Mason’s levels of information output in communication systems (1978). We applied the assumptions of a process model in our framework to identify the necessary factors for the actionability of a public reporting system. However, these factors may not be sufficient to achieve actionability. Our conceptual framework was effective in exploring the actionability of public waiting time reporting in public primary oral healthcare, though further research is needed to determine its applicability with diverse information contents and in other healthcare areas.

The actionability of the studied public waiting time reporting systems from the perspectives of different user groups varied significantly. Unfortunately, the systems did not effectively fulfill their objectives of public reporting. High-quality information output is critical for the actionability of the systems, but the waiting time information provided by both systems was of low quality. Insufficiently recorded input data did not evolve into accurate waiting time information. Data recording practices for public reporting were not adequately institutionalized. Neither were the algorithms designed to effectively process relevant information to meet the information needs of different user groups of public reporting. One well-designed functional public waiting time reporting system can potentially suffice. While developing a functional system is necessary, it is not enough. Users must recognize that the system addresses a specific problem, and the system must be properly utilized. Successful public reporting systems require collaborative efforts from all stakeholders. Changing the behaviors of various stakeholders is crucial, as it may involve a shift in the resistant institutional cultures within healthcare organizations.

Although public reporting can support decision-making, other factors may hinder the realization of its intended actions. Characteristics of the healthcare system can be such factors. For example, if patients are unable to choose their healthcare provider, public reporting via the selection mechanism (Berwick et al., 2003) cannot function. Improving the quality of healthcare through selection and change mechanisms depends on organizations’ motivation to maintain or increase their market share (Berwick et al., 2003). In Finland, discussions about market shares in public healthcare have been limited, as the entitlement to public services has been on an individual’s municipality of residence. Among the three mechanisms associated with public reporting, only the reputation mechanism (Hibbard et al., 2005) has the potential to enhance the quality of care in this healthcare system, as healthcare providers are inclined to improve the quality of care to protect or promote their public image. It is essential to remember that public reporting can also aim to provide transparency in public services without a clear strategy for improving the quality of care (Marshall, Shekelle, Brook, & Leatherman, 2000, 74). In such cases,

the information generated may be less rigorous, as the goal is not to enhance the quality of care.

The results of this study aligned with previous evaluations of public reporting. While public reporting has contributed somewhat to improving care quality within healthcare organizations, its impact on patients' ability to select healthcare providers has been limited. The actionability of public reporting has been constrained, as the information content has not met users' needs, and the healthcare system has not enhanced patient choice. Both in Finland and other countries, public reporting has often been implemented mainly to ensure public accountability, offering transparency regarding public services but delivering poor-quality information with limited possibilities to improve care quality.

Ultimately, it is important to determine whether public reporting can genuinely improve the quality of care or if it merely increases the transparency of public services. Public reporting in healthcare began in the 1860s when Florence Nightingale started to collect, analyze, and deliver comparative data on hospital treatment outcomes to improve hospital care (Smith, 2005, 2018). Since then, the world has changed, and we believe it is worth exploring whether fostering patients' choice activities in seeking care may promote their satisfaction with care, health behavior, and health status. Realistic discussions of patient choice could leverage public reporting to influence through change and selection mechanisms, alongside the reputation mechanism. Public reporting would be essential for improving the quality of care, acknowledging that processing and delivering high-quality information is necessary for actionability, but it is not enough without realized actions.

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Appendices

APPENDIX 1. Articles and reviews of the literature review on public reporting in healthcare.

C*	Reference	Studies in	Theme
1	Bevan (2010)	Great Britain, the US	Impacts of performance measurement systems associated with reputational damage
1	Bevan et al. (2019)	Italy, the UK, Zambia	Motivation to improve healthcare performance associated with reputation
1	Canaway et al. (2017)	Australia	Identifying more weaknesses and barriers to public reporting than strengths
1	Canaway et al. (2018)	Australia	Involvement of all relevant stakeholders to design of public reporting frameworks
1	Chen et al. (2022)	China, Japan, the US	Impacts of hospital price and quality transparency on prices of healthcare procedures, payments of consumers, and premiums of health insurance plans
1	Garnick et al. (2017)	The US	Incentives to improvements and factors beyond the control of an agency
1	Hamblin (2008)	The UK, the US	Impacts of public reporting on providers' initiatives and consumer choice
1	Prang et al. ** (2021)	Australia, Canada, China, Germany, India, Italy, Japan, Korea, Taiwan, the Netherlands, the UK, the US	Impacts of public reporting on informed consumer choice, quality improvement activities, and clinical outcomes
1	Rousmaniere et al. (2020)	The US	Recommendations to psychologists to adjust to the requirements of public reporting
1	Song & Tucker (2016)	The US	Comprehensive system-level approach to transformational performance improvement for successful changes in complex healthcare organizations
1	Timofeyev et al. (2023)	Russia	Impacts of availability and accessibility of information about medical services to the general population
1	Veillard et al. (2013)	Belgium, Estonia, France, Germany, Hungary, Poland, Slovakia, Slovenia	Performance measurement and quality improvement initiatives without public reporting in an international project of hospitals
2	Berg et al. (2005)	The Netherlands	Development and implementation of the first national, public, and obligatory set of hospital performance indicators for public reporting

2	de Cordova et al. (2019)	The US	Public reporting on inadequate registered nurse staffing in acute care hospitals
2	De Rosis et al. (2020)	Italy	Analyses of waiting time information for outpatient visits and digital services on institutional websites of public healthcare organizations
2	Friebel & Steventon (2019)	The UK, the US	Transparency of composite measures for healthcare providers and patients
2	Kast et al. (2023)	The UK, the US	Web-based public reporting on long-term care facilities
2	Lee et al. (2021)	Australia, Canada, New Zealand, the UK	Public reporting on waiting time, waiting list, and key performance indicator in 15 English-speaking international jurisdictions
2	Mason & Street (2006)	England, Scotland, the US	Potential beneficial and harmful effects of publishing hospital outcome data
2	Rechel et al. (2016)	Australia, Canada, England, France, Germany, New Zealand, Norway, Sweden, Switzerland, the Netherlands, the US	Public reporting on waiting times, patient experience, and aggregate measures of quality and safety in 11 high-income countries
2	Romanelli et al. (2019)	The US	Request to develop meaningful procedure-specific quality metrics for surgical operations
2	Wang et al. (2019)	The US	Request to have specific outcome measures for public reporting on mitral valve disease
3.1	Bevan & Hamblin (2009)	The UK	Performance improvement associated with reputational damage with concerns about gaming
3.1	Friedberg et al. (2009)	The US	Association of publicly reporting hospital scores on antibiotic timing in pneumonia and unintended adverse consequences for patients
3.1	Greene & Hall (2012)	Australia	Comparability of performance at emergency departments by reported waiting time data
3.1	Pines et al. (2012)	The US	Predictors for benchmarking and public reporting on performance at emergency departments
3.1	Schuur et al. (2013)	The US	New evidence-based measures to report care quality and resource usage
3.1	Vermeulen et al. (2014)	Canada	Challenges of several concurrent issues on analyzing the effects of an intervention in healthcare
3.2	Aggarwal et al. (2021)	England, Wales	Plans for public reporting on radiotherapy treatment of prostate cancer
3.2	Aggarwal et al. (2022)	England	Governmental plans to reduce waiting times by patient choice in complex cancer care
3.2	Boyle et al. (2023)	England	A national performance indicator for public reporting on the care quality associated with systemic anticancer therapy treatment at hospital-level
3.2	Greenberg et al. (2005)	Canada	Development of scientifically sound and managerially useful system-level cancer care performance indicators for public reporting

3.2	Prang et al. *** (2021)	Australia	Impacts of time-based targets and public reporting on surgical waiting times
3.3	Adler et al. (2021)	The US	Development of targets for improving the care quality continuum from dialysis to kidney transplant
3.3	Gill et al. (2019)	Canada	Role of a national system for the quality of public reporting in provinces
3.3	Horslen et al. (2022)	The US	Annual data report on intestine transplantation
3.3	Kandaswamy et al. (2024)	The US	Annual data report on pancreas transplantation
3.3	Rana et al. (2019)	The US	Observer effects in reporting on liver transplantation
3.3	Schold et al. (2017)	The US	Performance criteria for reaching clinical goals without disincentives for clinical practices
3.3	Stith & Hirth (2016)	The US	Impacts of public reporting alone or with regulatory enforcement on the quality of healthcare
3.3	Valapour et al. (2024)	The US	Annual data report on lung transplantation
4	Canaway et al. (2020)	Australia	Perceptions of medical managers of public reporting on physician-level data
4	Du et al. (2016)	China	Perceptions of general practitioners of institution- and individual-level data reporting
4	Emmert et al. (2014)	Germany	Exploration of concerns of patients on physician rating websites
4	Emmert et al. (2017)	Germany	Physicians' responses to patient ratings on physician rating websites
4	Ikkersheim & Koolman (2013)	The Netherlands	Public reporting on clinical outcomes associated with general practitioners' usage of public reporting for hospital referrals
4	Lagu et al. (2013)	England	Government-run initiative enabling patients to provide narrative feedback about hospital care on the Internet
4	Prang et al. **** (2018)	Australia	General practitioners' usage of public reporting for hospital referrals
4	Tang et al. (2016)	China	Effects of public reporting on prescribing for bronchitis, gastritis, and hypertension in primary care settings
4	Tang et al. (2017)	China	Effects of public reporting on prescribing for upper respiratory tract infections in primary care settings
5	Aggarwal et al. (2023)	England	Associations between travel time, hospital quality measures, and patient characteristics with the location of a hospital in choosing a hospital for cancer surgery
5	Ciasullo et al. (2020)	Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary,	Patient satisfaction with health services in different European healthcare systems with various degrees of freedom of choice

		Iceland, Ireland, Italy, Luxembourg, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, the Netherlands, the UK	
5	De Groot et al. (2011)	The Netherlands	Characteristics of publicly reported information associated with utilization of public reporting in a choice of a hospital
5	Emmert et al. (2019)	Germany	Impacts of complexity and tailoring of hospital report cards on consumers' hospital choice
5	Fischer et al. (2015)	Not mentioned	Possibility of increasing knowledge on patient decision-making strategies in hospital choice using psychology and cognitive science
5	Kelagher et al. (2019)	The US	Impacts of public reporting on consumer selection and switching of health plans
5	Marang-van de Mheen et al. (2011)	The Netherlands	Surgery-specific and quality-of-care information rather than general hospital information for patients' hospital choices
5	Prang et al. *** (2018)	Australia	Patients' usage of public reporting for choosing a hospital for their elective surgery
5	Tobler & Stummer (2021)	Switzerland	Association between patient satisfaction and several provider-level contextual factors in inpatient care
5	Yahanda et al. (2016)	The Netherlands, the UK, the US, 11 other Western countries	Patient choice of a surgeon/surgical treatment

* Class 1= Impacts of Public Reporting, Public Reporting Mechanisms, and Factors Enabling Impacts; Class 2= Information Content; Class 3.1= Usage within Specialties/ Emergency Care; Class 3.2= Usage within Specialties/ Cancer Care; Class 3.3= Usage within Specialties/ Solid Organ Transplantation; Class 4= Physicians as Users; Class 5= Patients as Users

**Prang, Maritz, Sabanovic, Dunt, & Kelagher

***Prang, Canaway, Bismark, Dunt, Miller, & Kelagher

****Prang, Canaway, Bismark, Dunt, & Kelagher

APPENDIX 2. The questionnaire of the oral healthcare manager survey.

I have understood the information I have received about the study and I want to participate in the study.

Yes

1. Degree

Licentiate of Dentistry

Specialist Degree in Dentistry

Other, what

2. I have worked in management positions in oral healthcare

less than 12 months.

1–5 years.

6–10 years.

more than 10 years.

3. The population base of the health center I manage

Less than 10,001

10,001–20,000

20,001–30,000

30,001–70,000

More than 70,000

The National Institute for Health and Welfare gathers waiting time data from public oral healthcare for monitoring purposes and publishes this retrospective waiting time information on its website.

Information on realized waiting times of individual visits to oral healthcare is published, for example, on the page https://sampo.thl.fi/pivot/prod/fi/avo/hpaasysth01/summary_sthrapo2.

In my opinion, the website of the National Institute for Health and Welfare publishing oral healthcare information is

4. easy to access.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

5. Its response times are short.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

In my opinion, the oral healthcare waiting time information on the website of the National Institute for Health and Welfare is

6. timely.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

7. easy to understand.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

8. accurate.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

9. In my opinion, the website of the National Institute for Health and Welfare publishing oral healthcare waiting time information is visually clear.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

10. In my opinion, the oral healthcare waiting time information on the website of the National Institute for Health and Welfare enables comparisons.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

11. In my opinion, the website of the National Institute for Health and Welfare publishing oral healthcare waiting time information is easy to use.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

12. The National Institute for Health and Welfare website that publishes oral healthcare waiting time information has been useful to me in decision-making to manage my organization.

Not at all

Slightly

Moderately

Very

Extremely

13. The National Institute for Health and Welfare website that publishes oral healthcare waiting time information has made it easier for me to self-monitor access to non-urgent care at my organization.

Not at all

Slightly

Moderately

Very

Extremely

14. The National Institute for Health and Welfare website that publishes oral healthcare waiting time information has led me to evaluate data entry in our organization when the need for treatment is assessed.

Not at all

Slightly

Moderately

Very

Extremely

15. The National Institute for Health and Welfare website that publishes oral healthcare waiting time information has made it easier for me to compare access to non-urgent care in my organization with other organizations.

Not at all

Slightly

Moderately

Very

Extremely

16. The waiting time information published on the website of the Finnish Institute for Health and Welfare is accurate for the organization I manage.

Yes

No

17. The orientation for dental nurses to use the patient information system when assessing the need for treatment has been increased in our organization in recent years.

Not at all

Slightly

Moderately

Very

Extremely

18. Our oral healthcare organization has invested in documentation instructions to be used when assessing the need for treatment in recent years.

Not at all

Slightly

Moderately

Very

Extremely

19. Helpdesk activities to support dental nurses in using the patient information system when assessing the need for treatment has been developed in recent years.

Not at all

Slightly

Moderately

Very

Extremely

20. In recent years, our oral healthcare organization's managers have supported dental nurses who work on assessing the need for treatment more than before.

Not at all

Slightly

Moderately

Very

Extremely

21. We have made efforts to speed up access to care by developing processes. The development work has started because, based on the waiting time information on the National Institute for Health and Welfare website, the realized waiting time for oral healthcare at our health center has been longer than in other health centers.

Yes

No

22. We have made efforts to speed up access to care by increasing staff resources. The additional resources have been justified by the fact that, based on the waiting time information on the National Institute for Health and Welfare website, the realized waiting time for oral healthcare at our health center has been longer than in other health centers.

Yes

No

23. The National Institute for Health and Welfare website should use simple symbols to present the information on whether access to oral healthcare is provided by law.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

The information on realized waiting time for non-urgent oral healthcare on the National Institute for Health and Welfare website should also be presented in proportion to

24. the population of health centers.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

25. the number of oral healthcare clients at health centers.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

Waiting for treatment means that an assessment of the need for treatment has been made and an appointment has been given.

The National Institute for Health and Welfare website should present information by health center on

26. how many people are waiting for non-urgent oral healthcare on the last day of the month.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

27. what the mean waiting time for non-urgent oral healthcare is on the last day of the month.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

28. what the median waiting time for non-urgent oral healthcare is on the last day of the month.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

We are also conducting an electronic survey for asking citizens whether they know that information on waiting times for appointments with dentists at health centers is published on the Internet. The survey will be carried out in Southwest Finland in spring 2021.

29. What percentage of the citizen survey respondents know about waiting time signaling on the websites? My estimate is:

30. What percentage of the citizen survey respondents consider waiting time signaling as useful? My estimate is:

31. In my opinion, signaling waiting times for dental care on the websites is useful for citizens.

Yes

No

32. Should we signal on the websites on the average durations of the different dental treatment episodes we provide in our organization?

Yes

No

33. How is the information on waiting times for accessing non-urgent dental care processed to be signaled on the website of your organization?

Calculated automatically with the electronic patient information system

Calculated manually using T1, the first available non-on-call dentist appointment time

Calculated manually using T3, the third next available non-on-call dentist appointment time

Estimated by speculation

I don't know how the information is processed

34. The electronic patient information system should automatically process the necessary information on waiting times for access to non-urgent dental care.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

35. Is there anything else you would like to say about waiting time information in oral healthcare?

APPENDIX 3. The questionnaire of the citizen survey.

I have understood the information I have received about the study, and I want to participate in the study.

Yes

1. Prioritize the following six criteria in the choice of a dentist for non-urgent care. Mark the main criterion with the number 1, the second most important with the number 2, etc. (Criteria in alphabetical order in Finnish)

Client fee

Competence of a dentist

Interaction skills

Waiting time

Opening hours

Location

2. In my opinion, short waiting times for non-urgent care are important when choosing a dentist.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

3. When choosing a dentist, I screen information from my relatives, acquaintances, or friends.

Never

Rarely

Sometimes

Often

Almost always

social media.

Never

Rarely

Sometimes

Often

Almost always

public service providers' websites.

Never

Rarely

Sometimes

Often

Almost always

private service providers' websites.

Never

Rarely

Sometimes

Often

Almost always

4. I don't screen any information from anywhere when choosing a dentist, as I book an appointment with the dentist whom I have earlier visited.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

5. I can visit any dentist for non-urgent care if the waiting time is short.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

6. I go to the dentist

regularly for check-ups and if necessary due to symptoms in the mouth area.

irregularly for check-ups and if necessary due to symptoms in the mouth area.

only when I suffer from a toothache or other symptoms in the mouth area.

7. I use

only public oral healthcare services.

mostly public oral healthcare services, but also private services.

occasionally both public and private oral healthcare services.

mostly private oral healthcare services, but also public services.

only private oral healthcare services.

The care guarantee refers to the period defined in the Healthcare Act during which a patient must be admitted to a health centre for non-urgent care or examination of e.g. a dentist. By law, this waiting time information must be published on the websites of health centres.

8. I know that this information is reported on the websites of public service providers.

Yes

No

9. I have visited these websites.

Yes

No

10. In my opinion, reporting waiting times for dental care on the websites of public service providers is useful.

Yes

No

11. I would screen this waiting time information on the Internet for decision-making when choosing a dentist.

Never

Rarely

Sometimes

Often

Almost always

12. I would use this waiting time information on the Internet to assess whether I got a dentist appointment time in line with reported waiting times.

Never

Rarely

Sometimes

Often

Almost always

13. In my opinion, no-one is interested in the information on waiting times for dental care reported on the Internet.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

14. I have the opportunity to use the Internet at home.

Yes

No

15. I search for health and disease information on the Internet.

Never or very rarely

A couple of times a year

About once a month

About once a week

Several times a week

16. I search for information on health services on the Internet.

Never or very rarely

A couple of times a year

About once a month

About once a week

Several times a week

17. I use different health applications, such as MyKanta, on the Internet.

A couple of times a year

About once a month

About once a week

Several times a week

18. On a scale from 1 to 7, how would you assess your digital competence?

1 2 3 4 5 6 7

Very poor

Very good

19. Year of birth

20. Gender

Man

Woman

Other, what

21. Education

Elementary or comprehensive school

Vocational education or matriculation examination

Bachelor's degree or college-level education

Master's degree

Other, what

APPENDIX 4. The questionnaire of the dental nurse survey.

I have understood the information I have received about the study, and I want to participate in the study.

Yes

1. Year of birth

2. My work experience as a dental nurse

Less than 12 months

1-5 years

6-10 years

More than 10 years

3. I work on telephone triage tasks to assess the need for treatment

Daily or almost daily

Weekly or almost weekly

Monthly or almost monthly

Occasionally, e.g., during holiday seasons

Very rarely or never

The population base of a health center refers to the population size of a municipality or a larger area, depending on the way the services are provided. If the municipality does not have own health center, the municipality can provide the service in some other way, for example in cooperation with other municipalities.

4. I work in a health center with a population base of

-10000

10001-20000

20001-30000

30001-70000

70001-

5. The electronic patient information system in our oral healthcare is

Abilita

Apotti

Lifecare (Effic)

Mediatri

MediOral

Winhit

Other, what

6. What grade do I give my digital competence on a scale of 1 to 7?

1 2 3 4 5 6 7

Very poor

Very good

7. What grade do I give my competence on triage tasks to assess the need for treatment on a scale of 1 to 7?

1 2 3 4 5 6 7

Very poor

Very good

8. In my opinion, clients are good at explaining their symptoms and treatment needs.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

9. I have the necessary knowledge to use our patient information system module for the tasks to assess the need for treatment.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

10. Learning to use our patient information system module for the tasks to assess the need for treatment has been easy for me.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

11. I have the necessary means and instructions to use our patient information system module on the tasks to assess the need for treatment.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

12. In my opinion, IT Helpdesk can help me with problems in using our patient information system module on the tasks to assess the need for treatment.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

13. In my opinion, our patient information system module is useful for the tasks to assess the need for treatment.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

14. Using our patient information system module speeds up my tasks to assess the need for treatment.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

15. In my opinion, our patient information system module is easy to use on the tasks to assess the need for treatment.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

16. In my opinion, my way of using our patient information system module on the tasks to assess the need for treatment is clear and understandable.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

17. Using our patient information system module increases the quality of my tasks to assess the need for treatment.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

I use our patient information system module on the tasks to assess the need for treatment

18. to enable more individualized patient care.

Not at all

A little

Somewhat

Much

A great deal

19. to improve the effectiveness and efficiency of my treatment decisions.

Not at all

A little

Somewhat

Much

A great deal

20. to be able to analyze a patient's health problem as well as possible.

Not at all

A little

Somewhat

Much

A great deal

21. The dental nurses in this clinic think I should use the functionalities of the patient information system module in assessing the need for treatment.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

22. I use our patient information system module to provide the dentist with the information generated in assessments of the need for treatment.

Not at all

A little

Somewhat

Much

A great deal

23. The dentists in this clinic think I should use the functionalities of the patient information system module in assessing the need for treatment.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

24. I use our patient information system module to provide the National Institute for Health and Welfare with the information generated in assessments of the need for treatment.

Not at all

A little

Somewhat

Much

A great deal

25. The managers of this dental clinic support me on the tasks to assess the need for treatment.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree



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