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THE PERCEIVED ROLE OF DIGITISATION OF ELECTRONIC HEALTH RECORDS IN SOUTH AFRICAN HOSPITALS

by

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A Research Report to the Faculty of Digital Business of the University of the Witwatersrand in partial fulfilment of the requirements for the Degree of Master of Management in the field of Digital Business

Johannesburg, 2020

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Declaration

University of the Witwatersrand, Johannesburg

Business School

SENATE PLAGIARISM POLICY

I, Ashleigh Laullchander (Student number: 2383864), declare that this Research Report is my own unaided work. It is being submitted for the Degree of Master of Management in the field of Digital Business at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other university.

I hereby declare the following:

- I am aware that plagiarism (the use of someone else's work without their permission and/or without acknowledging the original source) is wrong.
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Signature: Ashleigh Laullchander Date 24 February 2022

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Key words: Electronic Health Record systems, Public Sector, South Africa, Technology, Waiting time.

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LIST OF ACRONYMS AND TECHNICAL TERMS

AI: Artificial Intelligence

Covid-19: Coronavirus Disease 2019

CTS: Cape Triage System

DoH: National Department of Health

DOI: Diffusion of Innovation

EHR: Electronic Health Record

Glucometer: Blood sugar tester

HPCSA: Health Professions Council of South Africa

HSS: Health System Strengthening

KPI: Key Performance Indicator

Perinatal: Period from becoming pregnant until about a year after giving birth

POPIA: Protection of Personal Information Act No. 4 of 2013

TEWS: Triage Early Warning Score

Triage: How patient care is prioritized.

Trialability: Ability to trial an idea, process or system

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CHAPTER 1

INTRODUCTION

1.1 Purpose of the Study

In South Africa, patients experience stark differences in the health care provided by private and public hospitals (Ward et al., 2017). Patients in public hospitals often feel neglected and unsafe, while private hospital patients are more satisfied with the patient-centeredness of their received care (Miller, 2019). Primary factors that lead to these significant differences in healthcare experiences are the waiting periods in both hospital settings (Sastry et al., 2015). Lengthy waiting times in public hospitals cause difficulties for patients and healthcare workers alike (Sastry et al., 2015). The long waiting times endured before receiving care are considered the leading cause of skipped appointments, low healthcare worker morale, and poor medication compliance, all leading to poorer healthcare outcomes (Sastry et al., 2015).

Differences in waiting times between the private and public domains of health care exist globally. With the introduction and improvement of computerised systems, digitisation of medical records and all clinical data in healthcare systems has become standard practice worldwide (Dash et al., 2019). Additionally, healthcare organisations are sources of big data, which includes records of patient information, results of medical examinations, and medical records information (Catalyst, 2018). Should this data not be managed appropriately, it fails to provide any value to the organisation in question (Dash et al., 2019).

The term Electronic Health Record (EHR) denotes the digitisation of medical records to improve healthcare services for both patients and healthcare professionals (Krousel-

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Wood et al., 2018). EHR systems can leverage data and technologies to improve efficiency and quality of care in hospitals (Cáceres, 2013). Automating hospital processes, including administrative and clinical care functions, can further eliminate the significant time delays that are often cited in healthcare settings (Cline & Luiz, 2013). In addition, research has shown that EHR systems can effectively automate hospital workflows and enhance operational efficiency to significantly improve clinical care (Yuan et al., 2019). For these reasons, this study will investigate whether EHR systems can be used effectively in South African public hospitals to minimise waiting times for patients.

While most private hospitals can offer short waiting periods with no rushed appointments, patients in public hospitals are required to wait longer to receive needed care (Miller, 2019). This study aims to understand healthcare professionals' experience of EHR systems reducing waiting times in South African hospitals. Evaluating the impact of EHR systems in minimising hospital waiting times may shed insights into the technological interventions that assist in reducing the challenges to receiving proper care at public hospitals. Semi-structured interviews were used to examine how the digitisation of health records can minimise waiting times at public hospitals in South Africa.

1.2 Background to the Study

Delivering high-quality health care in South Africa continues to be a significant problem resulting from various challenges, such as delays in care delivery and long waiting times (Maphumulo & Bhengu, 2019). Although numerous improvement programmes focused on quality have been deployed and tested in the past, none have produced the desired level of quality improvement in the public health sectors (Maphumulo & Bhengu, 2019). However, hospitals can effectively utilise technological developments to achieve dramatic improvements in healthcare services (Thimbleby, 2013). Reportedly, South African

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hospitals are currently not using these technological advances effectively to manage waiting times within public healthcare settings (Tanser et al., 2006).

According to Young (2016) the areas where patients wait at public healthcare facilities fill up almost instantly, suggesting a lack of proper patient scheduling and appointment systems. The current use of paper-based filing procedures and manual analyses makes the administrative and clinical functions challenging and complex, especially given that the number of appropriately trained staff in healthcare settings is significantly low (Katurura & Cilliers, 2018). At the same time, there is a strong demand to increase the response level at public hospitals, given the influx of people accessing health care (De Jager et al., 2011). Although there are significant barriers to improving health care across first and third world countries, technology can be explored as a viable solution to improve the standard and consistency of care (Houten, n.d.). For this reason, identifying and implementing suitable technological solutions is important in improving the quality of health care delivered and received at both private and public hospitals. However, given the perceived difference, this study will highlight areas of concern with a solution-driven focus on public hospitals.

To understand the current provision of health care and the barriers thereto, it is important to provide context regarding the country's heath system. South Africa has a two-tiered health system: 1) privately owned hospitals and health clinics where patients receive treatment and care at their own cost, and 2) public hospitals and clinics where the government funds treatment and care (Young, 2016). Public healthcare providers are considered the first level of care contact for approximately 71,2 percent of the South African population (Statistics SA, 2017). The free care provided by public hospitals ensures equal

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and quality health care to those who cannot personally afford it and is used mainly by individuals from impoverished communities (Young, 2016).

Since public hospitals are the first healthcare option available to most of the population in South Africa, this consequently increases patient waiting time from arrival to treatment at such public hospitals (Kelly et al., 2019). Individuals who cannot afford private health care must face long waiting periods, rushed appointments and subsequent lower-quality care in public hospitals (Young, 2016): this is inconsistent with South Africa's vision of ensuring quality care to the public (Maseko & Harris, 2018). It is considered the government's responsibility to assure quality health care as a large proportion of South Africa's population relies solely on the public sector for care (Health, National Department of, 2007). In addition, the South African national policy on health care aims to improve healthcare quality through various measures, including addressing access to health care for all (Health, National Department of, 2007).

Numerous adverse media reports have been published regarding the waiting times to access health services in public hospitals across South Africa (Maphumulo & Bhengu, 2019). The quality of services received was strongly related to the waiting experience among patients (Oche & Adamu, 2013). Prolonged waiting time has been identified as a significant cause of patients' unhappiness about health care (Naidoo & Mahomed, 2016). Past studies showed that a sample of individuals seeking medical attention at a large public hospital in Gauteng were dissatisfied with the waiting times before receiving treatment and dispensing of medication (De Jager et al., 2010; Naidoo & Mahomed, 2016).

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1.3 Research Problem

The quality of health care in South Africa receives plenty of scrutiny. Reportedly, patients attending public healthcare facilities wait for extended periods to receive service and care from relevant healthcare professionals (Mokgoko, 2014; Swart et al., 2018). Extended waiting times indicate poor quality health care, which prevents patients receiving timely treatment (Swart et al., 2018). Another significant issue is the lack of equality in the public health sector, concerning the time spent waiting to receive medical attention (Gordon et al., 2020).

Social justice has become a critical issue in the debate regarding the general population's access to health services and the degree of equity involved (Mahlathi & Dlamini, 2015). Studies indicate that patients from disadvantaged socio-economic backgrounds are required to wait for extended periods of time compared to individuals from middle-to-high socioeconomic backgrounds (Hajizadeh, 2018; Moscelli et al., 2018). Effectively, the key to receiving quality healthcare services depends on an individual's ability to pay for timely treatment within the private sector. The assumption is that there is an unequal distribution of waiting times in relation to the socio-economic status of individuals (McIntyre & Chow, 2020).

The issue around long waiting times experienced by patients needing care and treatment at public hospitals in South Africa makes healthcare visits an unpleasant and tiring experience for the majority of the population (Sicetsha, 2019). It in no way supports the "People First" or "Batho Pele" principles (Swart et al., 2018). In some cases, long waiting times can result in patients leaving without being seen by a healthcare professional, not returning for routine appointments, an increased risk of spreading untreated disease,

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and in the worst outcome, increased patient mortality in emergency rooms (Swart et al., 2018).

Improving the level of care in public hospitals would require development of an effective solution to address the long waiting times in this sector (Maphumulo & Bhengu, 2019). However, the National Department of Health (DoH) in South Africa has not yet devised an effective plan to shorten waiting times for patients (Sicetsha, 2019). Thus, an appropriate system needs to be established by health authorities to ensure social justice in healthcare services by enhancing access and equity in the provision of care. This research aims to investigate the viability of, and potential uses for, EHR systems to minimise waiting times at South African public hospitals.

1.4 Research Questions and Objectives

Research questions guiding the research are as follows:

- **Research Question 1**: What are the experiences and perceptions of healthcare professionals on waiting times in public health care?
- **Research Question 2:** What are the current initiatives adopted by private and public healthcare facilities to address the long waiting times?
- **Research Question 3:** How can digitisation of medical records or EHRs enable public healthcare facilities within South Africa to reduce the time taken to receive medical care?

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1.4.1 Research objectives

The following study objectives have been informed by the research questions above:

- Explore the experiences and perceptions of healthcare professionals regarding the time patients wait to receive attention in public health care;
- Gain a better understanding of what is currently being done to overcome long waiting times; and
- Explore healthcare professionals' perceptions of healthcare technology, such as EHR, and its efficacy in reducing patient waiting times.

1.5 Significance of the Study

Patients require urgent treatment for many health conditions, hence managing waiting times has attracted significant research focus (Cohen & Bruijns, 2018). A report by the Ministry of Foreign Affairs (2021) found that the South African health technology market is yet to utilise promising opportunities such as those offered by EHR systems (Netherlands Enterprise Agency, 2019). This research provides insight into the practical importance of EHRs to leverage technologies to enhance the overall quality and efficiency of caregiving in hospitals (Cáceres, 2013). More importantly, automation of hospital processes, procedures and systems, including administrative and clinical care functions, can eliminate time delays caused in healthcare settings (Cline & Luiz, 2013). Previous research has also shown that EHR systems can effectively automate hospital workflows and enhance operational efficiency, systems, process and procedures to ultimately improve clinical care (Yuan et al., 2019).

An advantage of EHR systems is that they enable the sharing of patient data between different healthcare facilities, thereby reducing the waiting times experienced by

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patients when medical records have to be retrieved (HealthIT.gov, 2019). A key contributor to such delays is the lack of collaboration between different medical departments. EHR bridges this gap by using data capturing and shared data technology. Previous studies focused on constraints to adopting these technologies (Netherlands Enterprise Agency, 2019). Few studies have examined how the public health sector can benefit from using these technologies (Netherlands Enterprise Agency, 2019).

The significance of the current study emerges from the potential to understand the effectiveness of EHR systems to reduce waiting times in South African public hospitals. This can contribute to overcoming constraints on the adoption of technology. The study also endeavours to achieve a better understanding of the effective use of technology, such as EHR systems, in health care. It aims to understand the benefits from adopting new technologies in various countries where they are most needed (Leitch, 2019). This research will further investigate whether EHR systems can be used in South African public hospitals to minimise inefficiencies such as long patient waiting times.

1.6 Delimitations of the Study

The aim is to explore how technology, such as EHR systems, can reduce waiting times in public hospitals. This will be done by exploring the barriers to addressing waiting times, the adverse impact of long waiting times, efforts to combat prolonged waiting times, and healthcare professionals' views on the barriers to delivering services. For this study, these issues were examined from the point of view of healthcare professionals in private practice (dentists, optometrists, physicians and GPs). This was done by gaining an understanding of current technologies used to cut the time spent waiting for care in hospitals or care facilities, and healthcare professionals' perceptions of the role of EHR

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systems. The aspects that are delimited or not within the scope of this research are as follows:

(i) The research will not implement an existing EHR system within hospitals and only evaluate its perceived impact on waiting times.

(ii) The research will not evaluate the actual impact of EHR systems but rather assess the perceived impact of EHR on waiting times in public hospitals.

(iii) The research will not evaluate current constraints to the effective implementation of any technology, especially EHR, in healthcare systems.

(iv) Healthcare professionals are currently in private practice but have previous experience in public hospitals. The sample members (in private practice) for this study were approached because of the lengthy approvals required for research in public hospitals involving healthcare professionals, nurses and patients.

(v) The bulk of this research focuses on emergency departments in hospitals where timely care is of the utmost importance.

1.7 Definitions of Terms

Waiting time: The time a patient spends waiting to see a medical professional (Carr et al., 2017).

Digitisation: Converting data and information into a digital format (TechTarget Contributor, 2007). In this research, digitisation refers to converting paper-based medical records, health information and other hospital data into digital format.

Electronic Health Record: Any electronic system that records medical encounters, tracks patient history, manages prescriptions and responds immediately to patient queries, and assists in minimising patients' waiting times (Kamble, 2021).

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1.8 Assumptions

In this study, “waiting time” refers to the time taken for a patient to obtain medical files, see a doctor and receive prescribed medication, measured from the moment when the patient arrives at a public hospital (Mokgoko, 2014). According to Egbujie et al. (2018), the average waiting time conceals certain details about the specific area where patients were most delayed. Assumptions include the belief that few efforts are being made to reduce waiting times, and that there is a willingness to investigate the benefits of technology. Some of the assumed barriers include a lack of understanding, inadequate implementation and the inefficient use of processes, procedures and systems for bookings, patient history and records.

1.9 Chapter Outlines

The current study covers six chapters. Chapter One discusses the background to the current research, explains the research problem, the purpose of the research and the study's significance. Chapter Two provides a critical review of the existing literature, including the background of the South African healthcare system, followed by delineating current efforts to minimise waiting times for patients in the public health sector and discussing recent technological innovations designed to reduce hospital waiting times. The critical review concludes with the theoretical and conceptual framework that underpins the study. Chapter Three describes the research methodology used to answer both research questions, and the objectives proposed. Chapter Four will discuss the presentation and findings derived from the research participants, centred on the three research objectives: this theme continues in Chapter Five where a discussion of the findings is presented. Chapter Six will conclude the research study with a summary of the findings and make recommendations for future studies.

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CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Healthcare organisations that are striving to improve healthcare quality are encouraged to adopt interventions to effectively manage waiting time in hospitals (Oche & Adamu, 2013). Patients at South African public hospitals are subjected to unacceptable waiting times before receiving medical care (Mokgoko, 2014). Most of the interventions examined – designed to address the long waiting times in South African public hospitals – have focused on structural changes. Few reviewed the role of technology in reducing patient waiting times. Commonly used interventions by South African public hospitals involve structural changes that do not involve the use of technology, such as restructuring the clinic's internal system and patient appointment scheduling (Egbujie et al., 2018), the lean principles technique (Naidoo & Mahomed, 2016), and the Cape Triage Score (CTS) system (Swart et al., 2018). This chapter's literature review provides a discussion of the South African healthcare system, covering the main challenges or barriers to reducing waiting times, current efforts to address the long waiting periods for patients in public hospitals, and technological developments aimed at reducing these waiting times.

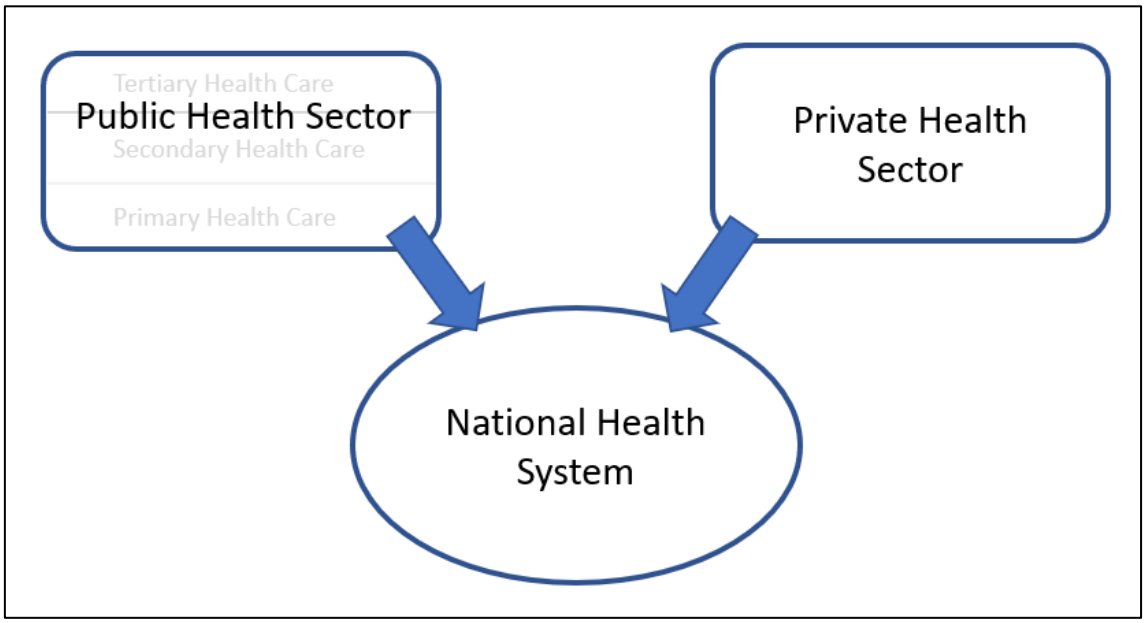
2.2 Public Health System of South Africa

South Africa is burdened with multiple communicable, non-communicable, maternal, perinatal, chronic and injury-related diseases (Van Straten et al., 2017). For these reasons an effective health system is paramount for addressing the burden of acute and chronic diseases on healthcare services. The health system constitutes the most vital component

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for ensuring the well-being of a country's citizens (Mahlathi & Dlamini, 2015). The two primary components of health care in South Africa are the public health sector and the private health sector (see Figure 2.1 below).

Figure 2.1: Macro-organization of the South African health system



Source: Adapted from Minimum Data Sets for Human Resources for Health and Surgical Workforce in South Africa's Health System (Mahlathi & Dlamini, 2015).

Public health services run by the South African Government are separated into primary, secondary and tertiary levels of health care, and for the most part managed by provincial departments of health (Mahlathi & Dlamini, 2015).

The primary level is the initial point of contact with a healthcare professional. This provides expertise from healthcare professionals, dentists, pharmacists, midwives and community nurses (Van Straten et al., 2017). Examples of primary health care are clinics located in municipalities (Van Straten et al., 2017). Patients who require the expertise of medical and dental specialists, or health professionals who do not necessarily have initial contact with patients, will fall into the secondary level of care (Van Straten et al., 2017). The

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third, or tertiary, level of care only provides healthcare services to in-patients and referrals from the previous two levels (Van Straten et al., 2017). Examples of tertiary health care are healthcare professionals and facilities that provide advanced and specialised care (Van Straten et al., 2017).

South Africa has an estimated population of 60 million people (Lubbe, 2021), with a significant proportion depending on government-funded clinics and hospitals to access health services. The private sector serves a smaller percentage of the population, leaving the public sector to serve a far larger proportion (Mahlathi & Dlamini, 2015). As a result, public sector health care in South Africa is overburdened at all levels of care. The National Ministry of Health is the body tasked with policy coordination and development to address prolonged waiting times in public hospitals (Mahlathi & Dlamini, 2015). Public health service delivery in South Africa covers three areas (see Figure 2.2 below): the national health departments, provincial health departments, and local authority departments… a division that leads to poor coordination (Zwarenstein, 1994).

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Figure 2.2: Organisation of the South Africa public healthcare sector



Source: Mahlathi and Dlamini (2015).

The Policy for Free Health Care of 1996 was developed to increase primary level health care accessibility to all citizens (Naidoo, 2012). As a result, 90 percent of the population now live in proximity (within 7km) to a public primary care facility (Fernandes, 2020). However, despite the increase in public primary care facilities, health care in South Africa remains difficult to access as a result of long waiting periods for patients. Overcrowding and long waiting times are frequently cited issues at public hospitals in South Africa (Maphumulo & Bhengu, 2019). With the majority of citizens relying on public health care, more than 70 percent of the patients at public hospitals have reported overcrowding as the central issue leading to long waiting hours (Komape, 2014). In addition, factors such as poor management of patients and shortage of staff contribute to the increase in waiting times experienced in public hospitals (Maphumulo & Bhengu, 2019). Other factors

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contributing to the extended waiting times include both human resources and non-human resource-related factors (Swart et al., 2018).

Human resources factors involve a lack of training and clinical staff skills to manage and assist patients, as well as staff shortages (Maphumulo & Bhengu, 2019). Non-human resource factors involve insufficient medical equipment and inadequate resources (Oche & Adamu, 2013; Swart et al., 2018). The first research question addressed in this study explores medical healthcare professionals' experiences of waiting times in South African public hospitals and the technologies these hospitals utilise to reduce the time taken for a patient to see a doctor and receive the required medication. The following section examines the literature relevant to the waiting time in public hospitals and the barriers to addressing them.

2.3 Waiting Times in Public Hospitals

Outpatient Departments

In outpatient departments, the South African National Policy refers to time spent waiting for services in a healthcare facility as waiting time (Egbujie et al., 2018). Waiting time is a significant challenge faced by the National Health System of South Africa. It not only affects health outcomes, but also leads to unequal access to healthcare services (Morteruel et al., 2018). In addition, a greater percentage of elderly people and a higher prevalence of chronic disease have increased the burden on already struggling health systems (McIntyre & Chow, 2020). Healthcare funding has not increased in line with the rising need for adequate services, while the burden of disease has increased to apply further pressure on the healthcare system (Van Straten et al., 2017). As a result, the failing

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healthcare system transfers the burden to patients through prolonged waiting times for care (McIntyre & Chow, 2020).

Increased demand resulting from the imbalances between supply and demand equates to the waiting time for medical care (Morteruel et al., 2018). Meanwhile, patients using private healthcare facilities with shorter waiting times showed increased levels of trust in private hospitals while expressing a lack of trust in public hospitals (Ward et al., 2017). It was found that if patients experienced significantly longer waiting times in public hospitals, they were more likely to report feelings of frustration and anxiety about the underfunded system and over-worked staff (Ward et al., 2017). Despite public health services being free, some individuals wanting to avoid long waiting periods and an unpleasant experience will chose private health care (Morteruel et al., 2018).

Quality and Outcomes

Waiting times in public hospitals form an important element of assessing performance. The Spanish National Health Care System established the Law of Cohesion and Quality to ensure citizens received healthcare assistance within a specific time and guaranteed a maximum waiting time under conditions of effective equality for specific surgical interventions (Morteruel et al., 2018). However, there is a lack of understanding surrounding the maximum waiting times allowed in hospitals without affecting quality and outcomes in health care (Ward et al., 2017). As a result, the maximum acceptable waiting times permitted in different hospitals and the different levels of service vary between countries. Thus, the measure of waiting time varies between health systems as other countries measure the start and end points differently (McIntyre & Chow, 2020). For example, Britain's National Health Service measured the emergency department (ED) waiting times as a percentage of patients who spend four hours or less in the ED (Paling

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et al., 2020). In Australia, the waiting time is measured as a percentage of patients seen on time by relevant healthcare professionals (McIntyre & Chow, 2020). Although health systems across the globe have recognised that waiting times have a huge impact on clinical outcomes for patients, and have included this concept in hospitals' data registries, the measurement of waiting times is not a routine practice in South Africa (Cohen & Bruijns, 2018).

Emergency Departments

In a comparison study, McIntyre and Chow (2020) found that emergency department waiting times in the United Kingdom, Australia and Canada remained less than four hours. In Britain, the National Health Services reported that 79,2 percent of patients spent four hours or less in emergency departments during 2002 and 2003, which improved to 98,3 percent in 2009 and 2010 (Paling et al., 2020). However, this number dropped to 84,6 percent in 2018 (McIntyre & Chow, 2020). In Australia, the waiting time was measured as a percentage of patients seen on time, and was reported to be 69 percent between 2007 and 2008, later improving to 72 percent between 2017 and 2018 (McIntyre & Chow, 2020). These authors also found a high variability in emergency department waiting times for patients in Australia. The average wait time for the 90th percentile was 93 minutes, and the median waiting time was only 18 minutes. In addition, McIntyre and Chow (2020) found that more than 29 percent of patients waited for longer than four hours in the emergency department in Canadian hospitals.

South African context

Arguably, waiting times in South Africa are significantly high when compared to other developed countries. Ensuring adequate accessibility to quality healthcare services is a critical component of primary health care, and waiting times are a serious obstacle to fair

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access (Daniels et al., 2017). A survey of waiting times in medical and healthcare facilities in and around Cape Town found that these times were particularly high (Daniels et al., 2017). As a result of such issues, there is widespread dissatisfaction among the South African population regarding waiting times in public healthcare facilities (Peltzer, 2009). A more recent survey found that 24,4 percent of respondents categorised the South African public health service waiting times as either “bad” or “really bad” (Shisana et al., 2014). Moreover, patients who experienced significantly long waiting times believed that they were unimportant to the healthcare provider, which further caused patient dissatisfaction and feelings of anxiety (Shisana et al., 2014).

Patients are subjected to lengthy wait times at various stages throughout their interactions with healthcare systems and providers. This includes time spent at home waiting for the initial appointment, time spent in waiting rooms at a clinic or at an emergency department, and time spent waiting for a diagnosis or an elective procedure (McIntyre & Chow, 2020). In South African public healthcare settings, waiting times are deemed to be particularly high, leading to patients skipping appointments and moving between clinics, searching for shorter waiting times across alternative healthcare facilities, as well as further provision of needed services (McIntyre & Chow, 2020). A study by Sicetsha (2019) found that patients attending Gauteng hospitals had to wait at three time-points. Firstly, there was the time spent waiting to register after arrival, secondly, time spent waiting to see a doctor, and lastly, the time it took to collect medicine from the relevant pharmacy (Sicetsha, 2019). Reportedly, the average time taken for registration after arrival was longer than an hour, and on average, two hours. The average waiting time for an appointment with a doctor was between two to three hours and it took a further two to three hours to collect medication (Sicetsha, 2019). This adds up to approximately five to seven hours spent waiting. At the same time, the waiting times per priority in South African public hospitals were consistently

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longer than the suggested times for healthcare practitioner consultations (Cohen & Bruijns, 2018).

Medical areas that have seen the most significant increase in patients witnessed the longest waiting times. Lohlun et al. (2015) noted that the increasing burden of invasive cervical cancer among South African women and the lack of resources and equipment have significantly increased the waiting times experienced by patients. For example, Charlotte Maxeke Academic Hospital in Johannesburg experienced a waiting list of up to 16 weeks in length for patients diagnosed with cervical cancer (Lohlun et al., 2015). Overall, the emergency departments of South African hospitals are overburdened with large patient numbers (Cohen & Bruijns, 2018). According to Cohen and Bruijns (2018) the waiting times in emergency departments across all healthcare facilities in the country, including community health centres and hospitals, were longer than two hours. Additionally, the waiting times at public hospitals were significantly longer than those at community public health centres.

In South Africa, the quality of health care has deteriorated owing to delays in care delivery, inefficiencies of processes, procedures and systems, and human error. The South African health system prioritises healthcare needs into red, orange, yellow and green categories, in a bid to ensure timely care: this division forms the basis for the South African Triage Scale or system-TSS (Twomey et al., 2012). The TSS is aimed at providing care and treatment more efficiently and quickly. However, patients are still required to wait long periods to receive healthcare services. A study by Cohen and Bruijns (2018) found that emergency patients (in the red category) waited for an average time of one hour for consultation with a healthcare provider, while patients classified as orange endured a wait time of between one to two hours. The journey of red patients from community health

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centres to definitive care is a serious cause for concern because of the significant waiting times at community health centres and transport times between facilities (Cohen & Bruijns, 2018). Overall, in South Africa, the reduction in healthcare quality has led to a loss of trust in the healthcare system among individuals (Maphumulo & Bhengu, 2019). The following subsection examines the main barriers to addressing high waiting times in South African hospitals and the resulting adverse impacts.

2.3.1 Barriers to addressing high waiting times.

Secondary or district hospitals face the highest waiting time challenges as they provide the primary point of contact for primary healthcare clinics (Naidoo & Mahomed, 2016). These challenges are primarily caused by the burden of disease, operational inefficiencies, training issues affecting healthcare professionals, poor leadership and inequitable resource allocation (Naidoo & Mahomed, 2016). This section discusses the frequently reported barriers to reducing waiting times in South African public hospitals.

2.3.1.1 Staff shortage.

Staff shortages contribute to extended waiting times at public hospitals (Naidoo & Mahomed, 2016). The high patient-to-healthcare professional ratio is a primary contributor to these service delays (Cohen & Bruijns, 2018). Fonn et al. (2011) note that while the staff-to-patient ratio in Europe is ten healthcare workers for every 1 000 patients, South Africa has fewer than one healthcare worker for every 1 000 patients (Maphumulo & Bhengu, 2019). Many hospitals in South Africa struggle with staff shortages and lack the appropriate resources to cater for patients in excess of a particular threshold (Sicetsha, 2019).

Proper provision of healthcare services is dependent on the availability of a sufficient number of qualified healthcare workforce members and how they are deployed and

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managed (Mahlathi & Dlamini, 2015). In 2007, a survey of waiting times undertaken across several clinics in Cape Town found that the common elements contributing to long wait times were: large groups of patients arriving at the clinic over a short period; high workloads; and a large number of patients arriving even before the clinic's operating hours (Daniels et al., 2017). Less common factors contributing to increased waiting times included queuing problems, long service times and logistical problems (Daniels et al., 2017).

2.3.1.2 Shortage of equipment and medicine.

Shortage of equipment is a leading cause of fatal delays to urgent medical treatments and surgeries (Fonn et al., 2011). Although the South African healthcare systems effectively prioritise healthcare needs into colour-coded categories according to urgency, emergency departments still fail to provide needed care in a timely fashion, mainly as the result of a lack of sufficient resources (Cohen & Bruijns, 2018). Cancer patients are the worst affected by the lack of trained staff and non-availability of equipment, leading to a long waiting time for surgery or a diagnosis (Fonn et al., 2011). Lengthy waiting periods for the purpose of medical intervention further expose patients to risks that can lead to grievous harm and even mortality. In addition, public hospitals are more resource-constrained than private hospitals, limiting interventions and time spent with severely ill patients (Cohen & Bruijns, 2018). Lack of medication and other essential supplies, such as glucometers, can also prolong patient stays in already overcrowded hospitals (Mokoena, 2017).

2.3.1.3 Poor management and administration.

Despite the prevalent long waiting times in Cape Town hospitals noted by Daniels et al. (2017), clinic managers failed to implement any action to reduce these waiting periods. Hospital management reportedly believed that changes were difficult to initiate and sustain (Daniels et al., 2017). The study by Daniels et al. (2017) further found that once

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clinic managers reduced the waiting limits to less than the perceived acceptable limit of 70 minutes, this issue of waiting times for service delivery was no longer a priority as managers believed they had “done enough”. However, the success of any healthcare system depends both on management capacity and on teamwork between healthcare professionals and nurses (Stott & Moosa, 2019). In the context of scarce resources, South African hospitals need to identify an effective solution to deliver more patient healthcare programmes (De Jager et al., 2011). Effectively, public hospitals in South Africa require systems and structures in place to facilitate the delivery of more responsive services and flexibility in their management. The lack of appropriate technology utilisation in South Africa’s public health systems has led to unreliable data inputs from peripheral facilities (Malakoane et al., 2020).

2.3.2 Adverse impact of increased waiting time in hospitals.

Long wait times have been recognized as a major source of discontent among patients (Egbujie et al., 2018; Naidoo & Mahomed, 2016). A local study by Lohlun et al. (2015) found that the average delay from the first consultation until treatment was 74 days for cervical cancer patients. This is significantly high compared to other developed countries.

There are several consequences to increased waiting times. Firstly, increased waiting times lead to patient dissatisfaction and anxiety. Secondly, they result in delayed treatment access, poorer clinical outcomes, unnecessarily increased costs and inequality (McIntyre & Chow, 2020). Mortality outcomes in hospitals also correlate with patient arrival time to triage, as well as from triage to a healthcare professional (Cohen & Bruijns, 2018). The consequences of long waiting times are severe for patients with chronic diseases (McIntyre & Chow, 2020). Patients with chronic illness need to access the healthcare

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system frequently. Their lengthy wait times consistently surpass the amount of time spent with a healthcare provider, adding to the burden imposed by chronic disease symptoms and treatment (Østbye et al., 2005). Chronic disease is becoming more prevalent in developing countries such as South Africa and has further strained the poorly staffed and equipped public hospitals that are unable to cope with large numbers of patients (Østbye et al., 2005).

Longer waiting periods reduce the quality of healthcare services since conditions can worsen for patients: this affects their mortality and morbidity outcomes (Daniels et al., 2017). Previous research indicates that longer waiting times increase the mean overall length of stay in hospitals, as well as the chance of death in the short term (Carr et al., 2017). In many emergency clinical situations, timely interventions such as administering antibiotics, fluids, or analgesics play a crucial role in improving a patient's critical state (Cohen & Bruijns, 2018). In addition, significant delays to the treatment of patients increase the financial costs of medical care, as well as the possibility of illness progression or the deterioration of a patient's condition, requiring alterations in treatment (Lohlun et al., 2015). The physical and psychological effects on patients awaiting medical treatment have been the subject of increased research focused on hospital waiting times (Sjöling et al., 2005). The following section examines current efforts in South Africa to address the prolonged waiting times experienced by patients in public hospitals.

2.3.3 Current efforts to improve waiting time in SA hospitals.

The length of time people wait for hospital visits and treatments has become a major issue in many countries, leading to policies focused on reducing waiting times and setting maximum waiting times in various healthcare facilities (Ward et al., 2017). One of the top priorities for improvement, according to the National Department of Health, is to reduce waiting times (Egbujie et al., 2018). To avoid harm resulting from delayed care, quality

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health care translates into appropriate waiting periods for patient assessment, management and disposition (Cohen & Bruijns, 2018). The duration, nature of healthcare services sought (preventative, curative or emergency care), communication of the projected waiting time, and the setting of the chosen facility all influence the acceptance of waiting time which is linked to the service delivery building block of the World Health Organization Health System Framework (World Health Organization, 2017). Inadequate communication of the expected waiting time and poor waiting environments result in longer perceived waiting periods for patients (Daniels et al., 2017). The impact of a facility's environment on perceived wait times has led to consideration of ways for cutting down on these times, including reducing congestion, improved workflow processes, medical dispensers, and the establishment of queues for certain service points at pharmacies (Daniels et al., 2017). The following section examines current efforts employed in South African public hospitals to reduce the prolonged waiting times experienced by patients.

2.3.3.1 Ideal clinic model.

Interventions to strengthen the health system through the Ideal Clinic model (ICM) were made by the South African Government in a bid to curb patient waiting times at public health facilities (Egbujie et al., 2018). The ICM was created by the South African National Department of Health to strengthen the health system and reduce hospital wait times (Egbujie et al., 2018). It strives to provide health clinics with strong infrastructure, such as good physical condition and space, the necessary equipment, sufficient staff, information and communication tools, suitable supplies, and reasonable administrative processes (Hunter et al., 2017).

A study by Egbujie et al. (2018) indicated that facilities that correctly implemented the patient appointment scheduling system, reported the most significant reduction in total time

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spent by patients in hospitals. After such implementation, facilities reported a significant reduction in the total waiting time recorded and a patient arrival trend that was evenly distributed (Egbujie et al., 2018). The Ideal Clinic Model guidelines recommend a maximum of three hours of waiting time in an out-patient non-emergency setting in South Africa, which can be dedicated to monitoring patients' vital signs and prioritising high-risk patients (Hunter et al., 2017).

2.3.3.2 Lean thinking.

Lean thinking is introduced in hospitals with the aim of removing non-value-adding elements, cutting waste and adding value for the consumers. In a medical facility, the period of time spent waiting for, and between, services is often wasted. Proper process flow can ensure a smooth and continuous flow of health services, thereby increasing patient care quality, safety and efficiency (Hughes, 2008). Western countries have successfully applied lean thinking practices to emergency departments to improve patient flow and care (Chan et al., 2014). When lean thinking was implemented for a Western Cape tertiary hospital, patient flow between the casualty and other wards improved, leading to decreased waiting times (Sastry et al., 2015). Similarly, a South African secondary-level hospital's orthopaedic out-patient clinic embraced lean thinking and saw a 39 percent reduction in patient wait times and a further 31 percent reduction in overall time spent at the clinic (Price, 2013).

According to a study by Naidoo and Mahomed (2016) undertaken at a rural district hospital in the North Coast of KwaZulu-Natal, lean thinking was adopted in the outpatients' department. This effort resulted in average waiting times being reduced from 75,8 minutes to 67,34 minutes. In addition, the cycle time significantly improved in the investigation section (Naidoo & Mahomed, 2016). One main reason for this reduction was the implementation of a pre-consultation screening tool by nurses: this empowered nurses to

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make decisions without waiting for healthcare professionals' instructions (Naidoo & Mahomed, 2016). Lean thinking implementation over a more extended period would have resulted in a further reduction in waiting times (Naidoo & Mahomed, 2016). However, the study also pointed to service areas where the waiting times exceeded acceptable periods for patient care. These included consulting rooms, X-ray departments and pharmacies. In addition, the researchers noted that fluctuating staff levels, equipment problems and acute disease levels were primary reasons for the failure to achieve a reduction in waiting times in these service areas (Naidoo & Mahomed, 2016).

2.3.3.3 Time-based KPIs.

Quality of care in hospitals is measured using key performance indicators (KPIs). In 2012, time-based KPIs were implemented by the Department of Health for emergency centres (Cohen & Bruijns, 2018). Time-based process measures are more valuable and practical than structure-based or process-based measures for determining healthcare quality (Cohen & Bruijns, 2018). Waiting periods for elective surgery and emergency room care are widely utilized as health service performance measures (McIntyre & Chow, 2020). Because of the impact of waiting times on hospital performance, many hospitals in Australia, for example, set waiting times to provide emergency hospital care (Charles & Kelly, 2008).

In 2012 the Western Cape Department of Health was the first in South Africa to introduce time-based KPIs for emergency departments (Cohen & Bruijns, 2018). These time-based KPIs measured the waiting time from arrival at triage, time taken to move from triage to the healthcare provider, and time taken from the patient discharge decision of the emergency department (Cohen & Bruijns, 2018). Cohen and Bruijns (2018) reported delays in excess of seven hours from arrival of high-priority patients at a community health centre

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to the first healthcare provider consultation. The researchers further noted that the time-based KPIs were not met at the Western Cape Department of Health. Reportedly, patients categorised as red – the most urgent level – had to wait longer at these community health centres when transferred to secondary care (Cohen & Bruijns, 2018).

2.3.3.4 Waiting time prioritisation.

Waiting time prioritisation is an effective method for national health services because it allows for quicker access to procedures that are more urgent and produces more acceptable waiting times (Sastry et al., 2015). In the Western Cape, two public clinics achieved significant improvements in waiting times following enhancements to procedures, software tweaks and customisation of processes based on patient needs (Sastry et al., 2015). Reportedly, Clinic A reduced the average waiting time from 86 minutes to 52 minutes, while Clinic B reduced the average waiting time from 256 minutes to 161 minutes. At the same time, resource constraints and staff turnover were frequently cited as barriers to implementing interventions to reduce waiting times in hospitals (Sastry et al., 2015).

Daniels et al. (2017) repeated the survey on waiting times first done in 2007 to evaluate whether recommendations made during that survey had led to a reduction in waiting times for Cape Town's primary care clinics. The study found a significant drop in waiting times in 2011 compared to 2007. The average waiting time was 76 minutes in 2007, reducing to 55 minutes in 2011 (Daniels et al., 2017). One intervention that reduced waiting times involved encouraging patients to make an appointment before visiting the clinic. Given the similar condition in 2007 and 2011, the reduction in waiting times is an actual reduction rather than merely a change in staffing or clinical attendance. However, Daniels et al. (2017) shared concerns that acceptable waiting times in clinics can be artificially

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inflated to make actual waiting times more acceptable. One major issue with the findings was that the clinics that had not implemented any interventions to reduce waiting times also reported a reduction in waiting times similar to those clinics that had taken action to reduce waiting times (Daniels et al., 2017).

2.3.3.5 Triage system.

In South Africa, a triage system is the standard model used in emergency departments for prioritisation of care (Daniels et al., 2017). Triage systems involve categorising patients depending on the urgency of treatment or need for attention (Stott & Moosa, 2019). In South Africa, sorting of patients started with the Cape Triage Score (CTS), which used discriminators and physiological parameters to group patients using various codes for different types of trauma (Stott & Moosa, 2019). Triage can be effective if used correctly and can immediately point patients in the right direction (Harding et al., 2011). At South African public hospitals, triage systems are only used in emergency departments (Adeniji & Mash, 2016). Public hospitals can utilise the triage system to improve accessibility and the quality of health treatment through reducing wait times (Engelbrecht et al., 2015; Swart et al., 2018).

The triage system further helps healthcare professionals to send patients to the appropriate location at the appropriate time, further facilitating the allocation of appropriate resources to provide services based on patient requirements (Engelbrecht et al., 2015); Swart et al., 2018). Triaging patients at public hospitals can reduce waiting times (Swart et al., 2018). The CTS system is a method for categorizing a patient that involves a series of steps, starting by calculating the early warning score (TEWS) to colour code the patient based on vital signs and a brief history of the patient's complaints (Twomey et al., 2012). The study by Swart et al. (2018) utilised a CTS system intervention to lessen the length of

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time people have to wait in public care facilities across South Africa. However, this research found that waiting times did not decrease, regardless of whether the CTS triage system was being implemented. Instead, staff shortages resulted in longer waiting times, according to Swart et al. (2018), highlighting the importance of resource availability in relation to barriers to health care.

An online triage technology system further allows hospitals to assess the symptoms and urgency of patients to efficiently prioritise patient care (Crouch, 2020). This system enables healthcare professionals to review patient inquiries, develop a care plan and arrange in-person reviews for those patients who require it (Crouch, 2020). The primary benefit of the online triage system is the fact that it allows for scheduled meetings with high-risk patients, which prevents unnecessary rush in hospitals (Crouch, 2020). Non-critical cases are also diagnosed online and directed with an appropriate care plan without the patient even attending the hospital. Under this model, a remote caretaker is the first line of consultation where the interactions result in gathering all relevant test results before reaching clinicians, thereby allowing clinicians to focus more closely on critical cases (Joy, 2020). The non-emergency setting in this research included high patient volumes, inadequate staff numbers and limited resources, thereby limiting the efficacy of the triage system used in emergency departments (Stott & Moosa, 2019). The two most important elements that determine whether an online triage system succeeds or fails are management and adequate staffing.

2.3.4 Proposition 1.

Waiting times in South African public hospitals continue to be perceived as high, even after implementing several models to reduce such waiting times.

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2.4 Digitisation of Medical Records of Public Hospitals

This research examines the role of digitising medical records or electronic storage of medical records to lessen the amount of time people have to wait in public hospitals. Several technological innovations have been designed to shorten the time spent waiting in hospitals. South Africa has currently made significant investments in EHR systems. Hence, the technology examined in this research will be the perceived impact of EHR systems on waiting times in public hospitals.

2.4.1 Artificial Intelligence technology.

Artificial intelligence (AI) technology is a powerful tool to mine the data necessary to aid in the diagnosis and management of a disease, in a similar manner to the decisions made by human physicians (Axelsen, 2019). AI can therefore support the healthcare sector, which is currently facing skill shortages and long waiting times, by improving patient benefits and outcomes (Axelsen, 2019). Hospitals in Britain that reported record high waiting times have integrated AI technology to reduce these waiting times for patients seeking treatment or emergency services (Axelsen, 2019). Implementation of AI is beneficial in the health sector as algorithms analyse health data to contribute towards diagnosing common illnesses and determine the optimum treatment more effectively (Axelsen, 2019). This also allows healthcare professionals to assess how critical the need for care may be for an individual patient, allowing more severe cases to be fast-tracked for treatment. AI technology can thus shorten waiting times in hospitals (Subbe, 2020).

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2.4.2 Electronic Health Record (EHR).

Implementing EHRs is another solution for reducing waiting times in hospitals. EHR systems can record and track patient history and manage prescription and test results before every doctor's visit, so saving valuable time (Kamble, 2021). All critical administrative and clinical data about the patient – including demographics, medications, vital signs, progress notes, laboratory data and radiology reports in a particular hospital – are maintained by the healthcare provider over time (Lee, 2021). Investing in centralised EHRs can minimise storing and management of administrative and clinical hospital documentation (Lee, 2021).

EHR avoids the excessive paperwork required in many hospitals and so reduces the patient wait time while effectively improving the quantity of patient examinations (Menachemi & Brooks, 2006). When the responsibility for documentation is handed over to other healthcare staff, healthcare professionals and physicians can focus solely on required patient interactions (Kamble, 2021). EHR further provides clinicians with automated access to information and streamlines a clinician's workflow, thereby saving time (Lee, 2021). It also offers various healthcare providers and facilities quick access to patient records. There are several inbuilt functions to EHR, including hospital-patient management software that allows hospitals to respond immediately to patient queries, enable mobile queues to minimise patient wait time, provide customers with a virtual waiting line to inform them about their schedules, and let the administration department know if a patient is running late (Kamble, 2021). In this way the hospital management software helps to reduce patient waiting time and improve booking management to enhance the overall service delivery of health care (Kamble, 2021).

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2.4.3 Proposition 2.

EHR systems can minimise patient waiting times in South African hospitals.

2.5 Analytical Framework

The analytical framework in the current research is a synthesis of theoretical and empirical notions. Diffusion of Innovation (DOI) theory underpins the study: this theory was developed by E. M. Rogers in 1962 and is still relevant and widely used today. It explains how a product or idea diffuses through homogenous groups over time (Kaminski, 2011). The main elements that E. M. Rogers identified as components in the adoption of innovation are: 1) relative advantage – when innovation is seen as more beneficial than the idea; 2) compatibility – when adopters evaluate the innovation consistency with needs and experiences; 3) complexity – the difficulty in the use or understanding of an innovation; 4) trialability – the extent of use before adoption; and 5) observability – whether tangible results can be gained from innovation (Kaminski, 2011).

2.5.1 Theoretical framework.

Technology has a significant influence on the effectiveness of organisational activities (Ibrahim & Leong, 2012). Organisational productivity and performance effectiveness are two critical factors driving technological adoption (Dastane, 2020). Technology adoption is not always easily accepted in organisations as several factors influence the adoption of new technologies. This research therefore aimed to examine healthcare professionals' perceptions about the role of EHR in reducing waiting times in South African public hospitals. The theoretical framework that underpins this research allows for clarification around the theory that influences healthcare professionals' perception of the role of EHR in reducing waiting times. DOI is the theoretical framework used for this

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research (Kaminski, 2011). It allows for a better understanding of how individuals adopt new ideas or technology (Kaminski, 2011).

DOI is a social and psychological theory designed to predict how people will adopt new technology (Kaminski, 2011). It is considered a change model that guides technological adoption when innovation is modified to meet the needs of all levels of adopters (Kaminski, 2011). As previously mentioned, the DOI theory presents five characteristics that are antecedents to technological adoption: 1) relative advantage of the technology; 2) complexity; 3) compatibility; 4) observability; and 5) trialability. Kaminski (2011) describes each characteristic as follows. The relative advantage of the new technology depends on the degree by which it is superior to current practices (Kaminski, 2011). Complexity is the degree to which the innovation is difficult to understand or use (Kaminski, 2011). Compatibility is the degree to which the innovation is consistent with the perceived needs and socio-cultural values of the system in which it is implemented (Kaminski, 2011). Innovation is said to be observable if the innovation outcomes are visible to potential adopters (Dearing & Cox, 2018). Lastly, trialability is the degree by which an innovation can be applied on a limited basis (Kaminski, 2011).

The extent of an innovation's success depends on these innovation characteristics (Kaminski, 2011). Innovation characteristics provide users with an evaluation list before implementing an innovative change (Kaminski, 2011). In the context of this research, the users of the innovative change are healthcare professionals who have experience of the innovation being implemented… EHR systems. Perception of the innovation characteristics influences healthcare professionals' belief in the effectiveness of EHR systems for reducing waiting times in public hospitals (Dearing & Cox, 2018). It is expected that people are more

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likely to adopt innovations that are promising and appear appropriate for their needs (Dearing & Cox, 2018).

The EHR systems used in hospitals allow sharing of medical information essential for patient care among all authorised parties (Katurura & Cilliers, 2018). EHRs are substantially useful for general practitioners to achieve immediate access to patient data and streamline day-to-day operations (Katurura & Cilliers, 2018). The increased workflow performed and effectively managed with EHRs is the core aspect that reduces waiting times in hospitals (Katurura & Cilliers, 2018). Participants in this research are healthcare professionals currently working in private practice who have had experience of public hospitals in South Africa, with particular reference to patient waiting times. First-hand experience allows healthcare professionals to be familiar with the characteristics of the EHR innovation, which subsequently influences their perceptions about its usefulness for reducing waiting times in public hospitals.

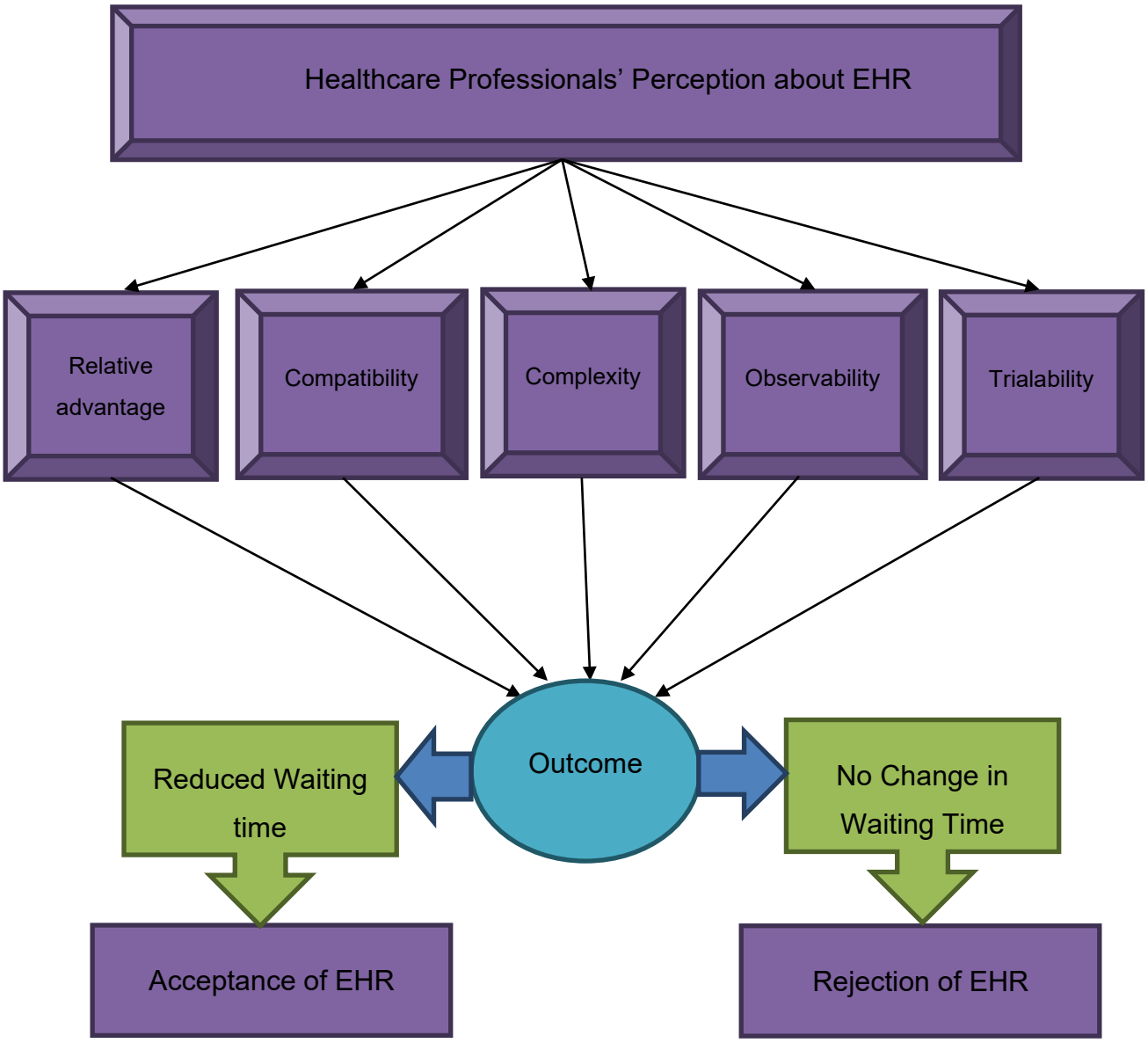
2.5.2 Conceptual framework.

An examination of healthcare professionals' perceptions about the impact of EHR systems on the waiting times experienced by patients can shed insights on whether EHR could be effectively adopted in South African public hospitals. The DOI is influenced by a participant’s reaction to the innovation. The repercussions of adoption, and their impact on the people they serve, influence individuals’ impressions of innovation even more (Kaminski, 2011). Figure 2.3 below looks at the healthcare professionals, considering the homogenous adopters, and perceptions about her, using the five critical influencing factors for the adoption of innovation (Kaminski, 2011). Using the influencing factors, healthcare professionals will either experience a change or no change in waiting times. Based on this,

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these healthcare professionals will either accept or reject EHR as an innovative technology to be implemented in the South African healthcare system.

Figure 2.3: Conceptual framework



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2.6 Conclusion

The public health sector in South Africa is frequently criticised for the long waiting times experienced by patients seeking medical attention (Mokgoko, 2014). Quality improvement efforts should aim to reduce waiting times in public hospitals (Maphumulo & Bhengu, 2019). More importantly, improving the standard of medical care services in public hospitals is crucial as most of the population depend on government-funded health care. To date, South Africa has implemented at least four clinical models aimed at reducing waiting times in public health care. These include the ideal clinic model, lean thinking, time-based KPIs and waiting time prioritisation.

The first research question investigates healthcare professionals' perceptions of waiting times in public hospitals, as well as the efforts currently underway to address long waiting times. The second research question investigates healthcare professionals' perceptions of the role of digitising medical records or EHRs in reducing the time taken to receive medical attention by patients in public hospitals. Table 2.1 below summarises the research questions and relevant propositions that guided this study.

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Table 2.1: Consistency table – research questions and propositions

	Research Question	Propositions
1	What are healthcare professionals' perceptions of waiting times in public hospitals, and how do general practitioners perceive the current systems used in public hospitals to address the long waiting times?	Waiting times in South African public hospitals continue to be above the acceptable waiting limits, even after implementing several models to reduce waiting times.
2	What is the doctor's perception of the role of digitizing medical records or EHRs in reducing the time taken to receive medical attention for patients in public hospitals?	EHR systems can minimize the waiting time in South African hospitals to acceptable limits.

EHR avoids excessive paperwork in hospitals and improves access to patient information, thereby reducing waiting times. Patient waiting times can also be reduced with the advanced functions of EHR, including improved booking management, virtual waiting lines, and mobile queue options. Despite significant investments in EHR systems, public hospitals in South Africa have never utilised technology efficiently to reduce waiting times. The critical literature review on EHR systems indicated that these can significantly reduce waiting times if adequately accepted and implemented. In this research, general practitioners are interviewed to gather their perceptions on the current usage of EHR systems at public hospitals. The theoretical and conceptual framework underpins the analytical framework.

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CHAPTER 3

RESEARCH METHODOLOGY

3.1 Research Approach

A methodical qualitative approach using snowball sampling was adopted to evaluate the perceived impact of the EHR system among healthcare professionals by utilizing semi-structured interviews. The three research objectives identified in Chapter 1 are: 1) to explore the experiences and perceptions of healthcare professionals about waiting times in public health care; 2) create a better understanding of what is currently being done to reduce long waiting times; and 3) explore the perceptions of healthcare professionals regarding healthcare technology, such as EHR, and its efficiency in reducing patient waiting times. A qualitative approach will aid in exploring and bettering understanding of the potential of EHR systems to overcome weaknesses of the existing systems in public hospitals, reduce waiting times and subsequently improve healthcare service delivery.

A qualitative approach is essential for this research as it provides a thorough comprehension of the phenomenon being studied. The qualitative research design further creates a broader account of real-life situations and lived experiences, which cannot be obtained from quantitative data (Hancock et al., 2001). Moreover, qualitative research allows the researcher to capture attitudes and perceptions, provide insights, allow for open-ended answers to questions and incorporate human experiences that are contextualised according to the research aims (Gaille, 2018).

This study aims to understand the factors contributing to public hospitals' waiting times and participants' perceptions of how different EHR features can reduce patient

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waiting times in public hospitals. Participants in this study understand the current public healthcare system and the issues faced, which are attributable to their subjective experiences and knowledge. These participants are thus likely to shed light on the aspects that need improvement within the public healthcare system and whether this can be achieved through EHR.

3.2 Research Design

The phenomenological method concentrates on studying experiences or perspectives of individuals to understand a phenomenon from their subjective viewpoints (Lester, 1999). The qualitative approach of phenomenology uniquely supports inquiry in the health field as individuals' lived experiences are often used to understand and inform a specific phenomenon (Neubauer et al., 2019). A phenomenological approach was used to assess the impact of EHR on the duration of waiting times in public hospitals. In this study, healthcare professionals in private practice with experience in both public and private hospitals in South Africa were included to elicit understanding of the impact of EHR on waiting times. Healthcare professionals have knowledge and expertise relating to the waiting times caused by both manual health records and EHR implementations and current efforts. In addition, their perceptions of the role of digitising health records and its impact on waiting times can provide further in-depth understanding of whether EHR can contribute towards reducing waiting times for patients in public hospitals.

Including healthcare professionals with expertise in both private and public hospital settings allows for an in-depth understanding of their diverse subjective experiences. Healthcare professionals' experiences in private hospitals give them specific views about EHR and its impact on waiting times. Similarly, healthcare professionals' experiences in

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public hospitals are helpful for evaluating the usefulness of potential EHR implementation in public settings and its subsequent impact on waiting times and healthcare services. Thus, healthcare professionals' experiences in different organisations and sectors are crucial for forming transferable findings on the consequences of EHR on the length of time that patients must wait in public hospitals and how EHR can benefit a variety of public healthcare services in South Africa. The primary benefit of implementing a phenomenological approach is that it allows learning from the experience of others (Neubauer et al., 2019).

3.3 Population and Sample Method

3.3.1 Population.

The sample frame from the individuals who were willing to participate in this study included healthcare professionals from private healthcare facilities in Gauteng. These professionals also have experience in the workings of public hospitals, as it formed part of their practical placements during their medical training.

3.3.2 Sampling method.

A convenience sampling method based on non-probability was used to select the study's initial participants. Convenience sampling is a technique where the researcher selects the most convenient and easy-to-reach participants from the target population (Lavrakas, 2008). This research focuses on a specific group of people – healthcare professionals – and not society at large. Convenience sampling for a homogenous group (similar population characteristics) can help the research to provide more precise and accurate findings as all participants have experience within the public health sector. After

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obtaining the initial sample of participants, snowball sampling was used to attract subsequent participants should data saturation not have been reached. Snowball sampling is an effective method to identify and collect data from hard-to-reach populations. This method is also known as chain referral sampling, as each participant is referred to, or identified by, another (Ellard-Gray et al., 2015).

3.4 Data Collection Methods

To gather information, semi-structured interviews were used to collect in-depth data. Interviews are advantageous as they allow the researcher to have open-ended, in-depth conversations with participants while staying within the research context (DeJonckheere & Vaughn, 2019). In phenomenological research, a variety of methodologies might be used, including participant observation, meetings and interviews (Lester, 1999). Interviews that are semi-structured are popular for qualitative data collection in health service research (DeJonckheere & Vaughn, 2019). The main benefit of using semi-structured interviews in health service research is that this allows for the collection of data that is rich and subjective, which is necessary to explore participants' feelings, thoughts, experiences and opinions regarding a specific phenomenon (DeJonckheere & Vaughn, 2019). Some of the benefits of semi-structured interviews include preparing questions before conducting the interviews, allowing open-ended questions and giving respondents enough time to think carefully about answers to questions (DeJonckheere & Vaughn, 2019). One other significant benefit is that they allow the researcher to move from the predetermined questions to more probing questions and answers, which increases the probability of obtaining further data relevant to addressing the proposed research questions.

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The interview questions were designed to elicit participants' experiences of EHR systems and their impact on public hospitals' patient waiting times. Data collected from these interviews was intended to inform the use of EHR for reducing waiting times in public hospitals. The interview schedule used open-ended inquiries to gather detailed information regarding the healthcare professionals' experiences of current methods adopted in public hospitals to reduce waiting times and the perceived ability of EHR to address patient waiting times. The main benefit of this approach is the opportunity to ask complex questions and deploy probing mechanisms, as mentioned earlier in this chapter.

3.4.1 Procedure.

Initial participants for the semi-structured interviews were selected using the researcher's own network; after that, snowball sampling methods were adopted to reach more participants. Participants for the semi-structured interviews were asked through telephone calls and electronic mail if they would be interested in joining in the study. The researcher asked them about their willingness to participate in the research. If they responded positively, they were sent the consent form (Appendix C). The semi-structured interviews were conducted at a date and location, and per a medium agreed upon by both participant and researcher. Participants in the semi-structured interviews were sent an invitation via electronic mail, including a covering letter (Appendix D), stating the objectives of the research, the importance of the respondents' role in the study, and how participant confidentiality and anonymity were to be protected in the research process.

In-person and video conferencing interviews were carried out with the selected participants who freely volunteered their time. Participants were given the options to be interviewed either in person or by video call, depending on their comfort and taking into account Covid-19 concerns. Video conferencing interviews via Zoom and Microsoft Teams

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allowed for collecting information while implementing Covid-19 protocols, keeping both the researcher and participants safe. Connectivity issues also had to be considered. Face-to-face interviews posed a challenge for participants relating to time and location availability. However, as opposed to online, in-person interviews gave the researcher the opportunity to observe participants' non-verbal cues more easily. Interviews were scheduled to last for one hour, with key points and themes captured. With the participants' permission, audio recordings of the interviews were made for subsequent transcription.

3.5 Data Analysis and Interpretation

Qualitative information for this study was probed using thematic analysis. This method involves identifying the main themes from information collected from participants. The six phases of thematic analysis, according to Braun and Clarke (2006), include: 1) familiarisation; 2) coding; 3) searching for themes; 4) reviewing themes; 5) defining and naming themes; and 6) writing up. Firstly, the researcher's familiarity and intimacy with the data were increased by repeatedly reading it to perceive possible themes. This was done by printing the raw data, going through individual transcripts, and highlighting the most important responses relevant to the researcher's question. This process was repeated several times to ensure the most relevant responses were identified. The researcher then cut out the highlighted responses in the raw data and placed them on a whiteboard, noting which participant commented, such as P1, P1… P7.

Secondly, all common responses were grouped together and reviewed several times to ensure the responses that had commonality were grouped together correctly. Thirdly, using the research aims, names or themes were assigned to each group. In some instances, the researcher had to review the names, codes and themes multiple times to be

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sure these were logical. The fourth step the researcher adopted was to identify relevant and irrelevant patterns in the data. The researcher then looked for commonality between the categories. In the fifth step, the researcher visually reviewed the codes and themes and transcribed them in tabular format, as noted in this research paper, for example the findings illustrated in Chapter 4 immediately following.

3.6 Limitations of the Research

One of the first apparent limitations to the research was the availability of healthcare professionals willing to partake in the research. However, there was general willingness to refer the researcher to other healthcare professionals – effectively, snowball sampling. The second limitation was the time available for actual interviews. While an hour was allocated to complete a semi-structured interview, most participants allowed for only 20-45 minutes: this did not give the researcher adequate time for further probing questions. The third limitation was that healthcare professionals from public hospitals and clinics could not be used in the research owing to the approvals required from Medical Ethics Committees. The researcher contacted the Human Research Ethics Committee on several occasions through the primary telephonic contact numbers and electronic mail addresses without success. After several attempts that met with no response, the researcher continued with the research by approaching professionals working in private healthcare facilities. The fourth limitation was the restrictions around Covid-19. With limitations and risks associated with contracting Covid-19, electronic methods were used to conduct interviews to limit the possibility of participants and researcher contracting Covid-19. Participants chose video conferencing as they felt this would negate possible risks of contracting Covid-19.

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3.7 Trustworthiness

To enhance the trustworthiness aspect, semi-structured interviews were conducted using methods convenient for the participants, such as video conferencing or in-person interactions at a specific time and date convenient to participants. A uniform approach and sequence for the questions was followed to minimize the likelihood of participant error. Respondents' answers to the semi-structured interview questions were transcribed, capturing core themes with no bias from the researcher. With no previous experience around the phenomena being studied, the researcher used a combination of interview extracts and literature to understand the topic better.

The researcher spent several months reviewing the literature on the topic from various sources. Participant responses were analysed utilizing the Thematic six-phase approach of Braun and Clarke (2006), allowing the researcher to spend more time with the data collected. Themes identified were informed by data and literature. Using video conferencing methods in interviews with a semi-structured format, there was an opportunity to hear and experience participants' responses. Verbatim quotes were used in the data analysis and presented findings for peer review for congruency. The data represented the information that participants provided, and interpretations of the data were not subjective or biased towards the researcher's own views and opinions.

3.8 Ethical Considerations

Ethical approval was obtained by the University of the Witwatersrand on 26 September 2021. The primary ethical consideration for the research was to ensure confidentiality and anonymity for participants by not capturing any of their unique identifiers. Assuring privacy and anonymity is essential to ensure that participants share honest

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opinions, thus improving the quality of the findings. No personal details of participants were collected or reported on as part of the research. Pseudonyms, such as Participant 1, 2, etc., were used later when referring to participants. Raw data was also kept on the researcher's password-protected laptop in a secure location. This data was only accessible to the researcher and the researcher's supervisor.

Another ethical issue involved conducting the semi-structured interviews in an unbiased manner. To minimise this potential weakness, the semi-structured interview schedule allowed questions to be designed in such a way that participants could talk about their opinions freely, while responses could be probed without following a standardised set of questions or research agenda. The researcher only probed participants to share more thoughts and views on the waiting experience and the use of EHR in reducing waiting times.

3.9 Conclusion

This chapter outlined how the researcher conducted the research by identifying how participants were selected for the study and approached, as well as the methods employed by the researcher to collect and analyse data for the research. While the individuals who were willing to participate in this study were from Gauteng, the results would be of interest to other geographies. In the following chapter the researcher will present the findings of the research using thematic analysis underpinned by the three research objectives. These objectives are to gain an understanding of the experiences and perceptions of healthcare professionals in regard to waiting times in public health care, understand the current initiatives adopted by private and public healthcare facilities to address long waiting times, and understand how digitisation of medical records or EHRs enables public healthcare facilities within South Africa to reduce time taken to receive medical care.

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CHAPTER 4

PRESENTATION AND FINDINGS

4.1 Introduction

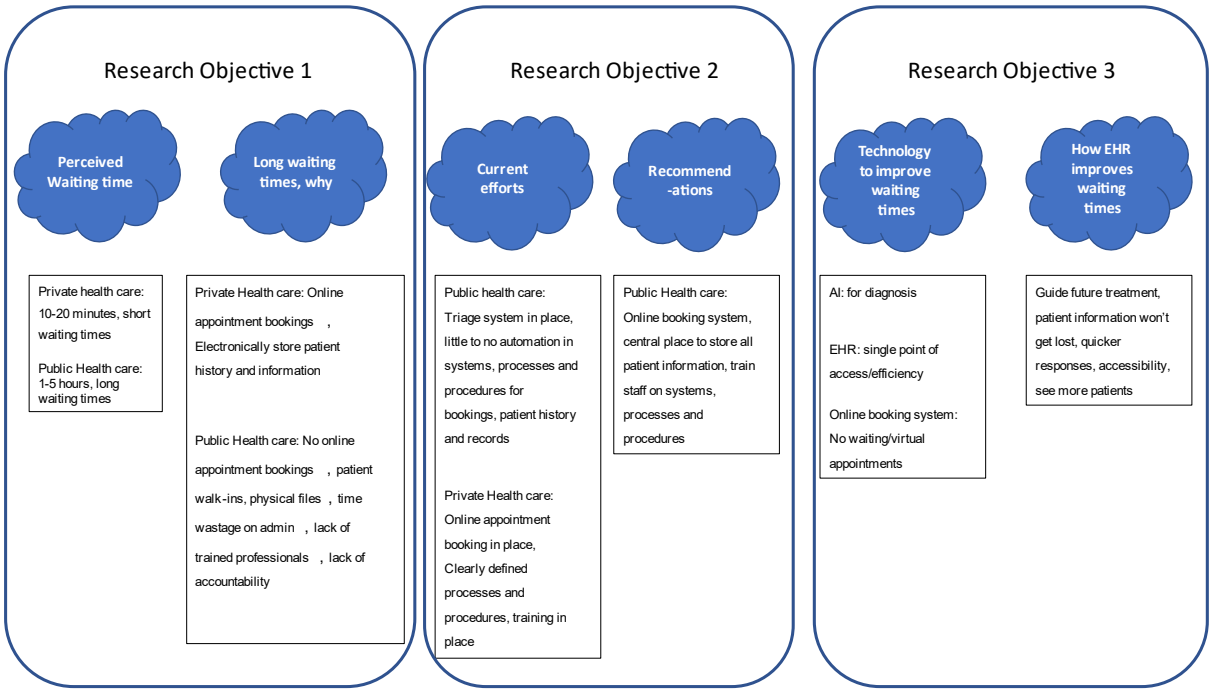
Outcomes of the interview schedule were investigated utilizing a thematic analysis. Research objectives guided the interview schedule, with the first objective being to explore the experience and perceptions of healthcare professionals about waiting times in healthcare facilities, both private and public. To satisfy the first research objective, the researcher's sample was limited to healthcare professionals currently in private practice, according to the reasons given for the delimitations of this research paper. To build a participant profile that would ensure a homogenous group, the researcher sought to understand the experience and opinions of the population regarding waiting times and technology and its frequency of usage in both private and public health care.

The second research objective was to gain a clearer idea of what is currently being done to cut long patient waiting times. To satisfy this objective, the researcher asked participants to provide experience-based insights about patient waiting times, the processes and procedures currently in place for bookings, patient history and records, and any recommendations for reducing waiting times at public hospitals. The third research objective was to explore healthcare professionals' thoughts on healthcare technology, such as EHR, and its efficiency in reducing the time patients must wait. To satisfy this objective, participants' thoughts were explored with regard to the use of technology to reduce patient waiting times.

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Thematic analysis was adopted for this study's data analysis and interpretation section. Each transcript was read in detail several times, and the researcher made great efforts to understand the content of the transcripts, as per the steps to conduct a thematic analysis outlined by Braun and Clarke (2006). Codes for key opinions and concepts were assigned in the transcripts. Thereafter, codes were grouped, and themes were assigned to each group of codes. Themes highlighted the commonalities among relevant responses as illustrated in Figure 4.1 below.

Figure 4.1: Thematic framework



4.2 Participant Profiles

Seventeen healthcare professionals volunteered for this study. All 17 identified as healthcare professionals and confirmed they were currently registered in the country as healthcare professionals with the HPCSA (Health Professions Council of South Africa) and

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were also currently active in private medical practice. Respondents' experiences, enabling them to provide opinions on public health care and its systems, came from their residency tenures, some volunteer work, and using public healthcare services for family members or employees. Participant profiles are illustrated in Table 4.1 below.

Table 4.1: Participant profiles

Interview question	Are you a healthcare professional?	Experience to provide relevant opinions	Frequency of use of health care
Codes	Yes	• Worked in public health care during residency. • Used public health care for a family member or employee. • Currently a healthcare professional for many years. • Volunteered at public health care.	• Private health care as a current profession with the frequency being 5-6 days a week. • Public health care during residency, using it on occasion not for self but for others. • Public healthcare volunteering several years ago.

Experience relative to the research: for Participant 3 this was 15 years as a medical doctor, and for Participant 11, it was 13 years as a medical operative. Both participants indicated that their training included at least five years of rotation in the public health sector: this is important because it gives the researcher opinions and recommendations from a population with experience in the researcher's topic.

Participant 3

Yes, as a medical doctor for 15 years, six in a public hospital and 12 in my own practice. I think I am able to provide sufficient information.

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Participant 11

Yes, I am medical personnel in, and have a private practice, for 13 years. I have experience in a public hospital for five years.

4.3 Perceived Waiting Times

To satisfy Research Objective One, two questions sought insights from respondents. The first was an opinion on how long patients generally waited before being attended to, and the second was the thoughts around patient waiting times and if there were long waiting times, why did this occur? Participants were probed for further explanation of possible reasons why patient waiting times in public hospitals were considered to be long.

Participant 4 indicated that patient waiting times in private health care run anything from 10 to 15 minutes. In comparison, patient waiting times in public health care can be anything from one to five hours. Participant 1 further stated that waiting times depend on the severity of the injury but that public health services have the longest patient waiting times compared to private health care.

Participant 1

It usually depends on the severity of an injury or why the patient needs to see a doctor. Often, the lower-severity patients can wait hours before being seen by a healthcare professional.

Participant 4

Anywhere from one hour to five hours in a public facility because patients walk in without appointments, and 10 to 15 minutes in my private practice because appointments are pre-booked.

Participants 2 and 12 provided insights that the shorter waiting times in private health care are attributable to two main factors. The first is an online platform that allows patients to

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book appointments at available times. The second is storing patient information electronically through the use of EHR systems.

Participant 2

In my practice, patients do not wait in line; they book an appointment to see me through our online patient booking platform. The only time a patient will wait is if I am running late from seeing a patient: even in this circumstance, my receptionist will update all the appointments booked for the day with the new times. At Charlotte Maxeke, it's different, there are no booking systems, and patients have to wait hours before seeing a healthcare professional.

Participant 12

Automated booking online and digitally storing patient information.

The insights provided on public health care identified four common areas that contribute to long waiting times. The first area mentioned was that no online platform for booking appointments for patients is available in public hospitals, as noted by Participant 3. Secondly, patient records are not stored electronically, and paper-based filing is predominantly used, as mentioned by Participant 7. This is problematic as participants indicated that patients' files and important historical information could be lost.

Participant 3

Ten minutes in my private practice because patients book their times through my online appointment-scheduling platform and possibly between one and three hours in a public hospital because there is no appointment scheduling system.

Participant 7

At the public clinic, there isn't much of a system, everything is still paper-based, and patients walk in as and when they have to.

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The third area noted by Participant 16 was that there are not enough healthcare professionals relative to the total number of patients needing care. This leads to patients facing longer waiting times to receive care. Lastly, Participant 8 noted that public hospital staff do not take accountability for providing care to patients.

Participant 16

Yes, there are not enough personnel to attend to the patients timeously, and too much time is wasted getting patient files.

Participant 8

Yes. From a public point of view, lack of professional resources. Lack of use of technology for patients' medical information. Lack of accountability from healthcare professionals in providing care to patients in public hospitals. Then in the private sector, there are minimal waiting times as resources are scheduled as per appointments. Process and procedures are clearly defined for the medical staff. A one-touch view of the patient's medical history and medication reduces waiting times.

4.3 Current Efforts

To satisfy Research Objective Two, two questions sought insights from respondents relating to this theme. The first looked for an opinion on what systems, processes and procedures are in place to reduce patient waiting times. The second question aimed to get a recommendation on what can be done to reduce long waiting times at public hospitals. Respondents provided insights that highlighted facilities running efficiently in private health care, as mentioned by Participants 2 and 4. Through the adoption of technology, patients can book specific times with healthcare professionals. Moreover, storing patient history electronically has helped reduce patient waiting times. Participant 3 provided insights into

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public health care and mentioned that the lack of technology in patient booking systems makes it difficult to see a healthcare professional promptly.

Participant 3

One and three hours in a public hospital because there is no appointment scheduling system.

Reportedly, patient history is not stored electronically and there is a lack of training and clearly defined processes and procedures for bookings, patient history and records (Participant 2). These issues were also noted by Participant 3 as areas or suggestions to alleviate patient waiting times in public health care. Participant 1 mentioned that public healthcare systems make use of triage: this could be adopted by private healthcare systems to further reduce patient waiting times.

Participant 1

The system in place at the public healthcare system is the triage system, which separates patients depending on the urgency of the treatment that the patient needs.

Participant 2

I find that no one wants to implement a system or process because it's too difficult and not sustainable, and the second is that there simply aren't enough trained professionals to deal with the number of patients that come in.

Participant 3

Review the manual processes that happen during the patient entering the ER to the time they are seen by a doctor and the medical chart accessed. If some of these processes can be automated, the wait time can be reduced.

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4.5 EHR Systems and Reducing Waiting Times

To satisfy Research Objective Three, two questions were put to respondents regarding EHR systems, seeking their insights and thoughts on whether technology can reduce waiting times and possible motivations for why they provided these insights. The second question sought participants' opinions regarding medical records being stored electronically and how this could reduce waiting times. Participants mentioned that technology could assist in reducing waiting times and add efficiencies to processes. They also mentioned the use of AI in patient diagnoses.

Participant 1

Yes, technology can assist by reducing the waiting time. Processes can be made more efficient and more streamlined rather than continuing with the manual processes that are currently in use. One example that works very well in private hospitals is using technology like Artificial Intelligence to make suggestions on what's wrong with a patient based on historical information.

The insights relating to technology that can be used to reduce waiting times were consistent among all the participants, and included Artificial Intelligence, electronic health records, online patient booking systems, and virtual appointments as proposals to help cut patient waiting times.

Participant 6

Virtual appointments and maybe some sort of technology that can capture blood pressure, heart rate, temperature as well as details on the patients' symptoms. Using those inputs to make recommendations on course or treatment, I am not sure if something like that exists, it will be pretty cool to have a tool like that.

Participant 12

Automated booking online and digitally storing patient information.

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Participant 16

The public hospital should move to a pre-booking system and store client records electronically.

Insights offered on the benefits of EHR included accessing patient data from anyone, anywhere, in the world, patient information not being lost, reducing patient waiting times, and increasing the number of patients that can be seen. The following chapter discusses the findings of each theme in greater detail, as well as linking the findings to the existing literature.

4.6 Conclusion

Using a thematic framework that is illustrated in a logical and easy-to-read format, the researcher was able to identify common themes from the participant responses to gain insights into the research problem. Common themes found were perceived waiting times, reasons for long waiting times, current efforts, recommendations for action, technology to improve waiting times, and how EHR can reduce waiting times. Extracts from the responses of participants were used to support the researcher's objectives. The next chapter will provide a discussion of the findings.

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CHAPTER 5

DISCUSSION OF FINDINGS

5.1 Introduction

Because public health is the initial point of contact for most South Africans, the goal of this study was to understand whether EHR systems can be used effectively in South African public hospitals to minimise long waiting times, an issue which has been cited as a significant factor influencing service delivery. The areas of specialisation of the 17 healthcare professionals who participated in the study vary from general practice to dentistry. Most of the participants have worked in emergency departments of both public and private healthcare centres. The study sample highlighted that as healthcare professionals, all participants have experience in private health care and a minimum of five years' experience and training in public health care. As a result, participants were able to provide input, opinions and recommendations relating to the waiting times experienced in public hospitals and the efforts being implemented for improvement. A qualitative method was used to explore the three objectives discussed in Chapter 1. Common themes related to the research objectives found in the study are discussed in this chapter.

5.2 Perceived Waiting Times

The waiting times experienced by patients differ substantially between private and public health care. Where participants of the study indicated that patients wait on average of 10 to 15 minutes in private health care facilities, they also indicated that waiting times in public healthcare settings can vary anything between one to five hours. Participants identified that public health care has no online booking systems and patients often walk in

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when health care is required. Moreover, patient details are kept in physical files and too much time is spent looking for files and updating records. Reportedly, there is also a lack of accountability and a shortage of the trained staff required to assist patients. This section will cover each of the identified areas in more detail.

5.2.1 Online booking systems and patient walk-ins.

Online patient booking is suggested as being a key contributor to efficient and responsive health care (Idowu et al., 2014). It allows the patient the flexibility to choose an available time slot to see a healthcare professional: this means patients don't have to walk in without appointments and wait for the next available time. It further helps to reduce the number of missed appointments, and the long queues that lead to long waiting times to receive care from a facility that is already overburdened. An online patient booking system, also known as a web-based system, is fast becoming the preferred method for booking appointments with healthcare professionals. Chapter 2 of this study identified online patient booking as an inbuilt function of EHR that reduces patient waiting times. Recommendations from the study participants strongly suggest the adoption of an online patient booking system and electronically stored patient history, discussed in the following section, as key factors to reduce patient waiting times.

5.2.2 Physical files and time wasted on administration.

Patient files provide a single source of information for healthcare professionals and often have a large quantity of data that assists the healthcare professional in making decisions on patient care (Ojerinde & Iroju, 2015). Improving efficiency and the quality of health care are the primary building blocks for the use of files as this creates consistency in the exchange of information (Ojerinde & Iroju, 2015). Accurate information allows

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healthcare professionals to make the right decisions at the right time, helping to provide timely quality care to patients when the material in a patient's file is transformed into meaningful information (Ojerinde & Iroju, 2015).

Typical information in patient files contains details of the results of any clinical or medical examination, any medical conditions, disease, or symptoms of medical issues that have been or are being investigated, analysed and captured. This is often in the form of X-rays, ultrasounds and other visual representations of imaging techniques in patient care (Ojerinde & Iroju, 2015). Patient files also include any costs associated with treatment and details of who will be responsible for costs. In some instances, patients – known as cash patients – pay for their own medical expenses; in other instances, patients are covered for medical expenses through medical aid schemes. Considering all the vital information collected in patient files, it is important that this is collected, stored and processed efficiently (Ojerinde & Iroju, 2015).

When this information is paper-based, the time taken to provide care can often have dire consequences, as information is not easily accessible when needed, especially in emergency departments. Paper-based systems bring interoperability risks if the patient requires treatment from various internal departments or healthcare facilities. Ojerinde and Iroju (2015) point out that there are also risks involved in the paper-based delivery of key pieces of information at the time of treatment, as these, in the form of physical files, might not be readily available at the time or point of treatment. Further risks arise of medical errors being made if information is lost from patient files (Ojerinde & Iroju, 2015). However, while EHRs provide a solution that moves away from paper-based systems and reduce the time spend on administration, the users of EHR systems must also be adequately trained to

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understand and effectively utilise the benefits of EHRs in improving systems, processes and procedures.

5.2.3 Lack of trained professionals.

Participant 11 mentioned training staff to use systems effectively. With the issues of complexity, diversity, geographic location, and differences in education levels and skills, a generic approach is proposed to address training. Explorance (2021) proposes five key areas of focus when formulating a training programme. The first area is to understand the training requirements and look at what is currently in place to address these requirements. If nothing is in place, the results will form the building blocks of training. Training objectives need to be set as a second step, and this is done by exploring any gaps in the proposed training and the necessary set of skills for the individuals to be trained. The gaps form part of a prioritisation list that is translated into objectives (Explorance, 2021). The third area proposed is to create an action plan that includes the needed elements, learning theories, instructional design and content materials (Explorance, 2021).

It is important to note that under the third proposed area, various delivery methods for training should be exploited. This includes, but is not limited to, online or virtual classes, webinars, training manuals, podcasts and videos. The next area is to establish whether training should take place through outsourcing or by using internal skills and resources. All resources required for the successful delivery of training need to be made available at the time of training, and these include equipment, facilities and training material. The last area proposed is to evaluate and revise the training (Explorance, 2021). This is achieved through constantly monitoring the impact of training against the training objectives or KPIs (which are discussed in the following section), follow-up training sessions, and constant evaluation with the stakeholders on the impact training has had on the intended area.

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5.2.4 Lack of accountability.

Participant 8 identified a lack of accountability as being a contributor to long waiting times in hospitals. According to Cohen and Bruijns (2018), key indicators of performance (KPIs) are widely deployed to improve accountability. This is a process-driven approach that is both efficient and timely. Quality health care is built on sustainability, equitability, efficiency, providing healthcare services in time, being patient-centred and effective (Cohen & Bruijns, 2018). To effectively measure quality in health care, KPIs in the areas of process, structure and outcomes should be identified and measured. The resources required to run a service such as staffing and infrastructure are structure-based KPIs, effective patient management process indicators, and outcomes following patient management (Cohen & Bruijns, 2018). Time-based KPIs are just as important when they improve the management and assessment of patients as this aids in improving waiting times from the time the patient gets to the healthcare facility, to seeing a healthcare professional, being admitted into a healthcare facility if needed, or receiving medication (Cohen & Bruijns, 2018).

5.3 Current Efforts

In relation to private health care, participants mentioned that the shorter waiting times experienced by patients are attributable to the implementation and use of an online patient appointment booking system. There are clearly defined processes and procedures for bookings, patient history and records, while training is in place within the private health sector. Meanwhile in the public healthcare sector, there is no automation of systems, processes and procedures for bookings, and patient history and records, according to participants. While training and online patient booking systems have been discussed in Chapter 5, in Sections 5.2.1 and 5.2.3 respectively, the following section discusses the

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triage system for health care, both private and public, as a factor that aids in improving patient waiting times.

5.3.1 Triage system.

While public healthcare systems can adopt online patient booking, defined processes and procedures for bookings, patient history and records, and training to improve patient waiting time, private healthcare systems can also adopt the triage system to further improve patient waiting times, as mentioned by Participant 1. The triage system aids in improving patient waiting times as it categorizes patients based on the severity and urgency of the treatment needed. Triage scores are given to patients relative to their healthcare requirements when visiting public healthcare facilities (Stott & Moosa, 2019).

Triage scores further assist in the allocation of patients to the proper healthcare professionals. This aids in reducing waiting times as the patient sees the correct healthcare professional at the first referral. Two areas of influence underpin the triage system. The first involves using the right equipment, infrastructure and documents as protocols for sorting patients and allocating triage scores (Stott & Moosa, 2019). The second important area of influence relates to ensuring that the triage system is adopted throughout the entire healthcare facility and not just in pockets of the hospital. This adoption means that the staff allocating triage scores must be well trained and able to allocate scores effectively to realize the benefits of the triage system.

5.4 Technological Advances and EHR

While it may be challenging to reduce patient waiting times to zero, electronic health records provide a way to reduce the current burden faced in public health care (Kamble,

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2021). Kamble (2021) identifies six building blocks for a successful EHR system. The first involves sending patients a digital form that collects patient information such as past illnesses and medication, the reason for the visit, and other key pieces of information that will aid the healthcare professional during the actual appointment. The second is to ensure that the healthcare professional is spending time on patient care and not wasting it on related administrative functions. All functions that do not involve patient care, such as arranging tests and recording and updating patient information, must be delegated to the healthcare professional support areas to update the EHR system (Kamble, 2021). The third building block is to explore all communication methods going beyond phone calls to communicate with patients. The fourth is to provide automation rules for patients who miss appointments. If a patient is late or does not arrive for a scheduled appointment, the EHR system will either inform the next patient of the proposed new time or cancel the appointment for the patient who is running late. The fifth building block relates to using AI to build intelligence around patients' visits, including the average time taken with the healthcare professional for certain conditions, time taken for a patient to arrive from home at the healthcare professional's practice, and how external factors like traffic or weather affect travel time. This material can be used as value-added data and information to inform more efficient patient care. The last building block is to provide patient care through telemedicine.

5.4.1 Artificial Intelligence.

Participant 1 mentioned the use of Artificial Intelligence (AI) as a method for patient diagnoses and to reduce the time patients wait. A study by Li et al. (2021) found that by accessing key pieces of information about a patient through AI, followed by AI then analysing this information and providing outcomes, there was a reduction both in costs and patient waiting time. The study further found that using AI technology to design processes

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within health care could further assist in reducing patient waiting time without increasing the workload of healthcare professionals (Li et al., 2021). Moreover, machine learning in AI can predict waiting times and time delays in schedules for seeing a healthcare professional and proactively identify contributors that affect patient waiting time.

AI is therefore clearly a potent tool to enhance operational efficiency, patient monitoring and patient flow, all of which reduce patient waiting times (Jiang et al., 2017). AI improves operational efficiency by using algorithms to predict delays in appointments and helps with resource optimisation (Jiang et al., 2017). In this way AI tools can assist healthcare professionals in both decision-making and by in-patient monitoring where patients are left unattended. This allows for a quick, proactive response time to patient care as it makes provision for attention through AI technology as opposed to a reactive approach where problems are only picked up physically by a healthcare professional (Jiang et al., 2017). AI tools also help optimise the forecasting of patients visiting healthcare facilities. Having advance knowledge of the expected flow of patients assists healthcare professionals to plan and reduce stress and burnout in systems and processes, while further optimising the availability of resources (Jiang et al., 2017).

5.5 Conclusion

The discussion of findings provided an interpretation covering key areas identified relative to the research objectives. The importance of an online booking system that can contribute towards efficiently matching a patient up with available health care offers significant benefits for reducing patient waiting times. Storing patient information electronically contributes higher quality data for use by healthcare professionals and aids in reducing situations where time is spent looking for physical files. Such time can be better used to treat patients. Training and accountability form part of a critical step in the value

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chain of delivering care to patients, as patient expectations are that healthcare professionals will always be equipped with up-to-date information in the medical field. While patient waiting times in public healthcare facilities are long, there are systems, such as triage, that have been deployed and have reported degrees of success. However this research identifies a multi-faceted approach that exploits technology to reduce patient waiting times. In the following and final chapter the researcher will identify any limitations to the study, provide a conclusion, and make recommendations for areas of further research.

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CHAPTER 6

LIMITATIONS, RECOMMENDATIONS AND CONCLUSIONS

6.1 Introduction

This research paper seeks to understand the perceived value of digitising electronic health records. The summary of conclusions drawn from the findings is based on the qualitative research methods applied by interviewing various healthcare professionals and analysing the data using a thematic approach. The researcher also presents suggestions for additional research that can be implemented for the benefit of the healthcare sector.

6.2 Limitations

The study aimed to provide information on the perceived role of the digitization of electronic health records (EHRs) in South African hospitals. Only participants from the private healthcare field were approached to take part in the research, because of the lengthy process involved in gaining approval from public hospital structures for research involving healthcare professionals, nurses and patients. This study is therefore limited as to what it can contribute to broader public healthcare settings as only the views and opinions of healthcare professionals in private practice were used.

Participants preferred video conferencing as a medium for the interviews. There were two reasons. These were their concerns about Covid-19 infection and the availability issue. The first concern related to possible infection and further spread of the Covid-19 virus by participants and the researcher. Participants, being at a higher risk of contracting the virus, sought to mitigate such risk in as many ways as possible, one of these being the

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limiting of contact with unknown people (other than patients). The second limitation involved time constraints. When this research was being conducted, participants felt themselves to be under great pressure to provide care to their patients, leaving them with very little time for involvement in research interviews.

6.3 Summary of Findings

The research sought to understand the perceived role of EHR systems that could be used effectively in South African public hospitals to minimise waiting times, this being considered a significant component of healthcare service delivery. Using a qualitative approach and applying snowball sampling, healthcare professionals were interviewed to evaluate the perceived impact of EHR systems. Through semi-structured interviews, the researcher posed questions that addressed the three research objectives.

6.3.1 Theme 1: Perceived waiting times.

Three main themes were identified across the transcripts, based on thematic analysis of the findings of the research. The first identified theme was the perceived waiting times in healthcare facilities. Codes identified under the first theme were online bookings and patient walk-ins, physical files and time wasted on administration, the lack of trained professionals and the lack of accountability. The findings showed a substantial variation in time spent waiting between public and private healthcare facilities. A patient in a private healthcare facility can expect to be assisted and provided with care in under 30 minutes, while a patient in a public healthcare facility might wait several hours before being seen or attended to by a healthcare professional.

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6.3.1.1 Online booking system and patient walk-ins.

Participants noted that the difference in waiting times involved the absence of an online booking system: this absence contributes to patient walk-ins. Patients cannot pick a time slot to see a healthcare professional and, as a result, must just wait until one is available.

6.3.1.2 Physical files and time wasted on administration.

Participants indicated that patients wait longer at public healthcare facilities because too much time is spent searching for files and updating records manually. Patient files contain essential information that assists a healthcare professional to provide care quickly and accurately, for which reason patient files must be easily accessible. Participants noted that patient data is predominantly stored on paper and so the time it takes to provide care can be lengthy, especially in emergency rooms, because the necessary information is not readily available. According to the findings, if a patient requires care from multiple departments inside the hospital, paper-based files pose a risk since they may not be readily available and can often become misplaced or even lost.

6.3.1.3 Lack of trained professionals.

Participants mentioned that another area contributing to the long waiting times is the lack of training in systems, processes and procedures. The researcher identified a method of reaching and training healthcare professionals that allows for training in a structured and measurable way. This method is underpinned by five areas. It involves documenting the training requirements to clearly understand what training is currently in place, versus training needed, which will form the training objectives. With objectives codified, a plan can be formulated covering the training areas, types of skills and resources required to train.

Sensitivity: Public

6.3.1.4 Lack of accountability.

Another area that further impacted waiting time was the absence of accountability in public healthcare settings. The researcher identified the adoption of KPIs as a method to make healthcare professionals accountable in the delivery of health care. KPIs should be structured around improving the experience and cutting waiting times by providing a healthcare professional with structured objectives to be met.

6.3.2 Theme 2: Current efforts.

The second identified theme relates to current efforts applied to reduce waiting times for patients using public healthcare facilities. Triage is a system that public hospitals have adopted.

6.3.2.1 Triage.

A triage score is allocated to patients based on their specific health requirements and the urgency of the required health care. This process assists in reducing the waiting time as the correct healthcare professional can see patients at the inception of a visit to healthcare facility, thus fast tracking the time it takes to obtain treatment.

6.3.3. Theme 3: Technological advances and EHR.

The last theme identified during the data analysis involves technological advances and EHR systems. The researcher identified the necessity to use an EHR system based on accuracy and quality. The immense benefits gained from EHR systems can only be realised if the correct information is captured and maintained. The EHR system forms the basis of interventions adopted to cut patient waiting times. Participants indicated that the use of AI in healthcare systems could also assist with patient diagnoses, reduce waiting times and further support the EHR system in improving healthcare delivery.

Sensitivity: Public

6.2.3.1 Artificial Intelligence.

AI tools can aid healthcare professionals to make decisions on patient monitoring when patients are left unattended. AI enables a faster, proactive response time because changes requiring attention are noted through AI technology rather than a reactive approach where problems are only detected physically by a healthcare professional (Jiang et al., 2017).

6.4 Recommendations

The research and findings of the study have identified five areas for the improvement of patient waiting times, supported by Chapter 2's literature review. An online patient booking system can be implemented to allow patients flexibility in scheduling or cancelling appointments. This can potentially reduce the number of walk-ins at public hospitals and the number of missed appointments. Reducing the number of walk-ins can assist in reducing the long waiting times. Data provided during the scheduling of appointments can also include various items of information that healthcare professionals can utilise to assess a patient accurately before an appointment. The findings also suggested that the implementation of technologies to improve healthcare service delivery would only be successful if staff were properly trained. Healthcare professionals need to be trained on existing and new systems, processes and procedures. Regular evaluation of the effectiveness of training is needed to ensure that staff utilise the systems, processes and procedures effectively to reduce patient waiting times. KPIs against which healthcare professionals are measured can be introduced to assess competency. These KPIs can include – but are not limited to – time-based KPIs, processes and procedures adhered to by staff, the quality of the health care provided to patients, and efficiencies, outcomes and patient service.

Sensitivity: Public

EHR systems need to be implemented in more hospitals, especially in public healthcare environments. Adoption of EHR systems in hospitals that serve the majority of the population will assist in the reduction of patient waiting times. Patients could have access to their EHR records up to a certain level, allowing the active management of health records. Consistently updated patient records can reduce the possibility of incorrect information being used during patient diagnoses. Centralised data storage, and the rate at which records are made available, can improve patient care by reducing waiting times linked to paper-based procedures and storage. EHR systems that are integrated into supporting systems enable the sharing of information for patients at a faster rate than physical charts permit, thus cutting the time before a patient receives the necessary care. Adopting and implementing AI in public health care will increase efficiencies and processes. The integration of AI into EHR systems to access patient records could assist patients who are left unattended and assist with diagnosing common illnesses, thus reducing the workload on already overburdened staff at a hospital. AI can further allow easier access to schedules and appointments, predict appointment delays by using algorithms, and provide updates to patients and healthcare professionals regarding patient appointments.

6.4.1 Further research.

For further research, the following studies are recommended:

- Implementation of AI in healthcare facilities;
- Exploring integration of healthcare systems locally and internationally; and
- A longitudinal study to see how patient waiting times before receiving health care in public hospitals may change.

Sensitivity: Public

6.4.2 Practical implications.

Several areas for improvement were identified in this research. To improve waiting times, the researcher proposes implementing an online booking system to assist patients in selecting convenient time slots and appropriate healthcare facilities to avoid waiting before being attended to.

Electronic patient files can be linked to the online booking system. Multiple departments of the healthcare facility will benefit from the use of electronic files as this provides a single source of valid information.

The researcher proposes regular training, skilling and upskilling of staff in healthcare facilities, to be undertaken in a periodic and measurable way to provide higher care quality and service to patients.

6.5 Conclusion

Waiting times experienced by patients at public hospitals are longer than those at private hospitals in South Africa. Waiting times have been cited as a major concern regarding access to proper health care. Findings from the current study indicated the adverse effects of long waiting times. Patients in public hospitals often feel unsafe and neglected: this causes distress to both patients and staff. The study further indicated that the digitisation of medical records and the automation of processes and specific administrative tasks, together with the use of AI in healthcare facilities, could reduce the long waiting periods that patients experience. Hospitals can leverage data and available technologies to mitigate patient waiting times by implementing EHR systems.

Sensitivity: Public

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APPENDIX A: Ethical Clearance

Graduate School of Business Administration
University of the Witwatersrand, Johannesburg

Wits Business School

Wits Business School Ethics Committee
Constituted under the University Human Research Ethics Committee (Non-Medical)

Ethics Clearance Certificate

Ethics protocol number: WBS/DB2383864/162

This certificate is only valid with a legitimate ethics protocol number and signed by the Researcher (below,

Project title	The perceived role of digitisation of Electronic Health Records in South African hospitals
Investigator / Researcher	Mr Ashleigh Laullchander
Nature of Project	MM (Digital Business)
Decision of the Committee	Approved, provided stakeholders and participants are guaranteed anonymity and confidentiality.
Issue Date of Certificate	2021-09-26
Expiry date	Date of submission of the project report
Chairperson	Prof Anthony Stacey ☎ +27 11 717 3587 +27 82 880 4531 anthony.stacey@wits.ac.za

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Declaration by Researcher

One copy must be signed by the Researcher and returned to the Chairperson of the Wits Business School Ethics Committee.

I fully understand the conditions under which I am authorized to carry out the abovementioned research and I guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I undertake to resubmit the protocol to the Committee.

Signature _____ Date: _____

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APPENDIX B: Interview schedule

Respondent (1-30)	
Date	
Time	

1. Are you a healthcare professional currently in your own private practice that has used a Public Health facility?

2. Do you have sufficient experience in using or working in/with or used the Public and Private Health Care System to provide an opinion on the waiting times and technology used, If Yes can you explain why?

3. How often do you use the Public and Private Health Care System?

4. How long do patients generally wait in line before being attended to?

Sensitivity: Public

5. Do you think that Patients experience long waiting times, if Yes can you explain Why?

6. What systems, processes or procedures are in place to reduce waiting times?

7. Do you think technology can assist in reducing the waiting time to see a healthcare professional? If Yes can you please tell me how.

8. If medical records were stored electronically and available at the touch of a button would this help reducing waiting times? If Yes, please explain how.

9. If given the opportunity, how will you improve the waiting time?

Sensitivity: Public

APPENDIX C: Consent

Title of project: The perceived role of digitization of EHR in South African Hospitals

Name of researcher: Ashleigh Laullchander

I, ……., agree to participate in this research project. The research has been explained to me and I understand what my participation will involve. I agree to the following:

(Please circle the relevant options below).

I agree that my participation will remain anonymous	YES	NO
I agree that the researcher may use anonymous quotes in his / her research report	YES	NO
I agree that the interview may be audio-recorded	YES	NO

…… (Signature)

…… (Name of participant)

…… (Date)

…… (Signature)

…… (Name of person seeking consent)

…… (Date)

Sensitivity: Public

APPENDIX D: Participant Information Sheet

Dear participant

My name is Ashleigh Laullchander and I am a Masters student in Master of Management in the field of Digital Business at the University of the Witwatersrand, Johannesburg. As part of my studies, I have to undertake a research project. I am researching the perceived role of digitization of EHR in South African hospitals.

The research will be conducted under the supervision of Dr Jenika Gobind. The aim of the research is to understand how technology can assist in reducing the waiting times in hospitals. Your support by participating in research study would be much appreciated. I would like to invite you to a one-hour interview. The interview will be scheduled according to your availability and all data related to the interview will be kept confidential. Please note that your participation is voluntary, and you will not receive any direct benefits from participation. If you have any questions, feel free to contact me. This study will be written up as a research report which will be available online through the university library website.

Yours sincerely,

Researcher:

Ashleigh Laullchander

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Supervisor:

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Sensitivity: Public

APPENDIX E: Master of Management Approval of Title

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Private Bag 3 Wits, 2050
Fax:
Tel:

Reference: Ms Jennifer Mgolodela
E-mail: jennifer.mgolodela@wits.ac.za

03 January 2022
Person No: 2383864
PAG

Mr A Laullchander
29 Bellas Place, 5TH Road
Sonneglans
Honeydew Ridge
2170
South Africa

Dear Mr Ashleigh Laullchander

Master of Management: Approval of Title

We have pleasure in advising that your proposal entitled *The perceived role of digitisation of Electronic Health Records in South African hospitals* has been approved. Please note that any amendments to this title have to be endorsed by the Faculty's higher degrees committee and formally approved.

Yours sincerely

Mrs Marike Bosman
Faculty Registrar
Faculty of Commerce, Law and Management

Sensitivity: Public