

NATIONAL GUIDELINE ON MANAGEMENT OF PATIENT WAITING TIME IN CLINICS, COMMUNITY HEALTH CENTERS, AND OUTPATIENT DEPARTMENTS OF PUBLIC HOSPITALS OF SOUTH AFRICA

October 2023

Contents

Foreword by the Director General- Health.....	1
Acknowledgement	2
1. Acronyms	3
2. Definition of terms as used in the guideline	4
3. Introduction and contextual factors associated with patient waiting time in clinics, community centers and outpatient departments of public hospitals of South Africa.....	5
4. Legislative mandate and policy prescript	7
5. Purpose and objectives of the guideline	8
6. Scope and application of the guideline	9
7. Measurement of patient waiting time	9
8. Addressing factors associated with patient waiting times in clinics, community centers and outpatient departments of public hospitals of South Africa.....	16
9. Service Delivery Improvement.....	21
10. Key messages for succesful management of patient waiting time clinics, community health centers and outpatient departments of public hospitals of South Africa.....	23
11. Conclusion.....	23
12. Figures	
Figure 1 : Example of results of measurement of patient waiting time.....	14
13. Tables	
Table 1: Aspired aspired maximum patient waiting time in Outpatient departments of various levels of public hospitals.....	10
Table 2: Adjusted International and South African triage coding system.....	11
Table 3: Predetermined sample size for use in measuring patient waiting time.....	11
Table 4: Example of results of patient waiting time.....	13
14. Annexures	
Annexure A: Data collection tool.....	24
Annexure B: Data collation and reporting tool for PWT (in minuts) for OPDs of public hospitals of South Africa	25
Annexure C: Data collation and reporting tool for PWT (in minutes) for Clinics and CHCs	26
Annexure D: Template for improvement of patient waiting time	27
Annexure E: Features of the passive multifunctional and automated systems for measuring PWT.....	28
Annexure F: Stakeholder participation and contribution on the guideline.....	31

FOREWORD BY THE DIRECTOR-GENERAL OF HEALTH

The public health care system is currently overburdened by justifiable demands for care, in particular an increase in the burden of diseases and increasing number of patients seeking care. Studies have proven that the length of time that a patient waits to receive health services is one of the important drivers of satisfaction and compliance with treatment and is indeed one of the commonest, most consistent bitterness issues that most complain about.

The Department of Health remains committed to providing an improved quality of services to all the people seeking care in our public health establishments through proper management of patient waiting time systems.

Various interventions have been implemented in our public health establishments to improve patient waiting time and satisfaction, however; the effects thereof differ across health establishments. In our quest to improve patient waiting time, we therefore align ourselves with globally and locally proven initiatives for improving patient waiting time.

Successful implementation of this guideline requires concerted efforts from all levels of health in particular, managers from provincial Quality Assurance and Improvement units, Public Relations and or communication officers, sub/districts and front-line staff members including clinicians and respective managers.

The outcome of our efforts in improving patient waiting time will be communicated by users of health services through various feedback including, among others, Patient Experience of Care surveys, other media platforms focusing on patient feedback including inspection reports from the Office of Health Standards Compliance.

I therefore urge all public health officials to consciously be guided by this National Guidelines on Management of Patient Waiting Time in Clinics, Community Health Centers, and Outpatient departments of public hospitals in South Africa and to do everything in their power to improve patient waiting time.



Dr SSS Buthelezi

Director-General: Health

Date: 14/12/2023

ACKNOWLEDGEMENT BY THE DIRECTOR-GENERAL OF HEALTH

The development of the National Guideline on Management of Patient Waiting Time in Clinics, Community Health Centers, Outpatient Departments of public hospitals of South Africa required rigorous inputs from various experts and stakeholders, thus it took time to research, consult, test, re-test to finalize.

Many officials in the public health establishments and health partners shared their contribution to the development, testing and compilation of this guideline. Therefore, we would like to express our sincere appreciation to every one of them for their contribution to this guideline.

Although acknowledging people by names carries the risk of unknowingly excluding other contributors, allow me to convey my appreciation to various advisory committees of the Technical Committee of the Health Council, namely the National Services Platform, National Health Information System of South Africa (NHISSA), Senior Management Committee and other officials from the National Department of Health and to Dr Gavin Reagan from the School of Public Health in the University of Western Cape for his guidance on measurement system of patient waiting time.

I would like to convey our gratitude to one of our health partners, namely, John Snow Incorporate: SA for drafting communication system on managing patient waiting time, Operation Phakisa: Health – Patient Waiting Time stream for guiding the technical content of the guideline, MEASURE Evaluation–Strategic Information for South Africa (MEval-SIFSA) for extensive research on various automated mechanisms that may be used to objectively measure patient waiting time, and to Ms. Annie Jautse in the NDoH: QAI for spearheading the research, development, documenting and finalisation of this guideline.



Dr SSS Buthelezi

Director-General: Health

Date: 14/12/2023

1. ACRONYMS

CHC-Community Health Centre

CCMDD - Central Chronic Medicine Dispensing and Distribution

EEDD - existing event driven data.

EML-- Essential Medicines List

FtA - Failure to Attend

GDP - Gross Domestic Product

IPC – Infection Prevention and Control

NHI – National Health Insurance

OPDs - Out Patient Departments

OPDPs – Outpatient Department Pharmacies

PWT - Patient Waiting Time

RFID-Radio Frequency Identification

SATS – South African Triage Scale

SDI - Service Delivery Improvement

SMS - Short Message System

TSIE - Time Spent in the Establishment

TSRS - Time Spent Receiving Services

TTO- Treatment To be taken Out.

TSWFS - Time Spent Waiting for Services

USSD - Unstructured Supplementary Service Data

WBPHCOT - Ward based Primary Health Care Outreach Team

HPRS- Health Patient Record System

2. DEFINITION OF TERMS AS USED IN THIS GUIDELINE

- OPD - Outpatient departments include all service areas that provide outpatient services such as patient information desks, patient record/registry departments, various hospital clinics, outpatients' pharmacy, radiology, Accident and Emergency departments.
- PWT - the time spent by a patient waiting for health services in the health establishment per visit taking into consideration the official opening time of the health establishment. It is calculated from the time the patient arrives at a service point/area to the time they receive the service. The sum of patient waiting time for healthcare service at every point/area per their visit in the health facility is therefore regarded as the
- Time spent in the health establishment - a sum of a time spent waiting for services and a time spent receiving services per patient visit to the public health establishment. It is calculated from the time the patient arrives at the reception area of the health establishment to the time they leave the health establishment.
- Service time - the total time spent interacting with the health professional and is calculated from the time the health service is provided in response to the patient presentation to the time the service is completed, and the patient departs the service area.
- Measurement - a process of determining how long the patient waits for services, for receiving services and aspired maximum time they spent in the health establishment per visit as compared with the relevant standards.
- failure to attend - the patient did not show up in the health establishment and or a service area as per appointment or expectation.
- Median - any number that lies in the middle (midpoint) of the numerically arranged numbers. In an instance where the numerically arranged numbers are even, the two middle numbers (midpoint) are added together and divided by two to obtain a median.

3. INTRODUCTION AND CONTEXTUAL FACTORS ASSOCIATED WITH PATIENT WAITING TIME IN CLINICS, COMMUNITY CENTRES AND OUTPATIENT DEPARTMENTS OF PUBLIC HOSPITALS OF SOUTH AFRICA.

Patient waiting time for services is among the most common patients' complaints and is one of the emerging and increasingly important parameters employed in the assessment of health care qualityⁱ. Long patient waiting time for health services in the clinics, CHCs and Outpatient departments of public hospitals is therefore one of the commonest, most consistent bitterest complaints of people using public health facilitiesⁱⁱ. Studies have further proven that the length of time that the patient waits to receive health services is one of the important drivers of satisfaction and compliance with treatmentⁱⁱⁱ. Increased patient dissatisfaction with care and litigations emanating from complications of health conditions that happen while waiting for healthcare services negatively influence daily health care seeking pattern of patients^{iv}.

In many health establishments justifiable demands for services is greater than the capacity at hand. This may be explained by daily long queues for services where, in some instances, patients return home without having received the required health services. In South Africa, 84% of the population access health services from public health sector while 16% receive health services from the private sector. Both the public and private health sectors equally share the Gross Domestic Product's (GDP) expenditure on health.

To correct the disparity between the public and the private sector, the South African government is implementing the National Health Insurance (NHI) whose purpose is to ensure that all South Africans have equal access to universal quality health care as enshrined in the Constitution^v.

As the NHI program is unfolding, it is important to understand and consistently measure other factors which are associated with PWT in Clinics, CHCs, and OPDs of public health establishments and use such findings to improve PWT. Emanating from years of observations, patient feedback, complaints, literature studies and various analytics, factors that are associated with PWT for services in clinics, CHCs and Outpatient departments of public hospitals include

- Organizational practices

- absence of a standardised patient waiting time that should be used to guide efficiency of service provision.
- batch booking (appointments) of all patients in the mornings with no matching staffing to provide respective services.
- performance of other administrative work such as meetings, in-service trainings, and cleaning/housekeeping of facilities in the mornings when there are already many patients waiting for services.
- Absence of fast lane queues for critically ill, aged, disabled patients and school children
- Staffing
 - a mismatch of staff members with the number of patients seeking health care
 - Absence of a consistently staffed information desks and patient triage to guide patients and prioritise urgency of services respectively.
 - Management oversight and supervision
- Building infrastructure
 - Poor signages to allow easier navigation of patients through the health establishment result in patients getting lost and thus spend long time searching for services.
 - Long patient waiting for files that are not easily found due to poor patient record storage and management systems. This includes multiple storage areas of patient files that are always far from the front desk.
- Patient factors
 - Failure to comply with the agreed upon appointment dates and times.
 - Preferential use of certain health establishments over others irrespective of the patients' health conditions.
- Others
 - inappropriate referral systems including suboptimal use of other services such as CCMDD resulting in overcrowding of facilities.
 - lack of medicines at some facilities (as per EML prescripts) for special health conditions requiring patients to seek services in facilities elsewhere.

To address the other factors that are associated with PWT, various mechanisms have been implemented in different health establishments over the years, however, long PWT for services remains one of the priority issues that inform overall patient satisfaction.

4. LEGISLATIVE MANDATE AND POLICY PRESCRIPTS

Management of Patient Waiting Time in clinics, Community Health Centers and Outpatient departments of public hospitals is guided by pieces of various legislation, policies and guidelines that advocate for efficiency and responsiveness in the provision of care in the Public Healthcare system. Such legislation entails

4.1 The South African constitution: Section 27: Bill of Rights: everyone has a right to access health and reproductive health (2) The state must take reasonable legislative and other measures, within its available resources, to achieve the progressive realization of each of these rights.

4.2 Norms and Standards Regulations applicable to different categories of Health Establishments: Item 22: The health establishment must monitor patient waiting time in line with the national core standards for health establishments in South Africa.

4.3 Patient Rights Charter: Access: Everyone has the right of access to health care services that includes

- (i) receiving timely emergency care at any health care health establishment that is open regardless of one's ability to pay.

4.4 Negotiated Service Delivery Agreement: Sub-Output 4.4.2: Improving Patient Care and Satisfaction "To ensure that patients don't face long waiting times"

4.5 South Africa's Ministerial Priority Areas of Care to fast-track improvement of healthcare services namely, patient waiting time for services, staff attitudes, cleanliness, patient safety and security, Infection Prevention Control, availability, and use of medicines.

4.6 Operation Phakisa: Health: 2: Patient waiting time is a time spent by a patient waiting for health services per visit taking into consideration the official opening time of the health establishment. It is calculated from the time the patient enters the health establishment (taking into consideration the official opening time of a health establishment) to the time

the patient leaves the health establishment. Operation Phakisa:2 defines PWT in PHC establishments as the aspired maximum time that every patient is expected to wait per visit and that it is two hours. Taking into consideration the time to be spent receiving healthcare services of one hour, the overall targeted time to be spent by a patient in a health establishment per visit is therefore, three hours.

4.7 The service time is the time spent receiving a healthcare service per patient visit.

4.8 The South African triage scale which is an effective scientific tool to ensure that the most seriously ill and or injured are attended to with the appropriate urgency that is required, prioritizes patient waiting time according to various colour codes.

5. PURPOSE

Patient waiting time for services is one of the priority issues in health service delivery. The risk of not improving patient waiting time for services may lead to various negative results such as the

- quality of care further decreasing as workload continuously increases,
- decreasing staff morale and increasing staff dissatisfaction with the situation. This may manifest itself in various forms such as negative staff attitude towards patients, high staff turn- public over, escalating adverse events and potential rise in litigations to persons or establishments,
- higher treatment defaulting rates and resultant increase in bacterial / viral resistance to medications,
- high morbidity and mortality
- frustration and aversion to the health system increases,
- a collapse of the health care system as patient flow into health establishments increases and the system just becomes totally unmanageable^{vi}.

There is a need to comply with the available legal and policy frameworks and to realize the benefits of quality health care, especially that which prescribe that health services must be timely, equitable, integrated, and efficient^{vii}.

5.1 It is in this regard that this guideline aims to provide generic guidance on management of Patient Waiting Time in clinics, Community Health Centres and Outpatient departments of public hospitals SA.

5.2 This aim will be realised by describing and recommending methods that should be employed to

5.2.1 measure patient waiting time.

5.2.2 analyze the results.

5.2.3 improve patient waiting time.

6. SCOPE OF APPLICATION

The guideline is applicable for use in all Clinics, Community Health Centers and Outpatient Departments of public hospitals of South Africa.

7. MEASUREMENT OF PATIENT WAITING TIME

Measurement of PWT requires that the **aspired (maximum) patient waiting time** be determined, consistently sign-posted at every service area for patients to see. Health care providers should then dedicate specific efforts to comply with the aspired patient waiting time.

Other variables that always come to the fore when managing PWT are “service times” and “times spent in a health establishment per patient’s visit”.

The **service time** is the time spent receiving a health service per patient visit to the facility^{viii}. The time spent receiving services may not be easy to standardize in clinical service areas due to the complexity and uniqueness of health conditions that each patient present with e.g., the provision of a service for a patient who presents with various co-morbidities and complications may take longer than that of a patient who presents with only one, uncomplicated health condition.

The **time spent in a health establishment** is the entire time that the patient spends in a facility per visit. It is a sum of patient waiting time and time spent receiving health services.

7.1 Determining the aspired maximum Patient Waiting Time

Due to complexity of healthcare services and health conditions that patients present with, there is a variation of PWT in various levels of health services, namely, clinics, Community Health Centers (CHCs) and outpatient departments of public hospitals.

7.1.1 Clinics and CHCs

In clinics and CHCs, the aspired maximum patient waiting time for services is 120 minutes (two hours) while the total time spent receiving services at various service points per patient visit is sixty minutes (one hour). The aspired maximum time to be spent by a patient per visit is therefore, 180 minutes (three hours)^{ix}.

7.1.2 Hospital Outpatient Departments

In hospitals, the aspired maximum patient waiting time is informed by the complexity of the patients' health conditions, the need for undergoing diagnostic tests and or intervention by multiple clinical specialists and respective treatment options before a patient can leave the service area.

Over the years, various investigative mechanisms such as literature studies, operational research, observations, and complaints from patients about PWT, demonstrated that the measurement of PWT vary across hospitals hence the need to determine aspired maximum PWT.

Considering the feedback received from frontline workers and trends in PWT for services in outpatient departments of hospitals, it is estimated that in specialized, district, regional and tertiary/central hospitals, the average PWT for healthcare services per visit is 60, 120, 120 and 140 minutes, respectively. The aspired maximum PWT for services, service time and aspired maximum time spent per patient's visit in the outpatient departments of public hospitals is therefore outlined in table 1.

Table 1: Aspired maximum PWT for services, service time and aspired maximum time spent per patient's visit *

LEVEL OF FACILITY	PATIENT WAITING TIME FOR SERVICES	TOTAL TIME SPENT RECEIVING SERVICES	TOTAL TIME SPENT IN A HOSPITAL
Specialized hospitals	60 minutes (1 hour)	60 minutes (1 hour)	120 minutes (2 hours)
District Hospitals	120 minutes (2 hours)	60 minutes (1 hour)	180 minutes (3 hours)
Regional hospitals	120 minutes (2 hours)	120 minutes (2 hours)	240 minutes (4 hours)
Tertiary/Central hospitals	140 minutes (2 hours and thirty minutes)	190 minutes (3 hours)	320 minutes (5 hours thirty minutes)

7.1.3 Accident and Emergency departments

In the Accident and Emergency departments of a hospital, patient waiting time is informed a patient's health condition as well as the required urgency to address them to save life and or complications. The adjusted International Triage coding system and South African Triage System (SATSA)^{xi} was considered to inform the aspired PWT in (A&E) departments.

On arrival of the patient at the A&E department, clinicians assess the patient's condition in a quick but organized approach utilizing a specific method of documenting patient's health condition, namely, Subjective, Objective, Assessment and Planning (SOAP). Quick assessment of a patient on arrival in A&E is utilized to determine the urgency of intervention and prioritization. The four colour codes are used to communicate the severity of a health condition and required urgency of intervention as outlined in table 2.

Table 2: Adjusted Triage coding system

Colour code	Aspired maximum time to be spend waiting
Red	No waiting
Orange	ten minutes
Yellow	thirty minutes
Green	one hour

It is therefore important to use the adjusted triage system to ensure that patients receive the required service within the aspired PWT to reduce the negative impact of a delay in treatment on prognosis of the patient.

7.2 Determining the sample size for measuring PWT.

A representative sample size for use in measuring patient waiting time is informed by daily patient headcount and is pre-determined in the Ideal Health Facility program as outlined in table 2.

Table 3: Predetermined sample size for use in measuring patient waiting time.^{xii}

Daily headcount	Sample size	Daily headcount	Sample size
10	10	600	234
20	19	700	248
30	28	800	260
50	44	1000	278
75	63	1200	291
100	80	1500	306
150	108	2000	322
200	132	2500	333
250	152	3500	346
300	169	5000	357
400	196	7500	365
500	217	>10000	370

7.3 Data collection

Every staff member that provides health service to patients is required to capture such service including the date and time in patients' records. This will further assist with data collection and analysis as the data will be easily obtainable from patients' records.

7.3.1 Preparation for data collection requires that:

- A randomly selected day in a month falling within a financial quarter be selected^{xiii}.
- All service points/areas including clinical service areas of the clinic, CHC are identified to inform areas where times must be noted.
- Data must be collected from all service points/areas and all clinics, CHCs and OPD clinics that are operational in the hospital during the day of data collection – see Annexure A: Data collection tools.
- In the IHF software, the total number of patients that visited the clinic, CHC or a sum of all patients that visited all the OPD clinics during any randomly selected day before data collection, must be captured in the IHF system.
- Once the daily head count of the entire clinic, CHC or sum of OPD clinics have been captured in the IHF system, a predetermined sample size for use in measuring patient waiting time will be projected as outlined in table 3.

7.3.2 Data capturing

- The service times at every service point/area that provided the service is copied from the patient's file and captured on the Annexure A: Data Capturing collection tool.
- A predetermined sample of completed Data Capturing tools is captured in the Data Collation tool (Annexure B and C: Data collation tool for hospital OPDs and Clinics/CHCs) that is obtainable from the IHF system.

7.4 Analysis of results

Analysis of PWT encompasses PWT, time spent receiving healthcare services and time spent in a health establishment by the patient per visit. The system automatically projects the results of the three variables of PWT once data capturing has been completed namely the average

7.4.1 time taken to provide services at given service areas/points.

7.4.2 PWT per service area.

7.4.3 time spent by patients per visit or on the day of data collection.

7.5 Presentation of results

The results can be presented in tabular (as depicted in the example in Table 5) and graphical format (as depicted in the example in figure 1). The results will depict

- 7.5.1 the sample size. This is to determine the feasibility for generalization of the PWT results.
- 7.5.2 average time spent waiting for services to determine the general PWT in comparison with the aspired maximum PWT.
- 7.5.3 average time spent receiving the services to contribute to the analysis of workload and complexity of services that are provided in the facility. Furthermore, the time spent receiving services may have ripple effect on subsequent PWT and time spent in a health establishment per patients' visits to inform alternative options that may be followed to improve services.
- 7.5.4 average time spent in a health establishment per visit in comparison with the aspired maximum time.

Table 4: Example of results of measurement of PWT

INDICATOR	DESCRIPTION	aspired maximum time	Score obtained	DEVIATION=Comparison of achieved score and aspired maximum time
1. Sample size	Number of patient's files sampled/sample size	152	150	-2
2. Average service time in minutes	Sum of all time spent receiving services in service areas divided by the number of captured service times	60	35	25
3. Average patient waiting time in minutes	Sum of waiting times in service areas divided by the number of respective service areas.	120	180	-60
4. Average time in minutes spent in the health establishment per patient's visit	Convert % scores of items 2 and 3 into whole numbers, add them together then calculate the average time spent in the health establishment.	180	215	-35

7.6.4.2 Example of results of measurement of PWT

To determine progress related to management of PWT, the collated average PWT, service times and times spent in a health establishment can be presented in a graphical format as depicted in figure 1

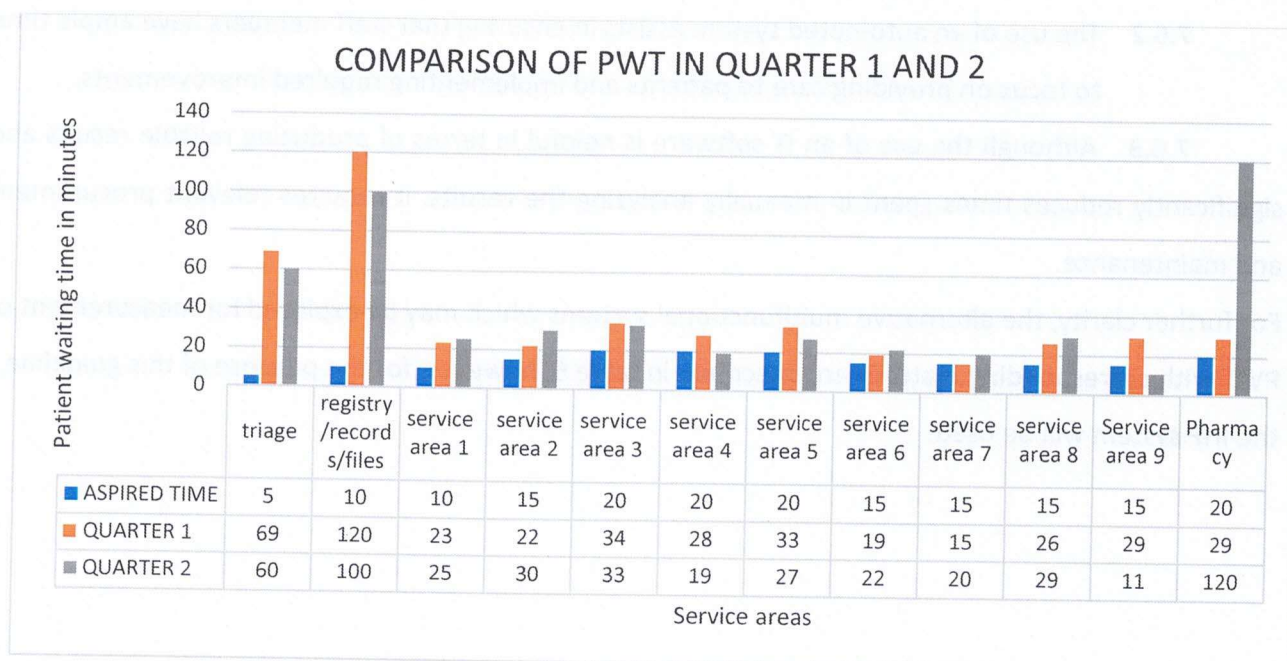


Figure 1: Example of results of measurement of PWT

The results depict the actual times in comparison with aspired variables used in measurement of PWT. It should be noted that the results, as depicted in table 5 and figure 1 can be further disaggregated according to service areas in a health establishment.

7.6 Alternative systems used to measure patient waiting time.

A multifunctional automated system may be utilized to measure patient waiting time, time spent receiving care and time spent in the health establishment.

7.6.1 The value of an automated measurement system

- Is that the results can be aggregated and disaggregated according to various service areas in the health establishment and levels of healthcare, and various comparisons can be performed through an automated system thereby reducing the workload for managers.
- produces objective results, data collection and analysis can be adjusted to be more frequent.
- can project the results and populate them in line with the available service delivery/quality improvement template. The manager will see, among others, aspect of care delivery that require improvement of patient waiting.

7.6.2 The use of an automated system assists in ensuring that staff members have ample time to focus on providing care to patients and implementing required improvements.

7.6.3 Although the use of an IT software is helpful in terms of producing reliable results and significantly reduces times spent in manually analyzing the results, it requires relevant procurement and maintenance.

For further clarity, the alternative multifunctional systems which may be explored for measurement of PWT with corresponding features are described in table 6, however, for the purpose of this guideline, the IHF system will be used.

the IHF system will be used.									
------------------------------	--	--	--	--	--	--	--	--	--

Figure 1: Example of results of measurement of PWT

The results depict the actual times in comparison with assigned variables used in measurement of PWT. It should be noted that the results as depicted in table 2 and figure 1 can be further disaggregated according to service areas in a health establishment.

7.6 Alternative systems used to measure patient waiting time

A multifunctional automated system may be utilized to measure patient waiting time, time spent receiving care and time spent in the health establishment.

7.6.1 The value of an automated measurement system

- It is that the results can be aggregated and disaggregated according to various service areas in the health establishment and levels of healthcare, and various comparisons can be performed through an automated system thereby reducing the workload for managers.
- produces collective results, data collection and analysis can be adjusted to be more frequent.
- can protect the results and populate them in line with the available service delivery/quality improvement templates. The manager will see, among others, aspect of care delivery that require improvement of patient waiting.

8. ADDRESSING FACTORS ASSOCIATED WITH PATIENT WAITING TIME IN CLINICS, CHCs, and OUTPATIENT DEPARTMENTS OF PUBLIC HOSPITALS OF SA.

It is important to focus on the root causes of long PWT and use various quality analysis tools and strategies to institute relevant solutions. The summarized improvement template, which can be used at every service area/point, and or collated at a clinic, CHC or outpatient department of a hospital is described in annexure D. Improving patient waiting time requires careful analysis of the waiting, service and times spent at various service areas. Other factors which might be confounding factors in PWT should be included to address generic factors that contribute to undesirable patient waiting time. Such factors are classified into:

8.1 Patient factors

Patient factors associated with long patient waiting time are those factors related to care seeking behaviors and use of health establishments and include,

- patients preferring to be seen in hospitals where all medical investigations, diagnosis and treatment are performed by doctors, self-referral to hospitals and in so doing, bypassing health establishment where their respective health conditions must be attended to,
- readily available public transport to hospitals, rather than to clinics and or community health centers,
- booked patients that are stable and who do not need to see a doctor, visiting the establishment to only collect their medications from the pharmacy and,
- patients collecting chronic medication that are not available on the Essential Medicines List (EML) for clinics and CHCs.

To ensure efficient use of health services which will result in shorter patient waiting times, patient should be informed of alternative methods that they can adopt to seek health services which include:

8.1.1 Education of patients to ensure that they have better understanding of their health conditions which will enable them to take necessary precautions without the need to frequently visit health establishments.

Use of local media and various communication platforms such as social media should be followed to provide relevant health education to the public. Use of clinics and Community Health Centres committees and hospital boards to inform communities.

8.1.2 Patients whose health conditions are stable and do not require regular observations and examinations in health establishments, should be referred to the local Central Chronic Medicine Distribution and Dispensing (**CCMDD**) point to receive their chronic medications.

8.1.3 **Appointments** should be made for patients who require regular follow-up. The clinician should, with involvement of the patient, determine the next follow-up date and time. Appointments of patients should be staggered across the entire operation time of the establishment. While honouring of patients' appointments is encouraged, no patients should be turned away without receiving services. Other methods of reducing the rate of failure to attend include the use of, depending on the capacity of the establishment, any of the following:

- Automated reminders in the form of SMS, WhatsApp messaging and electronic mail systems.
- Reminder calls especially to those with high-risk conditions that require close monitoring.
- Telephone or physical notification by the patient to the establishment in case the patient is unable to honour the appointment and therefore the need for alternative appointment.

8.1.4 Taking into consideration the cost implications related to patients who fail to honour their appointments (FTA) due to variety of reasons, Ward Based Primary Health Care Outreach Teams (**WBCHCOT**) should be used to make relevant follow-up and where necessary distribute chronic medicines directly to patients in their homes and refer them to a nearby health establishment.

8.2 Service factors.

Service factors entail resources, administrative support, communication, and coordination mechanisms that are employed in the health establishment to deliver health services. Some of the examples that demonstrate ineffective/ inappropriate systems and processes, emanate from the fact that

- despite knowing that there is an expected high number of patients, the number of staff being allocated to high volume service areas remains constant through-out,
- a lack of co-ordination of activities such as tea and lunch breaks that leads to patients having to wait until staff had return to their working station,
- patients are not informed where to queue to only later discover that they are in the wrong queue.
- patients in the Out-patient Department (OPD) accumulate rapidly, while doctors are still busy with ward rounds. When doctors later start at OPD, the subsequent sudden spill-over of patients to the pharmacy results in long queues and waiting times even after hours,

- the indiscriminate monitoring of vital signs for all patients in OPD, including those that are coming for counseling and repeats medications and,
- no booking system to limit the number of patients intake per discipline per day,
- provision of batch services and (h) poor patient filing systems and practices.

These factors are indicative of inefficient work processes, delay in commencement of services to patients and contribution to long patient waiting time.

While it should be ensured that most health services are provided throughout the entire operational days and or times of the health establishment, it is important that

8.2.1 **the location of various service areas** is visibly sign-posted to ensure better navigation through the health system. A resolute staff member should consistently monitor queues and ensure that patients who need urgent attention are addressed urgently and provide direction to those unsure of the process.

8.2.2 **Help / Information desk** should be consistently staffed to provide relevant information and guidance to patients.

8.2.3 Patient **Records/files** of patients who have appointments, complete with relevant test results, must be retrieved and prepared for the patient at least 24 hours before patient's arrival at the establishment and registration desk. Patient records / files must be effectively managed to prevent loss and or physical damage as follows:

- Redundant patient files must be managed in line with relevant legislation so that space can be created for active files.
- Every patient, irrespective of having multiple health conditions, must have only one file in the health establishment.
- Use of Electronic patient record system will expedite retrieval of patients' records at registry and information desk / office; however, this is yet to be applied in public hospitals.

8.2.4 **One-stop-service** must be provided for patients as they present at the counter i.e., patient requests the file (through provision of a card, ID, or other means), pay and or be given the file at once then proceed to the next service area.

8.2.5 **Triage area** should be consistently staffed by knowledgeable clinicians who will screen and prioritize patients in line with their health conditions to appropriate service areas.

- In CHCs and clinics patients are classified according to the care streams, namely, acute, chronic, and Maternal and Child health and allied health services. The colour coding for the streams is red, blue,

green, and yellow respectively¹⁴. As the patients enter the PHC, they are triaged then obtain their records and directed to the relevant stream of care.

- In Accident and Emergencies, the South African triage colour-coding system is the most effective way that is followed to save patients' lives¹⁵. The clinicians use it to allocate specific PWT according to red, amber, yellow and green. The patients that are assigned to a red colour are addressed immediately as they are emergencies while those that are amber, yellow, and green wait for about ten, thirty and sixty minutes before they are attended. The prioritization ensures that the patients with the most urgent healthcare need are helped first.

8.2.6 Capping of the number of patients for appointment

Every clinical service area to be allowed to provide an appointment for a specified number of patients per date. Instead of being directed to queue at an alternative service area for appointment date, patients should obtain their appointments dates /return dates from the consulting room before leaving the room. At the end of the service, all the appointments should be collected from the consulting rooms and collated according to return dates. This will ensure that proper preparations for the return of such patients are made.

8.3 Staff related factors.

In many public health care establishments, staff members, including clinicians, perform functions other than direct patient care. Such functions include, but not limited to attending in-service trainings, meetings, handover reports and preparation of service areas. It is in this regard that as more patients arrive in the morning, there is always no matching staff members to provide required services. It is therefore required that:

8.3.1 **proper matching of capacity** of staff with the number of demands for services be introduced.

The estimation of the number of patients that do not have appointments and those that have appointment system should be determined and be used to allocate required staff members to serve patients. Where possible, managers should consider introducing **flexible work times** of staff members to respond to the numbers of patients. It should further be ensured that patients with chronic and stable health conditions be referred to their accessible CCMDD.

8.3.2 To prevent excessive movement of staff, patients or systems that further elongate patient waiting time for services, and where possible, it should be ensured that **one stop services** in various clinical service areas are provided to every patient as they present in all service points.

8.3.3 Prioritisation of provision of patient care

- Meetings and in-service trainings should be conducted when the influx of patients is lower; however, urgent notices may be communicated at handing over or commencement of duties. This should not take more than quarter of an hour.
- Although doctors usually commence their work with ward rounds it is recommended that **some doctors be assigned to commence the work in OPDs and Accident Emergency departments in the morning.**
- **Tea and lunch breaks** must be staggered throughout the day to ensure continuity of services to patients. **Cleaning of facilities** and other housekeeping duties should be conducted at the end of the day when there are fewer patients in the health establishments. This will prevent interruption of services through cleaning procedures and ensure that health establishment is clean for the next day. The entire day should therefore be dedicated for emptying waste bins, filling up required resources and cleaning areas as the need arise.

8.4 Infrastructure factors

Often the frustration with long waiting times is further compounded by inappropriate building infrastructure which is not fit for the intended purpose of accommodating patients as they visit the facility. It is therefore important that

8.4.1 the various service areas be located nearer to one another to prevent time wasted through walking distance between service areas.

8.4.2 The **building infrastructure design** must provide for alignment of service areas with patient flow e.g., from entry/ information desk, triage, patient registration, relevant stream of care/service area, diagnostics, procedure rooms, pharmacy, and departure.

8.4.3 **Patient record storage room** must be near registry to prevent time lost through walking to a far storage area to retrieve files.

8.4.4 **well-organized and comfortable seating arrangements** should be in place to allow for smooth movement of patients from one service area to the next.

8.4.5 In pharmacy, **temporary storage shelves** for frequently dispensed medicines should be erected near the dispensing window to prevent unnecessary repeated movement to pick from shelves.

8.4.6 The dispensing shelves should be **erected vertical rather than horizontal to dispensing windows** to allow for shorter movements for picking of prescriptions.

8.5 Referral system and procedures

8.5.1 Standard operating procedures should be developed to ensure that the referring health establishment must first confirm with the receiving health establishment/service area before the patient is referred. This will ensure that on arrival during the agreed upon date and or time, the patient is addressed at once thereby improving patient waiting time.

8.6 Other factors

Other factors that should be considered in improving PWT in health establishments entail the use of various Quality Improvement Techniques such as:

8.6.1 Process mapping¹⁶

Process mapping follows the journey of the patient through the health establishments when visiting the health establishment to determine actual service points and what is happening at such areas/points and then resolve impediments at once. Resolutions may follow various approaches, however, the focus should be to

- Identify non-value-added steps (unnecessary steps/movement) and remove them.
- Identify where there is waste of time due to repetition of process and collate and or eradicate some activities.
- Where the patient journey results in patient having to move to multiple service areas to fetch and or undergo multiple diagnostic tests and treatments, re-order and or re-align such movements.
- Where possible steps in parallel i.e., provide all the services at one presentation rather than sending the patient to multiple service points.
- minimize hand-offs e.g., instead of physically submitting laboratory results to a service area, they can be electronically sent to the prescribing clinicians to effect swift clinical decision. The duplicate paper copies may be submitted later for filing in patients' records.
- Identify the biggest delaying service points/areas and determine local ways of speeding up the patients' waiting for services.

9. SERVICE DELIVERY IMPROVEMENT

Successful service delivery improvement should identify service areas where there is a need to improve patient waiting time as would have been depicted by the measurement system. The improvement should utilize relevant quality improvement strategies to determine the root causes of poor performance. Once the root causes have been determined, it is important to organize service delivery improvement.

The tasks that are delegated to respective staff members must be explicitly written in the form of a directive rather than a statement i.e., they must always commence with a “verb” see column 4 in table 5: Service Delivery Improvement. The delegated person’s details must be explicit in terms of name, title, and area of work. The comment section must tell if the delegation was completed or not. Where it was not completed, an accompanying reason and planned corrections, must be written as a form of commitment. This must be done only when the due date in sixth column has passed. The detailed template for service delivery improvement is outlined in table in table 5.

10. KEY MESSAGES FOR SUCCESSFUL MANAGEMENT OF PATIENT WAITING TIME IN CLINICS, COMMUNITY HEALTH CENTRES AND OUTPATIENT DEPARTMENTS OF PUBLIC HOSPITALS OF SOUTH AFRICA.

- Improvements in waiting times should be delivered through relevant legislation, policies, guidelines, and standard operating procedures.
- The Patients' Rights and Batho Pele principles are paramount in improving PWT. Once they are in a health establishment and or service areas, patients should be informed of expected waiting time and be updated on any delay and solutions that are being implemented.
- Patients should be clearly advised of the implications of failure to comply (FtC) with the agreed upon appointment.
- Patients should be offered care according to clinical priority and within the acceptable and or aspired maximum waiting time.
- Referrals should be clinically appropriate and directed towards the most appropriate service area and or health establishment.
- Factors which influence long patient waiting times should be regularly determined and action taken to resolve them.

11. CONCLUSION

Successful Management of Patient Waiting Time in clinics, Community Health Centers and Outpatient departments of public hospitals is a collective effort from all service areas. Improving PWT does not require new resources and finances. It is intended to ensure that patients have better experience when they seek healthcare in clinics, CHCs and outpatient departments of hospitals of South Africa. It therefore one of the benchmarks for customer care.

Annexure A

DATA COLLECTION TOOL

INSTRUCTIONS FOR COMPLETION OF THE TOOL

- NB! The numbering used in this tool is in line with the generic flow of patient per visit.
- Please capture relevant information in all grey shaded areas

Please circle if the patient had or did not have an appointment.

Patient's folder/file number			
Date of patient's visit			
Has appointment	YES	NO	
Date of appointment			
Time of appointment			
Time of arrival ¹			
Triage ²			
Registry (for a file/records) ³			
Vital Signs ⁴			
Clinical service areas			
		Service area ⁵	Arrival:
			Departure:
	OR	Service area ⁶	Arrival:
			Departure:
	OR	Service area ⁷	Arrival:
			Departure:
	OR	Service area ⁸	Arrival:
			Departure:
	OR	Service area ⁹	Arrival:
			Departure:
	OR	Service area ¹⁰	Arrival:
			Departure:
	OR	Service area ¹¹	Arrival:
			Departure:
OR	Service area ¹²	Arrival:	
		Departure:	
OR	Service area ¹³	Arrival:	
		Departure:	
Pharmacy ¹⁴			Arrival:
			Departure:

Annexure B

DATA COLLATION AND REPORTING TOOL FOR PATIENT WAITING TIME (IN MINUTES) IN OPDs OF PUBLIC HOSPITALS

Name of hospital: _____ Financial year: _____ Sub-District: _____ District: _____

NB!

*** Insert the time in minutes only in the relevant service area offered in the hospital OPD**

*** COLUMNS 2 - 4 MUST BE COMPLETED**

Frequency of reporting	Total time spent in facility	Total time spent waiting in a facility (arrival to departure)	Total time spent receiving services in the facility (arrival to departure)	Patient arrival inside the health facility ¹	Triage ²	Waiting time at reception (for files) ³	Waiting time for measurement of vital signs ⁴	Total time spent waiting in service area ⁵	Total time spent waiting in service area ⁶	Total time spent waiting in service area ⁷	Total time spent waiting in service area ⁸	Total time spent waiting in service area ⁹	Total time spent waiting in service area ¹⁰	Total time spent waiting in service area ¹¹	Total time spent waiting in service area ¹²	Total time spent waiting in service area ¹³	Total time spent waiting in pharmacy (medicine dispensing unit) ¹⁴
QUARTER 1																	
QUARTER 2																	
QUARTER 3																	
QUARTER 4																	
ANNUAL																	
REPORT																	

Annexure C

DATA COLLATION AND REPORTING FORM FOR PATIENT WAITING TIME (IN MINUTES) IN CLINICS AND COMMUNITY HEALTH CENTERS

Name of Clinic/CHC:

Financial year:

Sub-District:

District:

NB!

**Insert the time in minutes only in the relevant service area offered in the clinic/health center.*

***COLUMNS 2 - 4 MUST BE COMPLETED**

Frequency of reporting	Total time spent in facility	Total time spent waiting in a facility (arrival to departure per visit)	Total time spent receiving services in the facility (arrival to departure per visit)	Patient arrival inside the health facility ¹	Triage ²	Waiting time at reception (for files) ³	Waiting time for measurement of vital signs ⁴	Total time spent in service area (A&E) ⁵	Total time spent waiting in Acute service area ⁶	Total time spent waiting in Chronic service area ⁷	Total time spent waiting in Maternal and Child service area ⁸	Total time spent waiting other service area ⁹	Total time spent waiting in other health service area ¹⁰	Total time spent waiting in other health service area ¹¹	Total time spent waiting in other health service area ¹²	Total time spent waiting in pharmacy (medicine dispensing unit) ¹³
QUARTER 1																
QUARTER 2																
QUARTER 3																
QUARTER 4																
ANNUAL REPORT																

Annexure D

TEMPLATE FOR IMPROVEMENT OF PATIENT WAITING TIME

SERVICE DELIVERY IMPROVEMENT							
1. Aim							
2. Objectives							
3. Service area	4. Target/Required average waiting time	5. Average waiting time	6. Tasks (manager must delegate operational tasks/activities) i.e., the task must commence with a "VERB"	7. Person responsible for item 4. (Name and area of work)	8. Due date (day, month, and year) for completion of tasks in column 4.	8. Comment (to be completed after the date indicated under columns 6 has passed.	
Reception ¹							
Patient records area ²							
Vital signs area ³							
Service area ⁴							
Service area ⁵							
Service area ⁶							
Service area ⁷							
Service area ⁸							
Service area ⁹							
Service area ¹⁰							
Service area ¹¹							
Service area ¹²							
Service area ¹³							
Pharmacy/Dispensary ¹⁴							
Overall patient waiting time in a facility							

Annexure E

Features of multifunctional automated systems for measuring patient waiting time¹⁷

Options	% Clients covered	Challenges	Benefits	Scalability	Support required	Viability
Check-in and checkout on an HPRS system ¹⁸	Up to 100% of clients where computers are installed at service points	<ul style="list-style-type: none"> Requires additional development of the HPRS system (no plans exist for this) Only possible at sites where computers are installed at service points Would require healthcare workers to check clients in and out of service points Would not include capture of actual waiting times in waiting areas 	Improved linkage with ePHC project	<ul style="list-style-type: none"> High potential for scalability. dependent upon the rollout of the HPRS System 	Development, maintenance, and support by product developers of the HPRS system	Medium
RFID tags on client folders ¹⁹	Up to 100%	<ul style="list-style-type: none"> Would need to always have tags available to attach to client files Would need to change process of setting up client files Reliance on clients to tag in and out of locations Fairly complex initial setup 	Would be able to track client folders and potentially reduce loss	Low potential, owing to fairly complex clinic setup	Ongoing monthly support from company Additional tags added as required	Low
RFID active tags issued to clients at reception and collected at end of visit ²⁰	Up to 100%	<ul style="list-style-type: none"> Fairly complex initial setup Would need to change processes to include issue of tags at reception Would need to ensure that tags are returned 		Low potential, owing to fairly complex clinic setup	Ongoing monthly support from company Additional tags added as required	Low
Wi-Fi-based monitoring ²¹	Up to 40%	<ul style="list-style-type: none"> Privacy issues for tracking clients' smartphones May be difficult to identify when a client is at a waiting area as opposed to a service point, making setup complex Need to remove data generated from staff and other visitors' cell phones 		Low potential, owing to fairly complex clinic setup	Ongoing support costs	Low
Beacons at location points ¹¹	Dependent upon getting applications onto clients' smartphones	<ul style="list-style-type: none"> Requires that an application be developed that can interact with the beacons Requires a method for getting the application onto clients' phones Would potentially use small amounts of clients' data bundles, which could be viewed negatively 	Could send useful information to clients	Medium potential, owing to having only to place beacons at specific locations	Replace beacons every 3 years	Low
Beacons issued to clients at reception and collected at end of visit.	Up to 100%, but may be cheaper to issue tags to only a percentage of clients	<ul style="list-style-type: none"> Fairly complex initial setup Would need to change processes to include issue of tags at reception Would need to ensure that tags are returned Would require mobile network contract or Wi-Fi 	Could provide useful information to clients	Low potential, owing to fairly complex clinic setup	Monthly support costs to ensure the system is working correctly	Low

Tablets at service points and waiting areas ¹¹ .		<ul style="list-style-type: none"> Need to monitor that tablet are recording 			Mobile network contracts (R500) or Wi-Fi	
Fingerprint tracking ²²	Up to 100%	<ul style="list-style-type: none"> All challenges applicable to issuing tags and additional challenges with initial setup and recording of fingerprints May be viewed negatively by clients Very complex setup May be viewed negatively by clients 		Low potential, due to complex clinic setup, cost, and privacy concerns	Monthly support costs to ensure the system is working correctly.	Low
Facial recognition ²³	Up to 100%	<ul style="list-style-type: none"> Initial mapping required Need to have a method for getting the application onto client's phones Would potentially use small amounts of clients' data bundles, which could be viewed negatively May require that clients use their own airtime Limited amount of information that will come in an unstructured way Highly unlikely to produce the required information 		Low potential, due to only having to map the clinic	Monthly support costs to ensure the system is working correctly	Low
Magnetic positioning ²⁴	Dependent upon getting a specific application onto smartphones	<ul style="list-style-type: none"> Would need to collect client's cell phone numbers and send them requests to complete a survey on their phones Follow-up SMSs may be required Can only collect a small amount of information 		High potential	Monthly costs for short code; reverse-billed SMS costs	Low
Client-based monitoring using SMS ²⁵	Less than 10%			Medium potential—need to change processes to collect cell phone numbers	Human resources to decode messages	Low
Client-based monitoring using Unstructured Supplementary Service Data (USSD) ²⁶	Up to 30%				Monthly support costs; SMS costs; reverse-billed costs of survey data	Low
Client-based monitoring using a smartphone application ²⁷	Dependent upon getting a specific application onto smartphones	<ul style="list-style-type: none"> Could be used for various types of client interaction including providing information, allowing feedback, and connecting with services Could have beacon detection built into the application 		High potential	Continued development and support for application	Medium

Annexure F

STAKEHOLDERS PARTICIPATION AND CONTRIBUTION TO THE GUIDELINE

STAKEHOLDERS	DATE OF INPUT RECEIVED	FOCUS AREA OF INPUTS RECEIVED
1. LEAN Institute Africa	03/05/2010	Piloting of techniques for improving patient waiting time and measurement system
2. International Training Programme on Public Service Management Professional Management: Sweden	05/11/ 2010	Objective and automated measurement system
3. NDoH: Facility Improvement Team. Ministerial report	28/02/2013	Measures to improve patient waiting time
4. Operation Phakisa: Health	17/11/2014	Technical content and automated measurement system
5. South Africa President at the launch of Operation Phakisa: Health	18/11/2014	Pronouncement of standard patient waiting time in PHC
6. Operation Phakisa: Lab report	20/11/2014	Determined factors contributing to long PWT and suggested improvements and automated measurement system
7. 40 th International Hospital Federation	31/10-03/11/2016	Automated measurement system
8. Measure Evaluation SIFSA	11/2016	Measurement system and a video Public to educate on improvement of PWT
9. Health System Trust	10/08/2017	Assessing patient experiences of care in primary health care facilities in South Africa: suggested the use of "MEDIAN" patient waiting rather than average
10. National QA workshop	07/12/2017	Technical and measurement systems
11. WHO	08/2017	Regulated Norms and Standards applicable to different categories of health establishments: need to have a national guidance on management of patient waiting time
12. School of Public Health: University of the Western Cape.	2017	Gavin Reagon: Conducting and interpreting patient waiting time surveys.
13. Primary Health Care branch	10/2018	Technical content, grammar, and type setting
14. HoD: WC provincial inputs	01/2019	Suggested areas for improvement and clarification of terminology
15. NDHSC	21/02/2019	Technical content and measurement system
16. DG request provincial inputs	15/02/2019	Technical content and measurement system
17. NDoH SMC and EXCO	05/02/2019	Separation of measurement system and improvement of PWT into two documents
18. Individual follow-up inputs from some NDoH SMC committee members	25/03/2019	Technical content
19. International Cooperation and Development Fund (ICDF) Taiwan	26/06/2019	Improving patient waiting time using the electronic record management system
20. International Society for Quality in Health Care (ISQua)	22/10/2019	Paper on Improvement of PWT in SA
21. NHISSA	05/02/2020	Indicators and measurement system
22. HISP	21/10/2020	Patient Satisfaction Assessment Status Report: including PWT
23. NDoH: SMC and EXCO	23/05/2022	Technical content
24. NDoH: Cluster: Trauma, violence, emergency, and Hospital services	09/06/2022	Structure, technical content, and inclusion of measurement system

BIBLIOGRAPHY

- ⁱ Adi Leiba, IDF MC*; Col. Yuval Weiss, Deputy Surgeon General, IDF MCt; Judith S. Carroll, MD IDF MC*; Col. Paul Benedek, IDF MC*; LTC Yaron Bar-dayan, IDF MC* Waiting Time Is a Major Predictor of Patient Satisfaction in a Primary Military Clinic. *MILITARY MEDICINE*, 167, 10:842,2002
- ⁱⁱ Gavin Reagon: Conducting and interpreting patient waiting time surveys. School of Public Health: University of the Western Cape. 2017
- ⁱⁱⁱ Mayosi B, Lawn JE, van Niekerk A, Bradshaw D, Karim SSA, Coovadia HM. Health in South Africa: changes and challenges since 2009.
- ^{iv} Jing Sun, Qian Lin, Pengyu Zhao, Qiongyao Zhang, Kai Xu, Huiying Chen, Cecile Jia Hu, Mark Stuntz, Hong Li, and Yuanli Liu*Reducing waiting time and raising outpatient satisfaction in a Chinese public tertiary general hospital-an interrupted. *BMC Public Health* (2017) 17:668 time series study
- ^v National Health Insurance Bill. South Africa
- ^{vi} Reichert A, Jacobs R. The impact of waiting time on patient outcomes: Evidence from early intervention in psychosis services in England. *Health Economics*. 2018; 27:1772–1787. <https://doi.org/10.1002/hec.3800>
- ^{vii} WHO. Patient Safety news. 13 September 2019
- ^{viii} Address by President Jacob Zuma at the launch of Operation Phakisa 2: Ideal Clinic Realisation and Maintenance, Sefako Makgatho Presidential Guest House, Pretoria. Launch of Operation Phakisa 2. 18/11/2014
- ^{ix} Address by President Jacob Zuma at the launch of Operation Phakisa 2: Ideal Clinic Realization and Maintenance, Sefako Makgatho Presidential Guest House, Pretoria. 18 November 2014
- ^x National stakeholder recommendations. Quality Month: Beechwood Hotel. 2012
- ^{xi} J Massaut. P Valles. A Ghismonde. C Jn Jacques. L Pierre Louis. A Zaki. R v/den Bergh. L Santiago. R Massenat. N Edem., The modified South African triage scale system for mortality prediction in resource constrained emergency surgical centers: a retrospective cohort study., *BMC Health Services Research* (2017) 17:594
- ^{xii} IDEAL CLINIC REALIZATION AND MAINTENANCE (ICRM) PROGRAMME
- ^{xiii} ICRM version 19
- ¹⁶ The Aurum Institute. How to guide for quality improvement.
- ¹⁷ MEASURE Evaluation—Strategic Information for South Africa (MEval-SIFSA) Project Working paper: Electronic monitoring of waiting time at Primary Health Clinics in South Africa. November 2016 WP-16-170
- ¹⁸ National Department of Health. (2015). National health insurance for South Africa: Towards universal health coverage: Version 40. Pretoria, South Africa: National Department of Health, Republic of South Africa. Retrieved from <https://www.health-e.org.za/wp-content/uploads/2015/12/National-Health-Insurance-for-South-Africa-White-Paper.pdf>.
- ¹⁹ RFID Insider [blog]. Active RFID vs. passive RFID: What's the difference? (2016). Retrieved from <http://blog.atlasrfidstore.com/active-rfid-vs-passive-rfid>. RFID frequently asked questions. *RFID Journal*. Retrieved from <https://www.rfidjournal.com/faq/show?68>.

-
- ²⁰ RFID frequently asked questions. *RFID Journal*. Retrieved from <https://www.rfidjournal.com/faq/show?68>.
- ²¹ AbiResearch [website]. (2015). Wi-Fi indoor location in retail worth \$2.5 billion by 2020. Retrieved from <https://www.abiresearch.com/press/wi-fi-indoor-location-retail-worth-25-billion-2020/>.
- ²² AbiResearch [website]. (2015). Wi-Fi indoor location in retail worth \$2.5 billion by 2020. Retrieved from <https://www.abiresearch.com/press/wi-fi-indoor-location-retail-worth-25-billion-2020/>.
- ²³ Indoor Atlas [website]. (2016). Making indoor worlds discoverable. Retrieved from <https://www.indooratlas.com/>
- ²⁴ Moorhouse, M. (2016, June) Smart Linkage to Care (smart LtC) app. Presentation. Johannesburg, South Africa: Wits RHI. Retrieved from https://za.usembassy.gov/wp-content/uploads/sites/19/2016/06/Smart-Linkage-to-Care-Smart-LtC-App_Michele-Moorhouse.pdf
- ²⁵ United Nations Foundation. (2015). MOMCONNECT: Launching a national digital health program in South Africa. Washington, DC, US: United Nations Foundation. Retrieved from <http://www.unfoundation.org/assets/pdf/momconnect-case-study.pdf>.
- ²⁶ United Nations Foundation. (2015). MOMCONNECT: Launching a national digital health program in South Africa. Washington, DC, US: United Nations Foundation. Retrieved from <http://www.unfoundation.org/assets/pdf/momconnect-case-study.pdf>
- United Nations Foundation. (2015). MOMCONNECT: Launching a national digital health program in South Africa. Washington, DC, US: United Nations Foundation. Retrieved from <http://www.unfoundation.org/assets/pdf/momconnect-case-study.pdf>.
- ²⁷ Hovong Ahn. Chuluong Choi. Korean Journal of Remote Sensing: Pukyong National University. Assessment of a smartphone-based monitoring system and its application. June 2014: 30 (3) pages 383-397.
- United Nations Foundation. (2015). MOMCONNECT: Launching a national digital health program in South Africa. Washington, DC, US: United Nations Foundation. Retrieved from <http://www.unfoundation.org/assets/pdf/momconnect-case-study.pdf>.

NOTES

NOTES

NOTES

NOTES