The role of triage to reduce long waiting times in Primary Health Care clinics

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Dissertation submitted in fulfillment of the requirements for the degree *Magister Curationis* in Community Nursing at the Potchefstroom Campus of the North-West University

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May 2014

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DECLARATION

I, Anna-Therese Swart, student number 12064440, declare that:

- The study on the role of triage in reducing long waiting times in primary health-care clinics is my own work and all the sources that I used are acknowledged in the reference list.

- The study has been approved by the ethics committee of the Institutional Office of the North-West University (Potchefstroom Campus), Directorate Research, Policy and Planning of North West Province, as well as public-health institutions involved in the study.

- The study complies with the research ethical standards of the North-West University (Potchefstroom Campus).

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September 2013

ACKNOWLEDGEMENTS

ABSTRACT

Worldwide, patients who visit health-care facilities generally have to wait very long to be attended by physicians and professional nurses. In South Africa, the Cape Triage Score system was implemented with great success in Emergency departments in the Cape Metropole. In primary health-care clinics the concern is that patients have to wait too long for service delivery, even if they are very ill and need hospitalisation. In this research study the role of triage in reducing waiting times in primary health-care clinics was examined. The Cape Triage Score system that was used in Emergency departments in the private sector and also in public hospitals was adapted for a pilot intervention study. This was done to determine if the utilisation of this system can reduce the waiting times of patients visiting primary health-care clinics.

The researcher utilised a quantitative design with an intervention, after measuring the baseline waiting time. The strategies applied included an exploratory, descriptive and contextual strategy. The study was carried out in three steps according to the objectives set for the study. Firstly, the baseline assessment of the current waiting times in two PHC clinics in a sub-district of the North West Province was done. A waiting-time survey checklist was used to determine the baseline waiting time of patients visiting primary health-care clinics. These waiting-time survey checklists consisted of a few components that assessed different aspects of waiting time. The second objective was to explore and describe literature in order to understand primary health-care waiting times, triage and related constructs. The third objective was to pilot an adapted Cape Triage Score system to determine if the intervention contributed to reducing waiting times for patients visiting primary health-care clinics.

Data was analysed according to Cohen's effect sizes. The comparison between the baseline waiting times and pilot intervention waiting-time assessment was done according to Cohen's effect sizes. The analysis of the data indicated a practical significance for the component where the pilot Cape Triage Score system was applied, as patients were referred to the physician and professional nurse according to the

severity of their condition. The outcome of the study indicated no reduction in the overall waiting time of patients visiting primary health-care clinics due to the different components of the waiting-time survey checklist. Finally, the research was evaluated, limitations were identified and recommendations were stipulated for nursing practice, education, research and policy.

Key words: Primary health-care clinic, triage, waiting times, professional nurse and auxiliary nurse.

OPSOMMING

Wêreldwyd is die tendens dat pasiënte meestal baie lank moet wag om deur dokters en professionele verpleegkundiges gekonsulteer te word. Tans word die Cape Triage Score-sisteem in Suid-Afrika met groot sukses in die Noodgevalle-afdelings in hospitale van die Kaapse Metropool geïmplementeer. Terselfdertyd is daar kommer oor die lang wagtye vir dienslewering vir pasiënte in primêregesondheidsorg-klinieke, al is dit ernstig siek pasiënte wat hospitalisasie benodig. Die rol van triage om wagtye in primêregesondheidsorg-klinieke te verkort, word in die studie bespreek. Die Cape Triage Score-sisteem soos dit toegepas word in die Noodgevalle-afdelings van die privaat sektor en die openbare hospitale is vir die loodsprojek-intervensiestudie aangepas. Die doel van die intervensie is om te bepaal of dit die wagtye van pasiënte in die primêregesondheidsorg-klinieke kan verkort. Die navorser het gebruik gemaak van 'n kwantitatiewe navorsingsvoorstel met verkennende, beskrywende en kontekstuele strategieë. Die studie is na aanleiding van die gestelde doelwitte in drie stappe uitgevoer.

Eerstens is die basislynberaming van die huidige wagtye in twee primêregesondheidsorg-klinieke in 'n subdistrik in die Noordwes gedoen. Die basislynberaming van die huidige wagtye is gedoen deur gebruik te maak van 'n oorsigtelike wagtydkontrolelys. Hierdie kontrolelys bestaan uit verskillende komponente wat verskeie aspekte van wagtye in die primêregesondheidsorg-klinieke bepaal.

Die tweede doelwit behels dat die literatuur betreffende primêre gesondheidsorg, triage en ander toepaslike konstrukte verken en bespreek word. Die derde doelwit behels dat die Cape Triage Score-sisteem aangepas word om in die primêregesondheidsorg-klinieke te gebruik en sodoende te bepaal of die wagtye van die pasiënte wat die klinieke besoek, verkort word.

Data-ontleding is aan die hand van Cohen se effekgroottes gedoen. Die basislynberaming van huidige wagtye en die oorsigtelike intervensiewagtyd soos bepaal deur die kontrolelys is deur middel van Cohen se effekgroottes vergelyk.

Volgens die resultate verkry na die ontleding van die data was dit prakties beduidend dat pasiënte na die toepassing van triage volgens die erns van hul siektetoestand na die dokter en professionele verpleegkundige verwys is. Die uitkoms van die studie het aangedui dat daar as gevolg van die verskillende komponente van die wagtyd-opnamekontrolelys geen verkorting was van die algehele wagtyd van pasiënte wat primêregesondheidsorg-klinieke besoek nie.

Laastens is die navorsing geëvalueer, die beperkings geïdentifiseer en aanbevelings ten opsigte van praktyk, onderwys en navorsing in verpleging gemaak.

Sleutelwoorde: Primêregesondheidsorg-kliniek, triage, wagtye, professionele verpleegkundige en assistentverpleegster.

ACRONYMS

A	AIDS:	Acquired Immune Deficiency Syndrome
	AVPU:	Alert, reacts to voice, reacts to pain and unresponsive
B	BP	Blood pressure
C	CTG:	Cape Triage Group
	CTS:	Cape Triage Score
H	Hb:	Haemoglobin
	HIV:	Human immune deficiency virus
I	IMCI:	Integrated Management of Childhood Illness
N	NWU:	North-West University
P	PHC:	Primary Health Care
S	SANC:	South African Nursing Council
	SAS:	Statistical Analysis System
T	TB:	Tuberculosis
	TEWS:	Triage Early Warning Score
U	UNICEF:	United Nations Children's Fund
W	WHO:	World Health Organisation

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CHAPTER 1

OVERVIEW OF THE RESEARCH STUDY

1.1   INTRODUCTION AND BACKGROUND

During the Alma Ata conference in 1978, which was attended by 134 nations, a different way of looking at health matters emerged. The philosophy of primary health care (PHC) was shared with all the attendees, identifying health as a global issue. "Health for all by the year 2000" was established as a goal, with PHC as the vehicle for achieving this. This announcement influenced all other health strategies worldwide. The World Health Organisation (WHO) is a specialised mediator of the United Nations, with its head office in Geneva, Switzerland. The WHO has the authority that coordinated health matters worldwide on public level and it changed health guidelines to incorporate the PHC approach (Dennill & Rendall-Mkosi, 2012:4).

African countries also used the guidelines on health as set by the WHO, but decision-makers from the various countries adapted the guidelines to suit the needs of that country. The African continent has to deal with Third-World conditions, a high-density population and diseases like Human Immune Deficiency Virus (HIV)/Acquired Immune Deficiency Syndrome (AIDS), which have devastating effects on the various health systems (Edwards *et al.*, 2007:31*).* South Africa uses PHC services as the first level of contact in health care. The strategies that are used to ensure the successful implementation of PHC services include Batho Pele principles, the reorganisation of health services, a multi-disciplinary approach, inter-sectoral collaboration and community participation (Dennill & Rendall-Mkosi, 2012:10-12).

The expectations of the Alma Ata declaration led the new South African government to compile a policy of district health development concentrating on PHC in 1994 (Tollman *et al.*, 2008:893). The fact that PHC services are rendered as a first-level service leads to long waiting times for patients visiting PHC clinics. The causes of long waiting times in PHC

clinics were identified as a vital theme throughout the literature review, which will be outlined in the paragraphs below (Mashia & Van Wyk, 2004:45).

Long waiting times seem to be a real problem worldwide, and even more so in third-world countries with a very high population density and poverty. As South Africa is also a developing country, this can be applicable. According to the literature review conducted, the reasons for long waiting times can be summarised as follows:

Research studies in South Africa indicate that *professional nurses did not have the relevant clinical skills training to effectively manage patients more quickly* to reduce waiting times in practice (Thandrayen & Saloojee, 2010:76; Mashia & Van Wyk, 2004:45). According to the latter researchers, it was mentioned how important it was for all professional nurses working in PHC clinics to be trained in clinical nursing science, health assessment, treatment and care (South African Nursing Council [SANC], Reg. 48 of 20 January 1982) to enhance the effective management of patients in order to reduce waiting times for patients.

The shortage of trained professional nurses is common in practice due to the insufficient number of professional nurses appointed for the number of patients they have to serve (Couper *et al.*, 2007:127; De Villiers *et al.*, 2005:531).

The situation is aggravated further by professional nurses who should be on duty being allocated to additional departmental training, compulsory attendance of meetings, maternity leave and many other legal reasons for not working (Couper *et al.,* 2007:127; De Villiers *et al.,* 2005:531). This causes overcrowded waiting areas at PHC clinics due to an insufficient number of nursing staff being available to deal with the demand (Mashia & Van Wyk, 2004:36; De Villiers *et al.,* 2005:520; Rhoda *et al.,* 2010:442; Finamore & Turris, 2009:509; IkeOluwapo, 2002:121).

Lack of resources, e.g. a shortage of medicine, inadequate facilities in waiting area and insufficient maintenance of equipment, for example otoscopes, that do not work due to the unavailability of batteries (De Villiers *et al.,* 2005:529; Thandrayen & Saloojee, 2010:75; Mashia & Van Wyk, 2004:42). The professional nurses at PHC clinics feel discouraged when they have to send away patients who waited for hours because medicine was not been delivered on time, or when it had been delivered, it was found to be insufficient. Often

medicines are out of stock, or patients have to return for follow-up visits (Couper *et al.,* 2007:127).

Allocation of professional nurses to render a specific service for the day, e.g. one nurse will see ante-natal patients, the other nurse common conditions. Professional nurses often will not assist each other when their category of clients has been attended to and other sick patients are still in the waiting room. This leads to an uneven spread of the workload between the nurses on duty (Rhoda *et al.*, 2010:442; Finamore & Turris, 2009:512; Colebunders *et al.*, 2007:150).

The lack of transportation for blood and sputum specimens to the laboratory and the unavailability of ambulances in emergencies (Couper *et al.,* 2007:127). A delay in the transportation of blood and sputum specimens to the laboratory causes unnecessary waiting time for patients as the turnover time of available laboratory results is longer than suggested in the PHC provincial guidelines. These patients often visit the clinic when the results are not available, and that increases the waiting period. The shortage of ambulances results in patients waiting longer to be transported to a second level of care.

Poor feedback from management leads to professional nurses having to visit their local district health office at their own expense to communicate this issue of long waiting periods in an effort to solve these problems of how to deal with the long waiting times and logistics (Couper *et al.,* 2007:127). Furthermore, the involvement of management in monitoring and evaluating PHC services and providing feedback to professional nurses on the performance is crucial, but research studies reveal that management monitoring and support to professional nurses are lacking (Couper *et al.*, 2007:124).

Lack of proper functioning of clinic committees that are part of the PHC structures, professional nurses struggling to work with the committees to explain the reasons for long waiting periods and to get solutions to problems. These clinic committees do not function as planned in the PHC structures. Community representatives are not willing to attend meetings as they expect remuneration for attending meetings (Couper *et al.*, 2007:127).

According to the peer-reviewed studies worldwide, the effect of long waiting times was clear from the fact that patients spent about two to five hours waiting in the waiting area to be seen by a professional nurse (Castelnuovo *et al.*, 2009:123; Rhoda *et al.*, 2010:443; Colebunders

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et al., 2007:149). Patients became particularly anxious and stressed when they or their children were very ill (Lai, 2006:204; Patel *et al.*, 2008:107), or – even worse – when the children were brought to the health facilities by caregivers, waited several hours to be attended to and were then asked at closing time to come back the following day, without having seen any professional nurse (Thandrayen & Saloojee, 2010:75; De Villiers *et al.*, 2005:520). Long waiting times also had an influence on the attendance of follow-up appointments. Patients who were supposed to come to the clinic for follow-up examinations and treatments did not see their way open to do so when they realised that they needed to wait for a whole day at the PHC clinic (Lai, 2006:204; Jones *et al.*, 2000:57).

PHC is a basic service of health care provided to all people, especially people from low socio-economic areas. Due to very long waiting times, people from even the poorest environments would rather pay to get private health care, although they could not really afford this. They felt the care was better and the waiting time much shorter (Lewis *et al.*, 2004:303).

All the above mentioned factors contribute to poor quality in the rendering of PHC services. Waiting time was found to be an indicator of the quality of a health-care service, therefore it was found to be unreasonable to expect any patient to wait for hours to be attended to by a professional nurse (Mashia & Van Wyk, 2004.38). To ensure quality PHC services by professional nurses, the Batho Pele principles were set by government (South Africa, 1997:9). The Batho Pele White Paper was a national government White Paper for Transforming Public Services Delivery, to put people first by rendering good quality care in case of public service delivery (South Africa, 1997:13). Functional accessibility was identified in the literature review as one of the Batho Pele principles to which PHC services did not adhere (South Africa, 1997:15).

Accessibility of quality PHC services should be included as part of the first level of health care available to South African citizens (Mashia & Van Wyk, 2004:38). According to research studies, PHC clinics were not always functional and accessible due to a shortage of professional nurses and overcrowded waiting areas (Mashia & Van Wyk, 2004:36; De Villiers *et al.,* 2005:520). PHC patients experienced long waiting times because triage was not implemented in PHC clinics (Mashia & Van Wyk, 2004:37). Functional accessibility evaluation revealed practices of verbal abuse of patients, no help, poor organisation, long

waiting times, no extended clinic hours, and that patients were expected to come back the following day for PHC service (De Villiers *et al.*, 2005:520; Couper *et al.*, 2007:127).

The government of South Africa already tried to address functional accessibility and PHC services by implementing compulsory community services for professional nurses (SANC, 2011:1). Functional accessibility and quality PHC services would further be improved by implementing a triage system that might shorten waiting times (Qolohle *et al.*, 2006:17; Thandrayen & Saloojee, 2010:73). The management of the sub-district in which this study was conducted was planning the roll-out of the Cape Triage Score (CTS) pilot system in PHC clinics. Determining the effect of the CTS pilot system on waiting times could assist the sub-district management to evaluate whether the CTS pilot system contributed towards an improvement in functional accessibility.

The aim of triage is to sort and prioritise patient attendance according to a scientific scale of urgency. Thus the patient with the most pressing need would be attended to first (Wallis & Twomey, 2005:1; Lai, 2006:205). The CTS is a system that was initially developed for use in an Emergency department, but has the potential to be implemented at PHC clinics. The CTS system is a stepwise approach to categorising patients. As part of the triage system a Triage Early Warning Score (TEWS) instrument is used to identify and classify patients according to an applicable triage code, mainly based on the vital signs and a short history of the main complaint of the patient (Wallis & Twomey, 2005:6). After the vital signs have been assessed and a short history of the main complaint has been obtained, a colour code is allocated to the patient. The discriminator list is the next step to determine whether the colour code that was initially allocated to the patient did not skip important dangerous conditions such as hypoglycaemia. By using the discriminator list, the colour code can be changed to ensure that underlying serious problems that are not included in the TEWS calculator are dealt with quickly (Wallis & Twomey, 2005:7). The effective utilisation of triage would not only lead to a better flow of PHC patients, but also direct the patients immediately to the right health-care professional (Rhoda *et al.*, 2010:441). Implementing a triage system in PHC clinics therefore could shorten waiting times and improve functional accessibility and the quality of care (Finamore & Turris, 2009:509; Shah *et al.*, 2007:206).

The discussion above indicates that waiting times in PHC clinics are a serious matter. The literature overview identified no instances of triage being implemented in PHC clinics in

South Africa. Triage was implemented only in Emergency departments at national and international level. Due to the problems mentioned the researcher was interested in determining whether the use of the CTS system could contribute to reducing waiting times in PHC clinics.

1.2   PROBLEM STATEMENT

From practical experience and while conducting a literature review the researcher realised that long waiting times were a major concern for both patients and professional nurses in PHC clinics, resulting in poor functional accessibility and low quality of care. In this study the researcher wanted to determine whether the pilot introduction of the CTS system in two PHC clinics in a sub-district in the North West Province would lead to reduced waiting times for patients and alleviate the stress experienced by professional nurses attending to these patients.

1.3   RESEARCH QUESTIONS

On the basis of the rationale and background the following research questions were posed:

What is the current waiting time for patients visiting PHC clinics?

What is known about PHC waiting times and triage-related constructs from existing literature?

Can the pilot intervention of the CTS system effectively contribute to shortening the waiting time for patients visiting PHC clinics?

1.4   OBJECTIVES OF THE STUDY

The specific research objectives were:

Objective 1:   To determine the current waiting times for patients visiting PHC clinics.

Objective 2:   To conduct a literature review to understand PHC waiting times,   triage and related constructs from existing literature.

Objective 3:   To conduct a pilot intervention CTS system to determine whether the CTS system effectively contributed to shortening the waiting time for patients visiting PHC clinics.

1.5   RESEARCHER ASSUMPTIONS

The following framework was adopted by the researcher to conduct the study:

1.5.1   Meta-theoretical assumptions

The researcher approached life from a spiritual perspective, applying generally accepted religious norms and values. For that reason she assessed her participants from that point of view, as listed below.

Mankind: People are unique and have specific values in life, with their own interests and talents. Life is precious and the researcher felt that nurses should treat their patients with the same positive attitude that mankind will adopt within their particular value system. Therefore, mankind in this study refers to the patient who has to wait for a long time to be attended to in a PHC clinic.

Health: Health is the status of physical, mental and social well-being – not only without any diseases (Van Rensburg, 2004:146) – together with the intellectual, environmental and spiritual health as mentioned by Zweigenthal, *et al.* (2009:25). If the CTS system shortens waiting times at the PHC clinic, the health of a patient visiting the PHC clinic can be improved. Patients have the right to receive proper treatment as a whole, to promote their physical, psychological and spiritual well-being in the shortest possible time.

Environment: The environment in which this study was conducted was two PHC clinics in one sub-district of the North West Province in South Africa. These two PHC clinics are situated in two different geographical areas in the same rural area, each serving its own

group of people. In this community, people are mostly from low socio-economic groups and struggle with basic needs like electricity, water and sanitation.

Nursing: It is a service rendered by nurses who must have a passion for individuals, their families and the entire community. In nursing the main goal is to optimise health care for all by promoting, restoring and maintaining health. From a nursing perspective the researcher believed that generally accepted religious values should be the norm for treating people by healing them physically, spiritually, socially and emotionally. Patients should be treated the way nurses want to be treated themselves, with dignity and honesty. A professional nurse with a passion for people would also use the opportunity to spread values by example.

1.5.2 Theoretical assumptions

The central theoretical assumption includes the theoretical departure point and conceptual definitions applicable to this study.

This study was based on a theoretical framework developed by the CTG in 2005 under the direct leadership of Dr Clive Balfour and Dr Lee Wallis, specifically for implementation in Emergency departments (Wallis & Twomey, 2005:2). The CTS system consists of the five steps of the CTS system that are depicted in Fig. 1.1 and will be discussed in more detail in Chapter 3, section 3.3.

Figure 1.1: Framework as starting point for triage
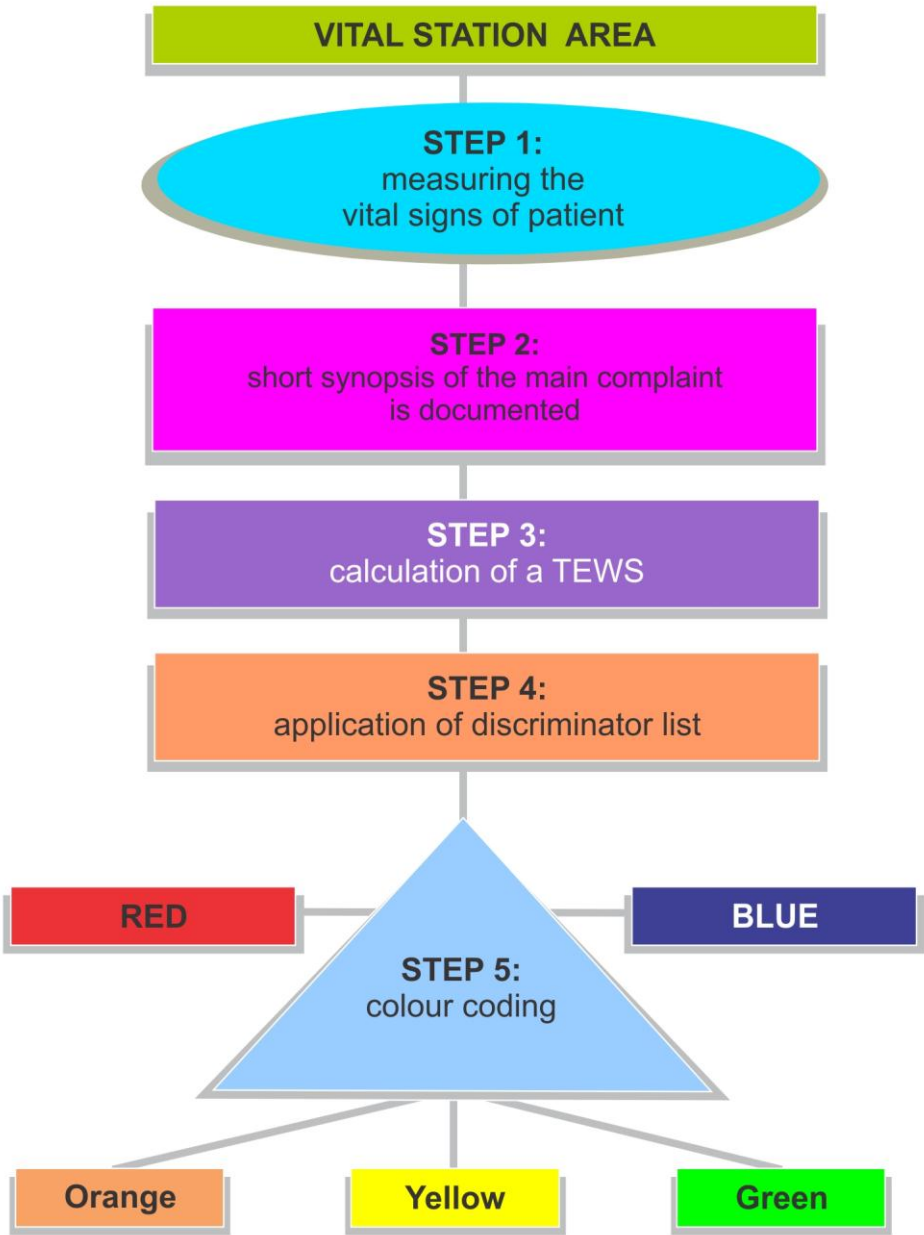
1.5.3   Definitions of key concepts

The following key concepts were used in this study: PHC clinics, triage, waiting times, professional nurse and auxiliary nurse. The concepts were defined as follows:

OVERVIEW OF THE RESEARCH STUDY

PHC clinics represent the first level of a health-care service to the community of South Africa, and the quality of health service is normally judged on this level (Couper *et al.,* 2007:124). This study was conducted in two PHC clinics in the Potchefstroom sub-district.

Triage is described as "putting the patient in the right place at the right time to receive the right level of care which facilitates the allocation of appropriate resources to meet the patient's need" (Bracken, 2003:75). In this study the CTS system was used to triage patients.

Waiting time in PHC clinics was described as the time from when the patient arrives at the clinic until the time the patient leaves the clinic. Worldwide, long waiting times seem to be a problem, with patients having to wait for between two to five hours (Couper *et al.*, 2007:125; Thandrayen & Salooyee*,* 2010:76). In this study waiting times were assessed.

Professional nurse is referred to by the SANC as "a person who is registered as a nurse or midwife in terms of the Nursing Act" (SANC, 33 of 2005). In this study the professional nurse was responsible for rendering PHC services to patients who visited the clinics.

Auxiliary nurse is referred to by the SANC as "a person educated to provide elementary nursing care in the manner and to the level prescribed in terms of the Nursing Act" (SANC, 33 of 2005). The auxiliary nurse was responsible for conducting four steps of the **CTS system.**

1.6   RESEARCH DESIGN AND METHOD

1.6.1   Research design

The design of a study is a logical strategy to gather evidence regarding the problem and is therefore the blueprint for the study (Burns & Grove, 2010:236). The research design is also an overall plan that provides information on how the researcher plans to perform the study, dictated by the research question and problem (Brink, 2009:92; Polit & Beck, 2008:763). This study makes use of a quantitative research design with exploratory, descriptive and contextual strategies to meet the objectives of the study (Klopper, 2008:67). This design should provide a clear understanding if the CTS system contribute to shorten waiting times for patients visiting PHC clinics.

Quantitative research is a systematic process in which researchers use numbers to estimate specific measurements about information in the world (Burns & Grove, 2010:22; Malty *et al.,* 2010:363; Schmidt & Brown, 2012:484). In this study, patients who visited two PHC clinics in a sub-district of the Dr Kenneth Kaunda District were included to estimate if triage could contribute effectively to shortening waiting times.

Exploratory research explores the dimensions of the phenomenon (Polit & Hungler, 1997:20). In this study a literature review was undertaken to explore PHC waiting times, triage and related constructs from a theoretical perspective.

The design must be descriptive in nature to provide a clear picture of the effect that the pilot intervention with the CTS system should have on waiting times for patients visiting PHC clinics (Wallis & Twomey, 2005:1). The effect of triage on the waiting times was measured after the pilot intervention with the CTS system. An intervention is a specific process of actions implemented to ensure the desired effect (Babbie & Mouton, 2011:88; Burns & Grove, 2010:317). In this study the researcher wanted to see if triage had an influence on the waiting times for patients visiting PHC clinics. For the assessment of waiting time before the start of the CTS system, a survey checklist developed by the PHC Policy Programme and Compliance Management: Health Care Division (Annexure D) was used. With the pilot intervention done and the CTS system, the waiting times were assessed with the same waiting survey checklist. This was done by the researcher to determine whether triage did have a positive outcome, resulting in shortening of waiting times.

This research was contextual in nature, as it focused on two PHC clinics in one sub-district of the North West Province (Burns & Grove, 2010:178).

1.6.2   Research method

According to Klopper (2008:69), the research method involves the population, sample, data collection, data analysis, reliability and validity. In this study the objectives were used to determine the steps to be followed. Table 1.1 provides an overview of the research steps, objectives and methods. More details about research methods are discussed in Chapter 2.

TABLE 1.1   OVERVIEW OF THE RESEARCH METHOD

OBJECTIVE	STEPS	DATA COLLECTION	POPULATION AND SAMPLING	DATA ANALYSIS	RELIABILITY AND VALIDITY
OBJECTIVE 1					
To determine the current waiting times for patients visiting PHC clinics.	Baseline assessment of current waiting times before the pilot intervention with the CTS system in the two PHC clinics of a sub-district in the North West Province.	Use a patient waiting-time survey check list (see Annexure D).	Multi-level sampling (see Chapter 2) Fish bowl to select two PHC clinics N = 6, n = 2 Convenience sampling to select patients N = 665, n = 360	Descriptive statistics analysis using Excel and SAS (SAS Institute Inc. 2011)	Cohen's variance test (see Chapter 2 for more detail)
OBJECTIVE 2					
To conduct a literature review to understand PHC waiting times, triage and related constructs.	Explore and describe literature in order to understand PHC waiting times, triage and related constructs.	Literature review. Retrieval using multiple electronic databases and hard-copy search.	Purposive sampling of all relevant national and international sources	Critical appraisal of documents regarding strength of evidence and relevance in context (Burns & Grove, 2009:104)	Content validity (see Chapter 2 for more detail)
OBJECTIVE 3					
To conduct a pilot intervention with the CTS system to determine whether the pilot CTS system effectively contributed to shortening the waiting time for patients in PHC clinics.	To conduct a pilot intervention with the CTS system to determine if the intervention contributed to shortening waiting times for patients visiting PHC clinics.	Colour code all patients according to the CTS system, refer these patients according to the colour code allocated and determine the waiting time for a patient according to the colour code application. The same instrument (Annexure D) will be used to determine the waiting time after consultation according to the colour code.	Convenience sampling of patients visiting clinics N = 665, n = 360 per clinic	Determine the current waiting times for patients visiting PHC clinics	Cohen's variance (see Chapter 2 for more detail)

1.7   RELIABILITY AND VALIDITY

Reliability during a quantitative approach is the level up to which a checklist is consistent, accurate and dependable. A reliable checklist cannot be influenced by any external environmental factors as long as the attribute that is measured stays the same (Polit & Beck, 2008:452; Crookes & Davies, 2007:97; Wood & Ross - Kerr, 2011:209; Leedy & Ormrod, 2010:93).

There are three forms of reliability, but only two were applicable in this study, namely:

Stability is the level up to which a checklist gets the same outcomes with two different tests. The name of the method is the test-retest method (Brink, 2009:164). The checklist the researcher used to assess waiting times before the start of the pilot intervention with the CTS system was a survey checklist developed by the PHC Policy Programme and Compliance Management: Health Care Division (Annexure D) of Tshwane Metropolitan Council. This checklist was used for more than five years as a quality assessment tool in the Tshwane clinics. Permission to use the checklist was obtained telephonically and in writing. After the baseline assessment of patients visiting PHC clinics, a pilot intervention with the CTS system was conducted by using the same survey checklist. The fact that this checklist was used several times contributed to proving the stability of the checklist.

Internal consistency is the level up to which all aspects of a certain checklist measure the same concept (Nieswiadomy, 2002:199; Leedy & Ormrod, 2010:93). The waiting-time survey checklist was used to assess all constructs relating to waiting time, namely the time that elapsed from when the patient arrived at the clinic until they received their duplicate record, the time spent at the vital-signs station, the time spent on consulting the patient including the time it took to dispense the medicine and time used to give health education as it is part of the consultation time. Lastly the time that the patient left the clinic was noted.

Validity is the level up to which a checklist measures what is supposed to be measured (Polit & Beck, 2008:457; Langford, 2001:121; Taylor *et al.*, 2007:177). If the validity of a checklist is very high, the possibility of achieving the objectives during the study is better (Nieswiadomy, 2002:200). The types of validity applicable to this study are as follows:

Content validity indicates how representative the checklist is in measuring the variable with its relevant combination of items. The content validity of an instrument is high when the specific items reflect the different parts of the phenomenon being under study (Brink, 2009:160; Nieswiadomy, 2002:201; Leedy & Ormrod, 2010:92). The waiting-time survey checklist addresses specific aspects that are important to obtain an overall view of waiting times in PHC clinics in this study.

Construct validity refers to the "relationship between the checklist and the related theory" (Brink, 2009:162). The main objective of the study was to determine whether a pilot intervention with the CTS system (which is the theoretical point of departure of this study) can lead to reduced waiting times.

These standards and rules guided the researcher to generate sound scientific knowledge, to ensure reliability and validity throughout the study.

1.8   ETHICAL CONSIDERATIONS

A proposal research evaluation committee at the School of Nursing Science of the North-West University had to approve the proposal. This study formed part of an umbrella research programme titled "Leadership and governance as mechanisms toward excellence in South African health systems." The ethical approval for this umbrella programme was granted by the research unit ethics committee of the North-West University: Potchefstroom Campus (NWU-00050-12-51) and this overarching program were approved by the Directorate Research, Policy and Planning (see Annexure B). Permission to conduct the study in the sub-district was obtained by the researcher from the same directorate (see Annexure A). Permission was also obtained from the sub-district local area manager responsible for the two clinics involved in the study.

The research was guided by fundamental ethical principles of respect, beneficence and justice as described by Brink (2006:31-32) (see Chapter 3 for an in-depth discussion):

Respect for persons – the autonomy of individuals and their right to decide whether or not to participate in the research study had to be respected. It was explained to patients visiting the clinic that the researcher was conducting a study to see whether a pilot intervention can

shorten current waiting times. All patients were greeted respectfully and the procedure was explained.

Anonymity – when the information was collected at the clinics, only patient numbers and not names were used to ensure anonymity. Patients were ensured that no detail from their clinic cards or files would be used.

Beneficence – participants have the right to protection from any discomfort and harm. Institutions where data was collected were selected because they served the most rural part of the area and the researcher was of the opinion that the triage of patients could contribute to enhance quality service. The assessment of waiting times before, as well as during the pilot intervention with the CTS system, was done by the researcher herself. The researcher worked with the vital-signs station staff to colour code patients and refer them to applicable consultation rooms. The calculation of the time used for every consultation during the data collection period was done by the researcher herself. Every patient was given an explanation of the intervention and the researcher foresaw no discomfort or harm towards any patient. The patient or professional nurses that were working in the clinics did not obtain direct beneficence from the pilot intervention with the CTS system. The assessment of waiting times assisted the researcher in concluding whether the pilot intervention with the CTS system was worthwhile or not.

Justice – participants were selected for reasons directly relating to the research problem. In this study the aim of the researcher was to determine whether waiting times could be shortened and data collection was to focus on waiting times only.

1.9 DISSERTATION OUTLINE

Chapter 1:   Overview of the research study

Chapter 2:   Research design and method

Chapter 3:   Literature review

Chapter 4:   Research results

Chapter 5: Evaluation of the study, limitations and recommendations for nursing, practice, education and research

1.10 CHAPTER SUMMARY

The researcher developed a research proposal by identification of a problem in practice. The introduction and background led the researcher to motivate the following topic for research: The role of triage to reduce long waiting times in primary health-care clinics. A literature search motivated the researcher to formulate a problem statement and to determine research questions. The objectives of the study were stated. The researcher identified the research design and method. Measures to ensure validity and reliability throughout the study were discussed. Ethical considerations, focusing on ethical approval, were also taken in consideration. Finally an outline of the dissertation was compiled.

CHAPTER 2

RESEARCH DESIGN AND METHOD

2.1 INTRODUCTION

In the previous chapter an overview of the research study was provided. In this chapter the research design and method used for this study are discussed. The outline of the research methods are explained according to the objectives of the study. A detailed discussion also provides information about the ethical considerations that were taken into account during the research study. The researcher used a quantitative research design with an explorative, descriptive and contextual design. The research method involved the pilot study, population and sampling, data collection, data analysis, reliability and validity and the ethical considerations.

2.2 RESEARCH DESIGN

The design is the heart of the study, with a specific step-by-step framework to answer the research questions and problem (Leedy & Ormrod, 2010:85; Coughlan *et al*., 2007:660). Thus, the research design is directed by the research problem, and the researcher followed this overall plan to gather information in order to solve the research problem (Klopper, 2008:68; Burns & Grove, 2010:236). The more structured the blueprint of the study, the better the control the researcher has over any external influences that might interfere with the validity of the knowledge that was gathered (Burns & Grove, 2010:696; Brink, 2009:92; Babbie & Mouton, 2011:74).

In this study, the researcher used a quantitative design with an intervention after measuring the baseline waiting time, to get the best results possible to achieve the objectives of the study and to develop recommendations for nursing education, practice, research and policy at the end of the study. Explorative, descriptive and contextual research strategies were

used as part of the quantitative design. These strategies, the terminology involved and their application will be described in the following paragraphs.

2.2.1 Quantitative research design

The researcher conducted a study of a certain phenomenon (waiting times). A formal objective and a systematic approach were used to gather information. Furthermore, a checklist with numbers to describe waiting times before a pilot intervention with the CTS system determined the waiting times with the pilot intervention with the CTS system. After the analysis of data, the researcher was able to generalise findings applicable in the area where the study was conducted. (Burns & Grove, 2010:22; Polit & Beck, 2008:763; Crookes & Davies 2007:232; Nieswiadomy, 2002:367).

The reason for using a quantitative design was because the researcher gathered data by using a waiting-time survey checklist before and during the pilot intervention with a CTS system. The purpose of the research was to determine whether the pilot intervention with the CTS system in a PHC context contributed towards shortening waiting times for patients visiting PHC clinics.

2.2.2 Explorative research strategy

A significant portion of this study was dedicated to exploring the topic and orientation towards the topic (Babbie & Mouton, 2011:29). A relatively new field of interest, like in this research where the implementation of triage in PHC clinics influences the waiting times of patients visiting these PHC clinics, that was not previously researched, necessitated the explorative strategy (Boeije, 2010:32). The expectation was to explore the full nature of the phenomenon (waiting times), increasing the scientific information on the influence of the implementation of the CTS system on waiting times in order to see how it manifested in practice (Burns & Grove, 2010:359; Nieswiadomy, 2002:126).

2.2.3   Descriptive research strategy

Descriptive research revealed new information on true life events, categorised it and described what the researcher could see at the time (Nieswiadomy, 2002:126; Burns & Grove, 2010:25; Babbie & Mouton, 2011:80).

In this study the researcher therefore described the influence of a pilot intervention with the CTS system on waiting times in PHC clinics in one sub-district of the North West Province. By using a descriptive strategy, the researcher used the new information gathered during this study to improve practice outcomes. In this research study the objective was to determine if a pilot intervention with the CTS system could shorten long waiting times (Burns & Grove, 2010:237).

2.2.4   Contextual research strategy

Contextual research can be described as certain characteristics in a specific research environment (Taylor *et al.,* 2007:402). The word context can be defined as a "setting within the site, where data-collection will occur" (Polit & Beck, 2008:44; Babbie & Mouton, 2011:272).

In this study, the context where the study was performed included two PHC clinics in the Potchefstroom sub-district situated in the North West Province in South Africa. This province has four districts, and each district consists of four sub-districts. The North West Province covers a large geographical area (14 767 square kilometres) (see Figure 2.1). Figure 2.1 indicates the selected district (Muller, 2010:56).

Figure 2.1   Health districts of the North West Province (name of southern region changed to Dr Kenneth Kaunda District)
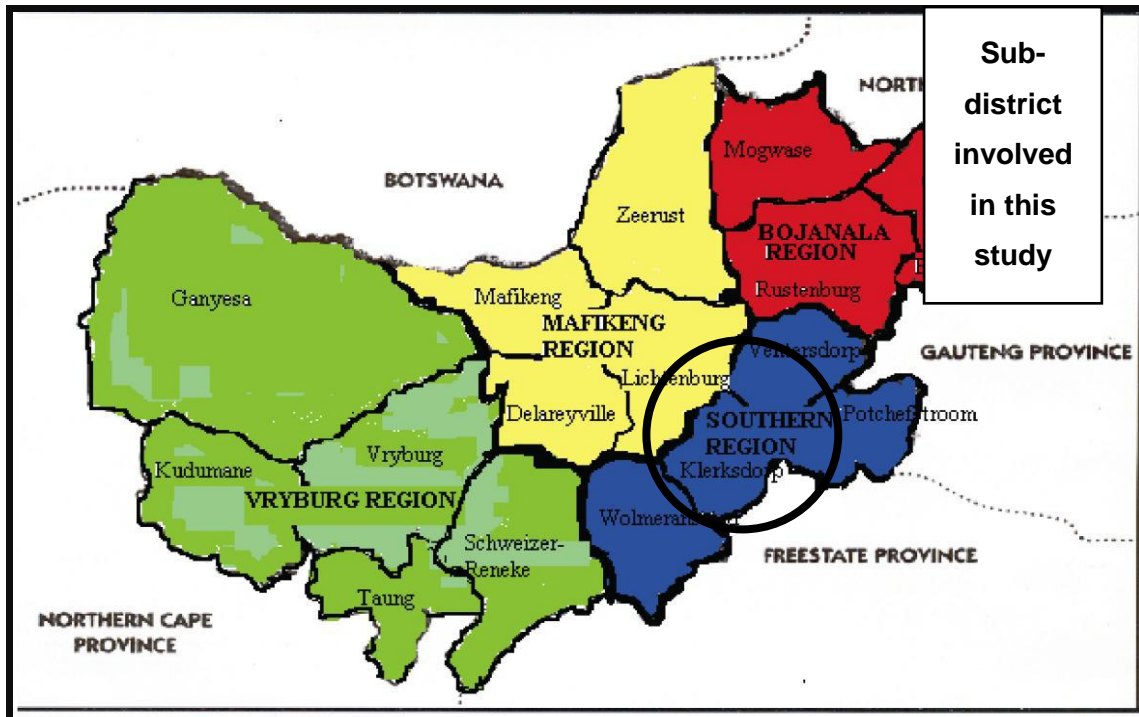
In the next section the researcher will give a brief discussion of the healthcare facilities, service delivery and socio-economic factors in the sub-district of Potchefstroom, situated in Dr Kenneth Kaunda District in the North West Province.

- **Health-care facilities**

The Dr Kenneth Kaunda District (one of the districts in the North West Province) consists of four sub-districts, namely Maquassi Hills, Matlosana, Potchefstroom and Ventersdorp (see Table 2.1). The researcher has been working as a preceptor at the North-West University (NWU) for a few years and decided deliberately to use the Potchefstroom sub-district in the North West Province. This decision was motivated by the researcher, who knew the sub-district health system and the location of the different clinics very well. The reason for excluding community health centres (CHCs) from this study was that research programmes were mainly conducted in these centres. This meant that the staff was overwhelmed with all the projects, leaving the rural sites behind in research projects. Another reason was because the researcher aimed to focus more on rural communities and health problems found in

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these clinics, because the patients from these clinics were often referred to the CHC for follow-up.

The Potchefstroom sub-district consists of six PHC clinics, two CHCs, a district hospital, one health post, two mobile clinics, one level 2 hospital and a specialised psychiatric hospital (Anon, 2011:6) (see Table 2.1 below).

Public health facilities in the Dr Kenneth Kaunda District in North West Province consist of different facilities, and the total number of facilities is indicated in Table 2.1.

TABLE 2.1   PUBLIC HEALTH FACILITIES IN DR KENNETH KAUNDA DISTRICT

Health facility	Maquassi Hills	Matlosana	Potchefstroom	Ventersdorp
PHC clinics	6	13	6	8
CHC centres	2	4	2	1
Health posts			1	
Mobile clinics	4	5	2	3
District hospitals				1
Level 2 hospitals		1	1	
Specialist psychiatric hospital			1	
Total health facilities	**10**	**23**	**13**	**13**

The researcher used two PHC clinics in two different rural catchment areas of the Potchefstroom district (see Table 2.2) during the research. These PHC clinics provided services in two different catchment areas and both catchment areas are more than ten kilometres from the central business area. The total population in the Dr Kenneth Kaunda District is **807 252**, while the total population of the Potchefstroom sub-district is 170 652 residents (Anon, 2011:3).

TABLE 2.2   DESCRIPTION OF THE SELECTED PHC CLINICS

Institution	Level of care	Category	Description
Dr Kenneth Kaunda District			
CHC CLINIC: 1	**3**	**PHC clinic**	A PHC clinic rendering all PHC services, except deliveries. Clinic is open five days a week, 07:00–19:00. This clinic is closed during weekends. No in-patient capability, only consulting rooms with couches and an emergency trolley to stabilise emergencies before referral.
CHC CLINIC: 2	**3**	**PHC clinic**	A PHC clinic rendering all PHC services, except deliveries. Clinic is open five days a week, 07:00–19:00. This clinic is closed during weekends. No in-patient capability, only consulting rooms with couches and an emergency trolley to stabilise emergencies before referral.

Table 2.2 contains a summary of the two clinics that were selected for this study.

- **Service delivery**

PHC services delivered in PHC clinics in the Potchefstroom sub-district include health promotion, preventative, curative and rehabilitative services. Part of the PHC service delivery is the re-engineering strategy. At present in South Africa the PHC re-engineering strategy is adapted to change the health system from a "largely passive, curative, vertically and individually orientated system to a more pro-active, integrated and population-based approach". The South African government's goal is to ensure "a long and healthy life for all" (Naledi *et al.*, 2011:23).

To reach this goal, PHC clinics in Potchefstroom, like in the rest of the North West Province, focus more on mother and child services, which include the integrated management of childhood illness (IMCI), family planning and ante-natal care, as well as the delivery of chronic services such as treatment for HIV/AIDS and TB and mental conditions, hypertension, asthma and diabetes (Van Rensburg, 2004:492; Department of Health, 2011:2, Kerry, 2005:32).

As part of the PHC services, curative services are available for common conditions and emergency cases, e.g. trauma cases that are stabilised before referral. The Potchefstroom

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sub-district office appointed staff members for the roll out of the re-engineering system. PHC re-engineering focuses on conducting home visits to identify high-risk cases to refer them to PHC facilities. However, the evaluation of environmental problems is the responsibility of the environmental health officer.

In most PHC clinics, professional nurses offer health education on different topics applicable to the community every morning. Health education is also given to individuals, e.g. in the case of the management of an IMCI child, the mother/caregiver is given education on danger signs, feeding, how to give medication and when to return with the child (Van Rensburg, 2004:475; Department of Health, 2011:2).

In most PHC clinics there are a maximum of 3-4 registered nurses, one of whom is the professional nurse in charge (operational manager), and 1-2 auxiliary nurses. The physician visits the clinic only about twice a week.

- **Socio-economic factors**

The dominant economic activity in the Potchefstroom sub-district includes the mining industry, as there are various mines in the area. Other main economic contributors include different public services, the NWU Potchefstroom Campus, trade, catering, manufacturing, finance and agriculture. Maize and sunflower are the major farming products (Muller, 2010:50).

The socio-economic status of the Potchefstroom sub-district is characterised by a very high rate of unemployment and poverty, and for this reason there is a high demand for social grants. The average unemployment rate is more or less 35%. Possible socio-economic indicators relating to total income are the following: the largest income sector is government with 32%, the trade sector with 15%, the household sector with 13%, the agricultural and manufacturing sectors with 10% and the financial sector with 7% (Anon, 2010/2011:9).

2.3   RESEARCH METHOD

The research method is a step-by-step specific approach followed by the researcher: a stepwise focus on the progress of the study by refining the applicable methods of gathering

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information, categorising and analysing new data (Burns & Grove, 2010:719; Babbie & Mouton, 2011:75; Polit & Beck, 2008:758; Leedy & Ormrod, 2010:12).

The research method in this study consisted of sampling (including population, sampling method and sample size), data collection, a pilot study, data analysis, validity and reliability. The method for each step is discussed below (Klopper, 2008:69) (see Chapter 1, Table 1.1).

2.3.1   Sampling

Step 1 (see Chapter 1, Table 1.1)

Baseline assessment of current waiting times before the pilot intervention with the CTS system in the two PHC clinics of a sub-district in the North West Province.

- **Population**

A population includes specific individuals or a phenomenon with certain features and can also be called a target population (Nieswiadomy, 2002:365; Burns & Grove, 2009:714; Polit & Beck, 2008:338). The total population in this study was N= 665, and the number of patients included in this study was n = 360. Two PHC clinics in a sub-district of the North West Province were used.

- **Sampling method**

  o **Multilevel sampling** was used to achieve Step 1. Sampling means to select a representative group of people in a population that is of interest to the researcher to study (Wood & Ross-Kerr, 2011:71; Taylor *et al.,* 2007:584; Burns & Grove, 2009:721; Allen, Titsworth & Hunt, 2009:15).

  o The **fishbowl method** involves names or numbers being written on pieces of paper and placed in a bowl or hat, and then withdrawn at random. This was the first method used in Step 1 and involved the researcher drawing the names of the two PHC clinics (representative group) in the sub-district of the North West Province, as it was not possible to include all six PHC clinics (total population) in the study. This method ensured that each PHC clinic had an equal chance of being part of this research study (Brink, 2009:127).

o The second method of the multilevel sampling used in Step 1 was **convenience sampling,** in other words "accidental sampling" or "availability sampling" (Brink 2009:132). The researcher used this method to sample patients who were available to be included into the study. The reason for using convenience sampling was that the researcher wanted to concentrate on the waiting times of patients attending PHC clinics. As patients (representative sample) arrived at the clinic they were therefore conveniently sampled as part of the study.

- **Sample size**

The sample size obtained during the fishbowl sampling with the selection of PHC clinics was N = 6, and n = 2. The size of the sample of patients obtained with convenience sampling was N = 665 and n = 360.

Step 2 (See Chapter, Table 1.1)

Explore and describe literature in order to understand PHC waiting times, triage and related constructs.

With this objective and as part of the literature review, a librarian from the NWU Potchefstroom supported the researcher in looking for different national and international sources pertaining to PHC, triage and other related constructs.

- **Population**

In order to define the population the researcher peer reviewed a variety of articles and abstracts.

- **Sampling method**

The sample method used was purposive sampling, in other words "judgemental sampling" or "theoretical sampling" (Brink, 2009:133). The researcher selected certain sources according to applicability in a PHC context in South Africa, using the following databases: Sae Publications, Science Direct and EBSCO Host. The search engine for EBSCO Host,

CINAHL: Medline, was also used. The researcher used this database because it was easily available and applicable to this specific field.

- **Sample size**

For the purposes of this study, searches were conducted with the following keywords in different sequences: triage, PHC, clinics and waiting times.

After having searched for scientific books and articles from scientific journals and peer reviewing different articles and abstracts (N = 115), the researcher came to the conclusion that only 35 sources could be used (n = 35).

Step 3 (see Chapter 1, Table 1.1)

Conduct a pilot intervention with the CTS system to determine if the intervention contributes to shortening waiting times for patients visiting PHC clinics.

- **Population**

As was previously described in Step 1, a population is a specific group of individuals, referred to as a target group (Nieswiadomy, 2002:365; Burns & Grove, 2010:714; Polit & Beck, 2008:338). The total population was N = 665, and the accessible population n = 360, as included from the same two PHC clinics selected in Step 1 from a sub-district of the North West Province (Crookes & Davies, 2007:221).

- **Sampling method**

The sampling method that was used to reach Step 3 was convenience sampling, in other words, patients were included in the study by accident (Brink, 2009:132). Thus the first 360 patients who visited the two PHC clinics were included in the study (Crookes & Davies, 2007:120).

- **Sample size**

The size of the sample of patients selected with convenience sampling was N = 665 and n = 360 per clinic. More than half of patients that was seen for waiting times in the clinic was included in the study.

2.3.2   Pilot study

The pilot study was a trial run performed on a smaller scale to improve on the proposed study (Brink, 2009:206; Crookes & Davies, 2007:232; Nieswiadomy, 2002:365). The pilot study was the first step of implementation and was performed in a different clinic from the two PHC clinics selected for the final study. By doing this trial run on a smaller scale the researcher could change unexpected problems and re-test the feasibility of the study (Brink, 2009:54). The researcher performed a trial run of 20 patients at a different PHC clinic form the selected PHC clinics and refined the whole procedure as stated under data collection (see Chapter 2, section 2.3.3).

2.3.3   Data collection

The researcher focused on the specific objectives and questions of the study in order to collect the applicable data in an exact, systematic manner (Langford, 2001:315; Burns & Grove, 2010:695; Crookes & Davies, 2007:225).

Step 1 (see Chapter 1, Table 1.1)

Baseline assessment of current waiting times before the pilot intervention with the CTS system in the two PHC clinics of a sub-district in the North West Province.

The process of data collection in this study can be described by means of five questions, namely what, how, who, where and when (Brink, 2009:124). With Step 1 the researcher aimed to determine the exact waiting time of patients visiting the chosen PHC clinics. After the two PHC clinics had been selected, the researcher visited the district office and requested permission from the local area manager in charge of the selected clinics to conduct the research. The purpose of the study was explained to the sub-district management team and the local area manager. After permission had been obtained, the professional nurses in charge of the clinics (operational managers) were visited and permission was obtained to conduct the study in their PHC clinics.

The target population included a total of 360 patients who visited two PHC clinics in the Potchefstroom sub-district over a period of two weeks. This information was gathered by using a waiting-time survey of the health-care division of the City of Tshwane. The waiting-

time survey checklist was developed by the PHC policy programme and management of the City of Tshwane in 2011.

A checklist was used in this study. A checklist is a format with specific attributes and behaviours, used by the researcher to explore the phenomenon of choice (Leedy & Ormrod, 2010:189; Burns & Grove, 2009:690; Wood & Ross-Kerr, 2011:179). The checklist indicated the time that a patient arrived at the PHC clinic and the exact time the patient left the PHC clinic after the service needed had been rendered. The checklist was adapted by the researcher to use in two PHC clinics in the Potchefstroom sub-district in the Dr Kenneth Kaunda District of North West Province to assess the baseline of current waiting times in these clinics.

The researcher arrived at the PHC clinic very early in the morning and assured that all professional nurses, doctors, auxiliary nurses and administrative staff adjusted their watches to ensure agreement with the time period that was stipulated on the waiting-time survey. After having obtained verbal permission from all the patients who arrived at the clinic, the researcher issued the waiting-time survey checklist to each patient and recorded the time that the patient entered the clinic. All the patients waited in the waiting room for their duplicate record. When the duplicate record had been issued to every patient, the time was recorded by the administrative staff. The time at which the patient was helped by the auxiliary nurses who assessed the vital signs of the patient, and was seen by a professional nurse or a physician, dietician, counsellor or other health worker was also recorded.

An auxiliary nurse is trained and educated to provide the basic and elementary nursing care for patients as prescribed in their scope of practice. That includes basic procedures like checking patients' vital signs, urine tests, etc. (Nursing Act, 2005:62) (also see Chapter 1, section 1.5.3). According to the peer-reviewed literature study, auxiliary nurses play a vital role in the practical implementation of the CTS system as used in Emergency departments in the Cape Metropole (Augustyn, 2011:26).

The vital signs that are assessed include the peak flow breathing rate, which is estimated by means of a peak flow meter to identify any asthma or other respiratory conditions, blood pressure (BP), pulse, respiration and temperature. The haemoglobin (Hb) for patients with HIV/Aids is also measured to follow up for treatment, and pregnant patients receive ante-natal care at the clinic. The blood glucose level of patients with diabetes mellitus is tested.

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Patients referred to hospital and waiting for an ambulance were also documented. To achieve Objective 1 the researcher stated only the actual waiting times of the patients from their arrival until they left the clinic. The waiting-time survey checklist was therefore documented 360 times for 360 different patients in two PHC clinics in the Potchefstroom sub-district of the North West Province.

Step 2 (see Chapter 1, Table 1.1)

Explore and describe literature in order to understand PHC waiting times, triage and related constructs.

A literature review assisted the researcher to explore applicable information about the research problem (Brink, 2009:52; Langford, 2001:94). During this study the researcher used the author's own ideas, scientific journals, articles, abstracts, books and theses (Taylor *et al.*, 2007:77). Even the CTS system checklists were adapted on the basis of the background of the literature review. The literature review will be discussed further in Chapter 3.

Step 3 (see Chapter, Table 1.1)

To conduct a pilot intervention with the CTS system to determine if the intervention contributed to shortening waiting times for patients visiting PHC clinics.

Like in Step 1, the researcher also had to answer five questions, namely what, how, who, where and when to formulate this objective (Brink, 2009:124). The researcher aimed to see whether a pilot intervention with the CTS system can effectively contribute to shortening waiting times for patients visiting PHC clinics. The same waiting-time survey checklist that was adapted by the researcher in the initial assessment was also used at the two selected PHC clinics in the Potchefstroom sub-district in the Dr Kenneth Kaunda District of the North West Province to determine whether the pilot system implementation contributed to shortening the waiting times of patients visiting PHC clinics.

Like in Step 1, the researcher arrived early in the morning and recorded the time the patient entered the PHC clinic, and also the time that the patient left the clinic. The time of the following was also documented: when the patient's file and the duplicate were issued, when

the vital signs were assessed by an auxiliary nurse, consultation by a professional nurse, physician or any other professional worker. The time that the patient had to wait for the ambulance if there was a referral to the public hospital was also determined.

During this step the researcher implemented a pilot intervention with the CTS system and triaged patients by using colour codes. The researcher used stickers with different colours and pasted them on the waiting-time survey of every patient who was included in the study. When the auxiliary nurse assessed the vital signs, all the applicable results of specific procedures required by a specific patient, as was mentioned in Step 1, were documented. That included procedures like peak flow to monitor asthma and to estimate the peak flow rate, Hb, blood glucose, weight, BP for blood pressure control, pulse, respiration and temperature. Depending on the classification of the patient, the researcher used different-coloured stickers to triage the patients.

After the researcher was sure that the time at which patients had arrived at the clinic had been correctly stated by the administrative staff, she went to the vital-signs room to triage patients after the auxiliary nurses had assessed the vital signs of the patients. Depending on what the condition of a patient was, different-coloured codes were used to sort the patients. If there were any patients with a red colour code, they were sent to professional nurses and physicians immediately, and those with an orange colour code had to be seen by professional nurses in less than 10 minutes. Patients with yellow colour codes had to be seen within 60 minutes, and patients with the green colour codes had to be seen in 240 minutes. The blue colour code pertained to patients who had passed away and needed certification. When the patients left the clinic, the researcher collected all the waiting-time survey checklists to ensure that the representative sample of n = 360 was reached.

2.3.4   Data analysis

Data analysis is conducted to reduce, organise and give meaning to data that was collected during the research process (Burns & Grove, 2010:695; Crookes & Davies, 2007:224).

Step 1 (see Chapter, Table 1.1)

Baseline assessment of current waiting times before the pilot intervention with the CTS system in the two PHC clinics of a sub-district in the North West Province.

Descriptive statistics were used to describe and summarise information gathered during data collection (Babbie & Mouton, 2011:641; Polit & Beck, 2008:752). Data was entered in MS Excel. The Statistical Analysis System (SAS) and Cohen Variance test were used to analyse current waiting times without any pilot intervention with the CTS system (Ellis & Steyn, 2003:54). The baseline waiting time for patients visiting the PHC clinics was established. A statistician from the statistics department of the North-West University supported the researcher with the analysis of the data (see further discussion in Chapter 4, section 4.4.3).

Step 2 (see Chapter 1, Table 1.1)

> Explore and describe literature in order to understand PHC waiting times, triage and related constructs.

During the literature review, the researcher critically appraised all the data in order to distinguish between information that could contribute towards the study and data that could not (Taylor *et al.*, 2007:85). Furthermore, a critical appraisal of the literature was also important to improve on "evidence-informed practice" (Wood & Ross-Kerr, 2011:64). The researcher used logical reasoning to break the whole into smaller parts, including inductive and deductive reasoning. Inductive reasoning involves changing a specific statement to a general statement, while deductive reasoning involves changing a general statement to a specific statement (Burns & Grove, 2010:6). In this study the researcher explored the literature to describe the role of triage and to determine if triage can shorten the waiting times for patients visiting PHC clinics. The interpretation and analysis of data are discussed in Chapter 4.

Step 3 (see Chapter 1, Table 1.1)

> To determine whether the implementation of the pilot intervention with the CTS system contributed to shortening the waiting time of patients visiting PHC clinics.

Data collected by the researcher was entered in the MS Excel program. The SAS and Cohen Variance Test were used to analyse the data. The analysis was done in collaboration with a statistician from the statistics department at the NWU. After the analysis the results were obtained with the aid of descriptive statistics (see Chapter 4, section 4.4.3).

2.3.5   Reliability and validity

The reliability of a checklist indicates its ability to reproduce results that are equal wherever this technique is used under the same conditions. The level at which the checklist measures therefore depends on how consistent and dependable it is (Taylor *et al.*, 2007:181; Polit & Beck, 2008:764; Panter & Sterba, 2011:129; Brink, 2009:207).

The validity of the checklist reflects what the checklist is supposed to measure (Leedy & Ormrod, 2010:92; Polit & Beck, 2008:768; Brink, 2009:209).

Step 1 (see Chapter 1, Table 1.1)

Baseline assessment of current waiting times before the pilot intervention with the CTS system in the two PHC clinics of a sub-district in the North West Province.

A waiting-time survey checklist of the health-care division of the City of Tshwane was used during Step 1. The researcher obtained permission telephonically and via email to use and adapt the checklist according to the needs of this research study (see Annexure D). The checklist had originally been developed to determine the waiting times of patients visiting PHC clinics.

The PHC clinics involved in this study were located in the same sub-district, which meant that the patients presented at the clinics requesting similar services. The checklist seemed to be consistent, dependable and reliable (Brink, 2009:207). The validity applicable to this objective was content validity, which indicates how accurately the checklist can measure the representative part of the content of the phenomenon being studied (Leedy & Ormrod, 2010:92; Polit & Beck, 2008:750; Langford, 2001:314).

After the consideration of all peer-reviewed literature, the researcher chose only the information that was applicable in a PHC clinic to make the checklist valid. The final checklist therefore measured only the waiting time of patients visiting PHC clinics to determine the baseline waiting times for these patients. Initially the waiting time was measured again after the researcher had implemented a pilot study.

Step 2 (see Chapter 1, Table 1.1)

Explore and describe literature in order to understand PHC waiting times, triage and related constructs.

During the literature review, the researcher had the responsibility to ensure that all information included in this study came from scientific sources, therefore "data gained through the application of rigorous methods and techniques" (Babbie & Mouton, 2011:647). Scientific data underpinning and exploring the role of triage in PHC clinics and the research problem formed the foundation of the study and therefore had to be reliable. The content had to be valid as well.

Step 3 (see Chapter 1, Table 1.1)

To determine whether the implementation of the pilot intervention with the CTS system contributed to shortening the waiting time of patients visiting PHC clinics.

As the researcher noted in Step 1, the reliability of a checklist refers to its "consistency and dependability" (Langford, 2001:320). The same waiting-time survey checklist that was used during Step 1 was also applicable here.

The test results of the checklist were consistent throughout the study, therefore the researcher believed that they were reliable. Internal consistency refers to a checklist where all the different perspectives measure the same variable – in this study the waiting time for patients visiting a PHC clinic. The statistical test that best determines internal consistency is Cronbach's alpha coefficient, but this could not be used in this study, as only one construct, namely waiting times, was assessed (Brink, 2009:164). Reliability is discussed in Chapter 4, section 4.4.2.

2.4   ETHICAL CONSIDERATIONS

The term ethics refers to conducting a study on the basis of moral values and behaviour that is legal and professional (Burns & Grove, 2010:61; Polit & Beck, 2008:753; Taylor *et al.*, 2007: 580).

After a research proposal had been submitted, the Research Ethics Committee of the NWU: Potchefstroom Campus granted the researcher permission to continue with the study. This study forms part of the umbrella research programme entitled "Ethical approval of the NWU" The umbrella programme is titled "Leadership and governance as mechanisms toward excellence in South Africa health systems" (see Annexure F).

The North West Province: Directorate Policy, Research and Planning gave permission for the research study to be conducted in the North West Province (see Annexure B). The Potchefstroom sub-district manager and the local area manager also granted approval for the study to be conducted in selected clinics.

Furthermore the researcher applied ethics to maintain high standards of "honesty and integrity and to provide sound evidence-based practice" (Burns & Grove, 2010:184).

In this study a waiting-time survey checklist was adapted and used twice. The checklist was used before the pilot intervention with the CTS system to obtain the baseline waiting time for patients visiting a PHC clinic. During the pilot intervention with the CTS system, the same checklist was used to determine the effect of the pilot intervention with the CTS system on the waiting times of patients visiting the PHC clinics.

Informed consent involves an arrangement between the participant and the researcher involved in the research after the researcher has provided the necessary background and future outcomes (Taylor, *et al.*, 2007:581; Babbie & Mouton, 2011:528; Wood & Ross-Kerr, 2011:230). As the research in this study did not influence the patient services at all, informed consent was not obtained from each patient. The study served rather to evaluate the overall waiting time of patients and therefore was seen as a method that can assist management to evaluate whether triage contributes towards better service delivery or not. Furthermore, the

exact same patients were not involved in determining the overall waiting times before and after the pilot intervention with the CTS system. Giving feedback to all the patients whose waiting times were monitored was not viable in the catchment areas of the PHC clinics, as the area covers extended informal settlements. The researcher therefore maintained that informed consent from patients was not necessary, as the researcher was not involved in service delivery to the patient.

The following ethical principles were attended to during the study:

- **Respect for persons**. Every patient entering the clinic for which waiting time was monitored was greeted and treated with respect. An explanation was given that the clinic was looking for ways to improve their service and that his/her time spent at the PHC clinic was being monitored that day and that he/she would receive the service he/she had come for. The first 360 patients who arrived at the two PHC clinic were involved in this study.

- **Beneficence**. The patients involved in this research were protected against any "discomfort and harm" as a whole (Brink, 2009:32; Welman *et al.,* 2007:181; Nieswiadomy, 2002:41). All services provided were rendered exactly as they were every day, and the professional nurses working full time at the PHC clinics rendered the services to the patient.

- **Justice.** The right to privacy of all patients who were involved during this study was protected, their names and any medical information were kept confidential. Anonymity was applied, and instead of names, numbers were used to protect all patients' identity (Leedy & Ormrod, 2010:102; Brink, 2009:32). The patients were selected fairly: the researcher decided beforehand to select the first 360 patients.

2.5   CHAPTER SUMMARY

In this chapter a quantitative research design with an explorative, descriptive and contextual strategy was used. The research method, including the pilot study, population, sampling, data collection, data analysis, reliability and validity, and the ethical considerations were also discussed. A checklist was adapted by the researcher to perform the pilot study, and after it had been re-assessed, it was used in the proposed study. The gathering of data was done

by the researcher herself and ethical principles like anonymity and confidentiality were applied throughout the study.

In Chapter 3 the literature review for this study is discussed.

CHAPTER 3

LITERATURE REVIEW

3.1   INTRODUCTION

In this chapter the researcher introduces the reader to the history of triage and the background of the development of the CTS. This is followed by an overview of the CTS system and how to use it. The CTS system was originally implemented in Emergency departments in the Cape Metropole to conduct research on patient waiting times. The findings from this implementation and the value of the triage methodology in the reduction of patient waiting times in Emergency departments are discussed. The researcher also introduces the reader to the context of the research study.

3.2   THE HISTORY OF TRIAGE

A literature review was carried out by reading and searching for relevant information that explains triage and its effect on waiting times in the bigger environment (Langford, 2001:103; Burns & Grove, 2010:719; Vogt, 2007:294). A review of the literature confirmed the need to research the problem due to the scientific knowledge gap, as no evidence could be found of triage being implemented in a PHC clinic, and of the resultant effect of the implementation on patient waiting times. The identified scientific knowledge gap supported the continuation of the study (Brink, 2009:67).

The researcher identified a study in which the CTS system had been implemented within Emergency departments in the Cape Metropole. The application of triage highlighted one specific outcome, namely a reduction in patient waiting times (Augustyn, 2011:26).

Triage is a relatively new concept in South Africa, relating more to Emergency departments and services (ambulances and helicopters) nationally and much more internationally.

Because there is no research on the implementation of triage in PHC clinics in South Africa, a short history of triage is given below.

According to Howell (1988:9), Baron Dominique Jean Larrey (1766-1842) developed the medical concept of triage. He was a well-known genius and a formidable French military surgeon who cared for injured soldiers during times of war. He started his medical career as a thirteen-year-old student in Toulouse, Paris. After completing his studies, he joined the French navy. In 1797, during his period of service, the French Revolution war policy allowed Larrey to help injured soldiers only at a distance of one-and-a-half kilometres away from the fighting line. Officers with complications had to be treated first, and then the soldiers – if they were still alive. This was an era of class differences. Therefore, if fellow soldiers could not help the injured soldiers to get to medical help, the injured soldiers died. In later years wagons called "fourgons" were used to reach injured soldiers. Unfortunately these wagons were not very effective and it sometimes took up to three days for injured soldiers to get medical help (Howell, 1988:9, Ligthelm *et al.*, 2011:40).

Larrey was so desperate to help the injured immediately, that he ignored all the rules regarding rank and class, and went to the front line to help soldiers by doing surgery in the field. He realised that this was not a very effective way to help soldiers. He started to evacuate soldiers using "flying ambulances". This vehicle was drawn by horses, but this was challenging for Larrey and his medical orderlies as they were exposed to attack (Gotschalk, 2004:325; Howell, 1988:9). Larrey realised that the treatment policy followed by the French military that officers had to be attended to first and then their subordinates could receive attention, had to be changed to reduce mortality. This was when the first form of triage was implemented. During triage the soldiers were treated according to their injuries and not their rank (Howell, 1988:9 -10). This was the beginning of triage or "trier" – to sort or to choose (Howell, 1988:10; Zimmermann & McNair, 2006:3).

In 1960, during the Vietnam war, nurses implemented triage for the first time, while triage by nurses became accepted practice in the United Kingdom in 1980. Trained ambulance staff employed triage in the field hospitals (Woolwich, 2000:476).

3.2.1 Background on the development of the Cape Triage Score (CTS) system

The Cape Triage Group (CTG) originated in the Emergency Medicine divisions at the Universities of Cape Town and Stellenbosch. The CTG consisted of diverse professionals like medical doctors, nurses and paramedics. The CTG developed the CTS, which has been implemented in several Emergency departments in Western Cape hospitals since 2006 (Wallis & Twomey, 2005:1; De Vries *et al.*, 2005:38). The two physicians who are leading this project are Drs Clive Balfour and Lee Wallis (Augustyn, 2006:8).

A subdivision of the CTG developed a training course, with a training manual, for doctors and nurses designated to implement this CTS system in their working environment (Wallis & Twomey, 2005:1). The CTS system was developed to be implemented in Emergency departments in the private and public health-care sector (De Vries *et al.*, 2005:38).

3.2.2 Practical application of the CTS system

According to the PHC CTS system, patients are classified into three age groups, namely the child (birth to 5 years), the child (6–11 years) and adults (12 years and older) (Wallis & Twomey, 2005:6). The CTS tool consists of two parts. Part 1 is the triage early warning score (TEWS), and Part 2 is the discriminator list, which involves the determination of a score. The TEWS has been formulated to be implemented in South Africa, but was originally derived from a British modified early warning system that was used for medical patients in hospitals (Augustyn, 2011:26; De Vries *et al.*, 2005:40).

The complete CTS system, as used in Emergency departments, is listed as an annexure (see Annexure E), and the focus of this section will be on the application of the CTS system in PHC clinics (Wallis & Twomey, 2005:7).

In this study, the focus was on the effect of a pilot intervention with a CTS system on waiting times in PHC clinics. In Table 3.1 the researcher indicates how the calculation of the TEWS for an child younger than 5 years was adapted to be applicable in a PHC context, which included PHC clinics, community health centres and district hospitals.

TABLE 3.1   TEWS CALCULATOR FOR A CHILD YOUNGER THAN 5 YEARS ADAPTED BY RESEARCHER FOR USE IN PHC CLINICS (THE CHILD UNDER 5 YEARS INCLUDES THE NEONATE AND THE INFANT)

CHILD TRIAGE SCORE								
	3	2	1	0	1	2	3	
Mobility				Normal for age		Stretcher/ immobile		**Mobility**
Respiratory rate (RR) birth to 12 months	Less than 20	20–39		40–59		60–69	70 or more	**RR**
RR 1 year to 5 years	Less than 15	15–24		25–35		36–45	46 or more	**RR**
Temp		Lower than 35		35–38,4		38,5 or higher		**Temp**
Alertness				Alert	Irritable	Lethargic	Unconscious	**Alertness**
Trauma				No	Yes			**Trauma**
Younger than 5 years/smaller than 106 cm								

The researcher adapted the TEWS calculator for use in the PHC clinics because the IMCI is used to assess children younger than 5 years in public health clinics. The IMCI was implemented by the South African Department of Health after it had been developed by the United Nations Children's Fund (UNICEF) (Thandrayen & Saloojee, 2010:73, Kerry, 2005:32, Woods, 2010:28). The term infant triage score was changed by the researcher to refer to a child younger than 5 years, instead of an infant younger than 3 years. All values were adapted to fit children younger than 5 years or smaller than 106 cm.

Heart rate and blood pressure are not applicable as part of IMCI in PHC clinics, as they are not part of the IMCI assessment. These elements were therefore removed from the TEWS calculator for children younger than 5 years. The vital signs to be observed are the mobility (for instance a 4 year old sitting in a wheelchair) and the respiratory rate. Two groups were

identified: children from birth to 12 months and children from 1 year to 5 years. The normal respiration values for children from birth to 12 months are 40–60 breaths per minute (Department of Health, 2011:2; Mash *et al.*, 2010:93, Kerry, 2005:34). For children from 1 year to 5 years the normal values are 25–35 breaths per minute (Mash *et al.*, 2010:93; Uys, 2004:157). The number of breaths per child has to be counted over 60 seconds to ensure that they are correct (Kerry, 2005:34).

Other vital signs like the temperature remained unchanged for the TEWS calculator (same values for all patients), including the alertness of a child. According to IMCI guidelines, one of the danger signs is when a child is lethargic or unconscious (Department of Health, 2011:2). This could indicate that the child suffers from trauma caused by child abuse or a serious accident.

After the TEWS had been calculated, the discriminator list was used by the researcher to triage the child with the applicable colour code. Table 3.2 contains information on how the researcher adapted the discriminator list to be used in a PHC environment.

In the PHC context the CTS system consists of five colour codes and the TEWS. Patients coded with the red colour code, with a score 7 or higher, must be attended to immediately.

Patients coded with the orange colour code, with a score of 5–6, must be attended to by a professional nurse in less than 10 minutes. The patients designated with the yellow colour code, with a score of 3–4, require attention within 60 minutes. Patients designated with the green colour code, with a score of 0–2, must be attended to within 240 minutes. The latter includes all other patients with other conditions not specifically mentioned, and patients experiencing mild pain. The final colour is blue, and this classification is applicable to dead children (Wallis & Twomey, 2005:9). The following table describes the discriminator list for children younger than 5 years and was adapted for the discriminator to be used in the PHC context.

TABLE 3.2   DISCRIMINATOR LIST FOR CHILDREN YOUNGER THAN 5 YEARS THAT IS USED IN PHC CLINICS

COLOUR	RED	ORANGE	YELLOW	GREEN	BLUE
TEWS	7 or more	5–6	3–4	0–2	DEAD
Target time to treatment	Immediately	Less than 10 min	Less than 60 min	Less than 240 min	
	Drooling	Shortness of breath			
	Acute onset of stridor		Stridor/ wheeze		
		Haemorrhage – uncontrolled	Haemorrhage – controlled		
	Seizure current				
		Level of consciousness reduced			
		Floppy child			
		Purpura			
		Fracture – open	Fracture – closed	ALL OTHER	DEAD
			Unable to bear weight		
	Burns – face/inhalation	Burns – over 10%		PATIENTS	
		Burns – electrical			
The patient presents with	Burn – face/inhalation		Burns – other		
		Burns – chemical			
		Poisoning/- overdose	Abdominal pain		
	Hypoglycaemia – glucose level less than 3				
		Rectal bleeding	Vomiting persistent		
			Not feeding		
			Not urinating		
			Inappropriate history		
			Prolonged or uninterrupted crying		
Pain		Severe	Moderate	Mild	

LITERATUTRE REVIEW

The discriminator list for children younger than 5 years was adapted to fit in with a PHC environment. PHC is the first level of health provision to the entire community, and any other conditions outside the frame of PHC are for referral to the public hospital (Denill & Rendall-Mkosi, 2012:4,72).

This discriminator list was also adapted with the IMCI guidelines in mind, as this programme was implemented by the South African Department of Health (Thandrayen & Saloojee, 2010:73).

The discriminator list consists of five colour codes, with the different scores of the TEWS under each colour. Some terminology is discussed to help an auxiliary nurse (SANC, 2005:63) understand the application of the discriminator (Wallis & Twomey, 2005:3). The following conditions are classified under red (score 7 or more) and have to be managed immediately (Wallis & Twomey, 2005:9):

- Drooling involves clear sputum coming from a child's mouth, the child bending forward, having a raised temperature and having difficulty swallowing (Prescott, 2009:178).

- Stridor is a high-pitched, harsh, crowing respiratory sound because of an obstruction in the upper thoracic airway, usually heard on inspiration (Mash *et al.*, 2010:93).

- Seizure – current or convulsions "is abnormal movement with local or generalised spasm of muscles, associated with loss of consciousness" (Mash *et al.*, 2010:54).

- Burns – face/inhalation are the result of skin trauma due to hot liquids, fire, electricity or chemicals. The degree of tissue damage depends on the temperature, duration of the burn and the area of the human body that is involved (Mash *et al.*, 2010:41).

- Hypoglycaemia is low blood sugar, for instance less than 3 mmol/l (Department of Health, 2011:16).

The orange colour code (score between 5 and 6) on the discriminator list means that patients have to be attended to in less than 10 minutes.

- Stridor and wheezing. Wheezing is a musical sound that is audible with the ear and a stethoscope, and varies from a high to a low pitch. An expiratory sound is dominant and is caused by lower airway obstruction by, for example, oedema and secretions (Mash *et al.*, 2010:18).

- Haemorrhage – uncontrolled (uncontrolled bleeding) like after surgery and trauma (Smeltzer *et al.*, 2010:464).

- Purpura is red-purple skin lesions (bleeding into the skin) that do not fade on pressure (Mash *et al.*, 2010:7).

- Level of consciousness is reduced, as observed with the AVPU (Wallis & Twomey, 2005:7).

- Floppy baby: children who are lethargic and drowsy (Department of Health, 2011:2).

- Open fracture: bone is in contact with the air due to bone piercing outwards through skin, or an external object piercing inwards. The skin or mucous membrane extends to the fractured bone (Smeltzer *et al.,* 2010:2084).

- Children with burn wounds over 10% of the body, electrical and chemical burn wounds (see Table 3.3).

- Poisoning/overdose.

- Rectal bleeding.

- Pain is severe.

TABLE 3.3   BURN   WOUNDS,   BODY   SURFACE   AREA   (PERCENTAGE) ACCORDING TO AGE

	Age					
Region	**0**	**1**	**5**	**10**	**15**	**ADULT**
Head (front & back)	10	9	7	6	5	9
Thigh (front & back)	3	3	4	5	5	18
Lower leg (front & back)	2	3	3	3	3	18
	Body surface area (percentage) according to age (Smeltzer *et al.*, 2010:1721)					

Table 3.3 helps to determine the percentage of burn wounds in children at the age of 0, 1, 5, 10 and 15 years as well as adults. Three regions are mentioned to get a more accurate percentage, e.g. head (front and back), thigh (front and back) and lower leg (front and back).

The classification under the orange code is mostly for referral to hospital (Department of Health, 201:2; Mash *et al.*, 2010:218).

The conditions classified under the yellow colour code (score between 3 and 4) have to be attended to within less than 60 minutes. The following conditions are classified under this code:

- Haemorrhage – controlled (controlled bleeding like a superficial cut without any damage to arteries and veins) (Smeltzer *et al.*, 2010:464)

- Closed fracture, "bone inside is not in contact with the air" (Smeltzer *et al.*, 2010:2084)

- Unable to bear weight

- Other minor burns

- Abdominal pain

- Persistent vomiting

- Not feeding

- Not urinating

- Inappropriate history, therefore the history does not correlate with the appearance of the child. Child appears to be more ill, for example a child who is brought in by the mother, with a history that he felt ill. After further investigation it is suspected that the child was abused while the mother denies it

- Prolonged or uninterrupted crying

- Pain is moderate

The green colour code (score between 0 and 2) includes all other children and those with mild pain, and they have to be attended to in less than 240 minutes. The blue colour code includes all children who have died and have to be certified (Wallis & Twomey, 2005:6).

The next age group with a TEWS calculator is for children of 3–12 years, as used in Emergency departments. The TEWS calculator for children of 5–12 years, adapted by the researcher, is discussed in Table 3.4.

The TEWS calculator for children of 3– 2 years/96–150 cm as it is used in Emergency departments consists of the basic vitals of a child that can be read vertically, comparing them with the TEWS that is read horizontally (Wallis & Twomey, 2005:7).The basic vitals include the mobility of the patient (needs help to walk or not); the respiration rate (normal values 17–21 breaths per minute); heart rate (normal values 80–99 beats per minute); systolic blood pressure (normal values 130–80 mmHg); temperature (normal values 35–38,5 degrees Celsius); AVPU (A – alert, V – react to voice, P – react to pain, U – unresponsive), and whether the child experiences any trauma or not (Wallis & Twomey, 2005:7). The TEWS together with the child discriminator list determines the colour code and in which order the child will be attended to. See Table 3.5 for further discussion of the child discriminator list. The following score was adapted and described as guideline for children of 5–12 years in a PHC context.

TABLE 3.4   TEWS CALCULATOR FOR A CHILD OF 5–12 YEARS OLD, ADAPTED FOR USE IN PHC CONTEXT

CHILD TRIAGE SCORE								
	3	2	1	0	1	2	3	
Mobility				Walking	With help	Stretcher/-immobile		**Mobility**
RR	Less than 15	13–14		15–25	26–30	30 or higher		**RR**
BP	Less than 70	70–79		80–140	141–159	160 or higher		**BP**
Temp		Lower than 35		35–38,4		38,5 or higher		**Temp**
Alert-ness				Alert	Reacts to Voice	Reacts to Pain	Unre-sponsive	**AVPU**
Trauma				No	Yes			**Trauma**
5 to 12 years old/106 to 150 cm tall								

The researcher adapted this triage score for children of 5–12 years/106 to 150 cm as follows: in children up to 11 years, blood pressure is not applicable at a PHC clinic (Mash *et al.,* 2010:93). The focus is more on the respiration and temperature. The score includes the mobility of a child, whether a child needs help, or is immobile (Wallis & Twomey, 2005:6). The normal values of respiration for patients of 5–12 years vary between 15–25 breaths per minute (Mash *et al.*, 2010:6,93). If respiration is lower or higher, a different score will be given. The temperature is the same for all the ages, but for this TEWS for children, a 0 score includes temperature values of 35–38,4 degrees Celsius, and a different score lower than 35 and higher than 38,4 degrees Celsius (Wallis & Twomey, 2005:7).

The alertness of a child includes whether the child is alert, responds to the voice of the professional nurse, whether the child reacts to pain or is unresponsive (AVPU) (Wallis & Twomey, 2005:7). If any child has experienced any trauma, it is marked as yes or no, with the given score. The discriminator list for children of 5–12 years was adapted to fit a PHC environment (see Table 3.5).

TABLE 3.5   DISCRIMINATOR LIST FOR CHILDREN OF 5–12 YEARS OLD, AS ADAPTED FOR USE IN PHC CONTEXT

COLOUR	RED	ORANGE	YELLOW	GREEN	BLUE
TEWS	7 or more	5–6	3–4	0–2	DEAD
Target time to treatment	Immediate	Less than 10 min	Less than 60 min	Less than 240 min	
	Drooling	Shortness of breath			
		Acute onset of stridor			
			Wheezing		
		Haemorrhage – uncontrolled	Haemorrhage – controlled		
	Seizure current	Level of consciousness reduced			
		Purpura			
The patient presents with		Fracture – open	Fracture – closed	ALL OTHER	DEAD
		Burns – over 10%		PATIENTS	

COLOUR	RED	ORANGE	YELLOW	GREEN	BLUE
		Burns – electrical			
	Burns – face/inhalation		Burns – other		
		Burns – chemical			
		Poisoning/-overdose	Abdominal pain		
	Hypoglycaemia – glucose level lower than 3	Diabetic – glucose level over 17 & ketonuria	Diabetic – glucose level over 11 & ketonuria	Diabetic – glucose level over 11 (no ketonuria)	
		PR bleeding	Vomiting persistent		
			Inappropriate history		
Pain		Severe	Moderate	Mild	

Like the discriminator list for children younger than 5 years, the discriminator list for children of 5–12 years was adapted to fit in with the PHC environment. IMCI guidelines as implemented by the South African Department of Health are applicable only to children of up to 5 years, therefore this discriminator list was not valid for children between 5 and 12 years old (Thandrayen & Saloojee, 2010:73).

The discriminator list consists of five colour codes, with the TEWS included in this list (Wallis & Twomey, 2005:10).

The red colour code indicates conditions that have to be managed immediately and mostly need referral. PHC clinics are the first level of management of all primary health-care cases, and every serious condition outside this frame needs to be referred to public hospitals (Denill & Rendall-Mkosi, 2012:72). The TEWS of 7 or higher is used under the red colour. Certain terminology has already been discussed in the discriminator list for children younger than 5 years. Only the terminology that differs will therefore be described during this discussion for conditions like:

- drooling

- seizure – current, or convulsions

- burns – face/inhalations

- hypoglycaemia less than 3 mmol/l

The abovementioned conditions need immediate consultation to be stabilised, and then must be referred to a hospital.

Patients designated with the orange colour, with a TEWS of 5–6, have to be treated within less than 10 minutes (Wallis & Twomey, 2005:10). The following conditions were adapted and included to be treated under the orange code in PHC clinics:

- patients with shortness of breath

- acute onset of stridor

- uncontrolled haemorrhage

- level of consciousness reduced

- purpura

- open fractures

- burn wounds – more than 10% of the total body surface area

- electrical and chemical burn wounds

- poisoning and overdose

- rectal bleeding

- inappropriate history, no correlation between the history received from the mother and the appearance of the real physical condition of the child after examination

- severe pain

Patients designated with the yellow colour code have to be attended to in less than 60 minutes and include the TEWS of 3–4 (Wallis & Twomey, 2005:10). This colour code includes conditions like:

- wheezes

- haemorrhage – controlled

- closed fractures

- all other burn wounds

- severe abdominal pain

- diabetic – glucose level over 11 mmol/l (normal glucose levels 4–7 mmol/l**)**; glucose level too high and ketonuria (may indicate uncontrolled diabetes)

- persistent vomiting

- severe pain

Patients designated with the green colour code have to be attended to in less than 240 minutes and the TEWS is 0–2 (Wallis & Twomey, 2005:10). Included in this colour code are:

- diabetic – glucose level over 11 mmol/l with no ketonuria

- patients with mild to moderate pain

- all other patients

The blue colour code indicates that the patient has died and has to be certified by a physician or professional nurse (Wallis & Twomey, 2005:10).

In the next section the TEWS calculator for adults is discussed. See Table 3.6.

TABLE 3.6   TEWS CALCULATOR FOR ADULTS

ADULT TRIAGE SCORE								
	3	2	1	0	1	2	3	
Mobility				Walking	With help	Stretcher/ immobile		**Mobility**
RR		Less than 9		9–14	15–20	21–29	More than 29	**RR**
HR		Less than 41	41–50	51–100	101–110	111–129	More than 129	**HR**
SBP	Less than 71	71–80	81–100	101–199		More than 199		**SBP**
Temp		Lower than 35		35–38,4		38,5 or higher		**Temp**
AVPU				Alert	Reacts to Voice	Reacts to Pain	Unresponsive	**AVPU**
Trauma				No	Yes			**Trauma**
Over 12 years/taller than 150 cm								

The TEWS for adults as compiled in the Cape Triage Score manual can be used in the PHC environment in the same way as in the Emergency departments of provincial hospitals (Wallis & Twomey, 2005:6). To get a total score, all the basic vital signs of a patient have to be checked by an auxiliary nurse (Nursing Act, 2005:63). A score of 0–3 measures the mobility of a patient (can walk into the facility or needs help). Vital signs include the respiration, heart rate, blood pressure and temperature. The normal values for the respiration of a patient of 12 years and older vary between 16–20 breaths per minute, and the normal heart rate of a patient should be 60–80 beats per minute. The systolic reading of a normal BP is 120, and the diastolic reading 80 mmHg (Wallis & Twomey, 2005:6). A temperature of 36,5–37 degrees Celsius indicates the normal body temperature of a patient.

The level of consciousness of a patient (central nervous system) is tested by using an AVPU scale while talking to the patient or applying pain stimuli, and if there was any trauma (Wallis & Twomey, 2005:6; Augustyn, 2011:27). After the TEWS calculator for adults had been completed, the discriminator list for adults was adapted for use in PHC clinics.

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The discriminator list for adults also consists of the five colour codes, with the different TEWS applicable, like both the other discriminator lists discussed above. In this case, where the patients are adults, the red colour code (7 or more) covers the following conditions where patients have to be attended to immediately:

- seizure – current

- burns – face/inhalation

- hypoglycaemia – glucose level less than 3 mmol/l

The following conditions are included under the orange colour code (score 5–6), where patients have to be attended to in less than 10 minutes:

- high energy transfer

- shortness of breath – acute

- coughing up of blood

- chest pain

- uncontrolled haemorrhage

- seizure – post-ictal is abnormal motor, sensory, autonomic or psychic activity and originates from excessive discharge from cerebral neurons. Post-ictal is an altered state of consciousness a person enters after experiencing a seizure that can last between 5 and 30 minutes. In severe cases it is characterised by headaches, confusion, drowsiness etc. (Schmeltzer *et al.*, 2010:1881)

- focal neurology – acute

- level of consciousness – reduced

- psychosis/aggression

- threatened limb

- dislocation – other joint

- fracture – compound

- burn wounds – over 20%

- electrical burn wounds

- burns – circumferential

- chemical burn wounds

- poisoning/overdose

- diabetic – glucose level over 11 mmol/l and ketonuria

- vomiting fresh blood

- pregnancy and abdominal trauma or pain

- severe pain

The yellow colour-coded (score 3–4) patients have to be attended to in less than 60 minutes and this colour code includes the following conditions:

- controlled haemorrhage

- dislocation – finger or toe

- closed fracture

- all other burn wounds

- abdominal pain

- diabetic – glucose level over 11 (no ketonuria)

- persistent vomiting

- pregnancy and trauma

- pregnancy and vaginal bleeding

- moderate pain

The green colour-coded (score 0–2) patients have to be attended to in less than 240 minutes and the code includes all other patients, while the blue colour code designates any patients who may have died (Wallis & Twomey, 2005:8). See Table 3.7 below.

TABLE 3.7   DISCRIMINATOR LIST FOR ADULTS

Colour	RED	ORANGE	YELLOW	GREEN	BLUE
TEWS	7 or more	5–6	3–4	0–2	DEAD
Target time to treatment	Immediately	Less than 10 min	Less than 60 min	Less than 240 min	
		Shortness of breath – acute			
		Coughing up of blood			
		Chest pain			
		Haemorrhage – uncontrolled	Haemorrhage – controlled		
	Seizure – current	Seizure – postictal			
		Level of consciousness reduced			
		Psychosis/ aggression			
			Dislocation – finger or toe	ALL	DEAD
The patient presents with		Fracture compound/- open	Fracture – closed	OTHER	
		Burns – over 20%		PATIENTS	
	Burns – face/inhalation of smoke		Burns – other		
		Burns – chemical			
		Poisoning/over dose	Abdominal pain		
	Hypoglycaemia – glucose level less than 3		Diabetic – glucose level over 11 (no ketonuria)	Diabetic – glucose level over 11 (no ketonuria)	
		Vomiting of fresh blood	Vomiting persistent		
		Pregnancy & abdominal trauma or pain	Pregnancy & trauma		
			Pregnancy & PV bleed		
Pain		Severe	Moderate	Mild	

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After the calculation had been done with the TEWS calculator, the discriminator list was used to identify any other signs or symptoms and conditions that had not been identified by the TEWS calculator, also called a "safety net" (Wallis & Twomey, 2005:5). The researcher adapted the discriminator list for adults to be able to use it in a PHC clinic.

The red colour code with a TEWS of 7 or more indicates patients who have to be attended to immediately, with conditions like:

- seizure – current

- burns – face/inhalation of smoke

- hypoglycaemia – glucose level less than 3 mmol/l (Wallis & Twomey, 2005:8)

Patients categorised with the orange colour code with a TEWS of 5–6 have to be attended to in less than 10 minutes. Unfamiliar terminology is discussed where applicable. The following conditions were included in the adapted discriminator list for adults:

- shortness of breath – acute

- coughing up of blood (caused by, for example, varicose veins in oesophagus, lung infections)

- chest pain – a constricting quality pain suggests angina, anxiety or oesophagitis; a sharp pain may be from the pleura or pericardium, worsening with deep inspiration; a prolonged, intense pain suggests myocardial infarction. In the case of angina, the pain is tight and retrosternal, and refers to the neck, arm or back and is relieved by rest; duration is normally 10 min (Mash *et al.*, 2010:11)

- haemorrhage – uncontrolled

- seizure – post-ictal

- level of consciousness reduced

- psychosis/aggression

- open fracture

- burn wounds – more than 20% of the total body surface area

- chemical burns

- poisoning/overdose

- vomiting of fresh blood – bleeding gastric ulcers (Schmeltzer *et al.*, 2010:1047)

- pregnancy and abdominal trauma or pain

- severe pain

The yellow colour code indicates that a patient has to be attended to in less than 60 minutes, and includes the TEWS of 3–4. Conditions include:

- haemorrhage – controlled

- dislocation – finger or toe

- closed fracture

- burns – 1%

- abdominal pain

- diabetic – glucose level over 11 mmol/l and no ketonuria

- persistent vomiting – due to food poisoning, gastroenteritis, gastrointestinal obstruction and appendicitis (Schmeltzer *et al.,* 2010:984)

- pregnancy and trauma

- pregnancy and vaginal bleeding

- moderate pain

The green colour code indicates that a patient has to be attended to in less than 240 minutes. A TEWS of 0–2 is applicable here. The conditions include:

- diabetic – glucose level over 11 mmol/l (no ketonuria)

- mild pain

- all other patients

The blue colour code indicates patients who have died and have to be certified by a physician or professional nurse (Wallis & Twomey, 2005:8).

To summarise, the researcher adapted the infant (0–3 years) and child (3–12 years) TEWS calculator and the discriminator list of the Cape Triage Score to children younger than 5 years and children of 5–12 years for use in PHC clinics. The reason for this was to allow the accommodation of the IMCI programme that has been used by the public PHC clinics for several years, and that was introduced in South Africa in 1998 as a strategy developed by UNICEF to reduce child mortality (Thandrayen & Saloojee, 2010:73). The TEWS calculator for adults was used as is, while the discriminator list was adapted to fit in with the PHC framework. The researcher also wanted to determine whether the CTS adapted for use in the PHC clinics would shorten waiting times for patients visiting PHC clinics in the North West Province.

3.3   STEPS INDICATING HOW TO USE THE CTS SYSTEM

These steps apply only to the CTS system.

Step 1: Measuring the vital signs and recording the findings

The auxiliary nurse (South Africa, 2005:63) assesses the patient's vital data like the respiration, heart rate, temperature and blood pressure to see if there are any abnormalities.

The professional nurse determines the level of consciousness by means of the AVPU scale (A = alert, V = responsive to verbal stimulus, P = responsive to pain and U = unconscious).

The mobility of the patient is determined: whether the patient can walk or needs assistance to walk (Augustyn, 2011:27).

Step 2: Taking the patient's history

The professional nurse takes the history of the patient by asking what the main complaint is. Questions that are asked include: what is the problem? After the identification of the main complaint, a brief history is taken.

Step 3: Calculation by using the TEWS calculator – a comparison between the results of the patient and the different parameters

The TEWS total for the specific patient is noted under a specific colour. After the basic vital signs (vertically) have been compared to the score of 0–3 (horizontally) as part of the TEWS calculation, all scores are added together to determine the TEWS.

Step 4: Comparison of the TEWS total in a specific colour with the discriminator list

The professional nurse compares the history that was taken during Step 2 with the discriminator list to see if any of the signs and symptoms are visible in another column. In consideration with the TEWS total, and if no discriminator is found in the same column, the triage colour code stays the same. However, when a discriminator is found in a different column, the colour code is changed to that column. The discriminator list is used if any medical condition was left out during the first three steps, especially Step 3.

Step 5: Final triage code

The last step is to record the final triage code with reference to the patient's vital signs. The patient is referred according to the specific colour code to the appropriate personnel for assistance (Wallis & Twomey, 2005:11).

The specific management of the five steps of triage was adapted to fit in with a PHC environment in the public clinics. The colour coding, with specific reference to the reasons for management, was as indicated in Table 3.9.

Patients in PHC clinics who have received a red colour code need immediate attention by a professional nurse. These patients have to be referred to the nearest public hospital for further examination, for example for severe trauma, burn wounds and hypoglycaemia.

Patients with an orange colour code have to be attended to in less than 10 minutes for conditions like acute hypertension, fever and signs of dehydration.

Patients with a yellow colour code have to be attended to in less than 60 minutes, and those with a green colour code in less than 240 minutes. Examples of the latter are patients

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following up for routine pre- and post-natal care (Wallis & Twomey, 2005:17). When a patient is blue colour coded, it means that the patient is dead and must be certified as such (De Vries *et al*, 2005:39).

TABLE 3.9   MANAGEMENT AND COLOUR CODING

COLOUR	TARGET TIME	MANAGEMENT
RED	Immediately	Any severe trauma, burn wounds, hypoglycaemia and convulsions need to stabilised in PHC clinics and referred to a hospital
ORANGE	< 10 minutes	Acute hypertension, fever, signs of dehydration
YELLOW	< 60 minutes	Patients following up for pre- and post-natal care without complications
GREEN	< 240 minutes	Patients following up at centres for antiretroviral treatment, TB and any other chronic conditions
BLUE		Dead

3.4   OUTCOMES OF THE IMPLEMENTATION OF THE CTS SYSTEM IN EMERGENCY DEPARTMENTS IN THE CAPE METROPOLE

The CTS system was developed by the Cape Triage Group (CTG) during 2005 and has been implemented in South African Emergency centres since 2007. The CTG found that the implementation of the CTS system has made huge differences in reducing the waiting time of patients since 2007 (Augustyn, 2011:26).

Another excellent feature of the CTS system is that nursing staff like auxiliary nurses can also triage patients, because the instrument is simple to understand and to use (Augustyn, 2011:26).

The flow of patients in the Emergency departments is much better and waiting areas are less crowded. Patients are more satisfied, as well as the staff. The waiting time for a patient from arrival until departure has also been reduced (Augustyn, 2011:26).

With the implementation of the same CTS system in PHC clinics, the researcher wants to establish if waiting times can be shortened in PHC clinics on provincial level.

3.5 VALUE OF TRIAGE IMPLEMENTATION

The researcher identified during a peer-review literature study that there was a direct correlation between the time that patients have to wait at a clinic and patient satisfaction (Eilers, 2004:42; McCarthy *et al.,* 2000:288; Blitz *et al.*, 2008:43a). Internationally and nationally different triage systems are implemented in Emergency departments, both in the private sector and in public hospitals, with good results (Ardagh *et al.*, 2002:6; Rauf *et al.*, 2008:43d). In South Africa there is at present no scientific literature available about the implementation of triage in PHC clinics. Therefore the researcher wanted to establish if the implementation of a triage system will have an influence on waiting times in the PHC clinics in the North West Province.

3.6 CHAPTER SUMMARY

In this chapter, background was given about the history of triage, which is better known in Emergency departments – both nationally and internationally – but which is a relatively new concept in PHC clinics at provincial level in South Africa. The CTS system was discussed as it had been implemented in Emergency departments in the Cape Metropole. After a brief discussion of the TEWS calculator and discriminator list as they had been adapted to fit in with the PHC context, the researcher focused on three different patient ages as part of the study. In addition, the outcome of the implementation of the CTS system in Emergency departments in the Cape Metropole, the value of triage implementation and whether it can shorten waiting times were discussed. In the next chapter the data analysis as received after data collection is discussed.

CHAPTER 4

RESEARCH RESULTS

4.1   INTRODUCTION

The previous chapter included the literature review of the research study. In this chapter the research results and an interpretation of the results are discussed. The data analysis is discussed as follows: the validity and reliability of data, analysis of data and other concepts applicable, e.g. the explanation of concepts such as time of arrival, waiting period before patients receive their duplicate records, time that it will take administrative staff to issue duplicate records, waiting period before vital signs are assessed, assessment of vital signs, waiting period before consultation by professional nurses or physicians, time of consultation and dispensing of medicine by professional nurses or physicians and the time that patients leave the clinic. A summary of the chapter is also provided.

4.2   VALIDITY AND RELIABILITY OF DATA

The validity of a checklist refers to the extent to which the checklist measures what it is intended to measure (Schmidt & Brown, 2012:492; Maltby *et al,* 2010:245). Reliability means that the researcher gets the same or similar results over time by using the same checklists (Schmidt & Brown, 2012:231; Maltby *et al,* 2010:246).

4.2.1   Validity of the checklist

The waiting-time survey checklist was used during this study. Permission was granted telephonically and in writing by the PHC Policy Programme and Compliance Management: Health Care Division (Annexure D) of the Tshwane Metropolitan Council. This checklist was used in clinics in Tshwane as a quality-assessment checklist for more than five years but they could not ensure validity. The researcher therefore believed that this waiting-time

survey checklist was valid because it measured what was intended to be measured (Schmidt & Brown, 2012:492; Maltby *et al,* 2010:245). According to Brink (2009:202) the instrument shown on the surface of its face, that it measured the desired data necessary for the study, as it measured only waiting times. In this study the construct measured, was waiting time and the instrument has the ability to include all the important elements relevant to the construct being measured (Burns & Grove, 2010:693).

4.2.2   Reliability of data

As part of reliability, the assessment of internal consistency is made by using the Cronbach's alpha test, which compares the items with each other with the aid of a computer program (Schmidt & Brown, 2012:233). It was not possible to include the Cronbach's alpha test in this study, because there is only one variable, namely waiting time. Reliability could therefore not be confirmed with a statistical analysis test. The researcher ensured reliability by encouraging all participants involved in the study, like the administrative staff, auxiliary nurses, professional nurses or physicians and the researcher herself, to adjust their watches to exactly the same time before the assessment of waiting periods. If clinic staff used watches that were not synchronised it could contaminate the waiting-time data and the interpretation of waiting times, resulting in unreliability. The researcher therefore ensured congruence in recording waiting times.

An overview of the study and exactly what the researcher expected from all the staff members were communicated. Every time that a patient visited the clinic, the staff members in the vital-signs room, consultation room, etc. had to record starting and completion times. When the patient left the clinic, the researcher collected all the waiting-time survey checklists and ensured that all the different times were indicated and that the time when the patient left was recorded. To ensure further reliability, the researcher was personally involved in the data-collection process. The researcher was present during the baseline measurement of the waiting times as well as during the conducting of the pilot intervention with the CTS system.

4.3   DATA ANALYSIS AND OTHER CONCEPTS

Data analysis is a systematic process that includes the collection of information to reduce, organise, manipulate and give value to the data collected (Burns & Grove, 2010:695; Brink, 2009:170; Polit & Beck, 2008:751). The data gathered by the researcher was statistically captured and analysed by the North-West University's Statistical Consultation Services on the Potchefstroom Campus using SAS (SAS Institute Inc., 2011). The applicable concepts were discussed, followed by a brief interpretation and discussion of the statistical data (Table 4.1).

Quantitative data analysis is performed by using numbers or quantities (Maltby *et al,* 2010:363). In this study the numbers indicated the actual waiting times of patients during their visit to the PHC clinic and were expressed in minutes to ensure accurate comparison. The sample (n) that was used during this study was 720. A sample is a part of the whole group selected by the researcher – in this case 720 patients attending two PHC clinics in the Potchefstroom sub-district of the Dr Kenneth Kaunda District (Brink, 2009:124). In this study the waiting times of the first 360 patients attending the two PHC clinics were written down during the initial assessment of waiting times to assist the researcher in determining a baseline waiting time for patients. The waiting times for another group of 360 patients attending the PHC clinics were written down while the pilot intervention with the CTS system was applied by the researcher herself.

- **Cohen's effect sizes.** No random sampling was done in this study, therefore the interpretation of the comparison between the baseline waiting times and the pilot intervention waiting-time assessment was done according to Cohen's effect sizes, which are designated by the letter "d" (Ellis & Steyn, 2003: 52). Effect sizes demonstrate the extent of the effect to indicate practical significance (Ellis & Steyn, 2003:52). Effect size describes the statistical finding of a group of indicators and specifies the extent of the difference (Malty *et al,* 2010:360; Schmidt & Brown, 2012:479).

  The following guidelines were used for d-values to indicate differences: small effect: d = [0,2]; medium effect (noticeable with the naked eye): d = [0,5]; large effect (practically significant): d ≥ [0,8]. Guidelines for interpreting the phi-coefficient are as follows: Φ = [0,1] (small effect); Φ = [0,3] (medium effect, noticeable with the

naked eye) and Φ ≥ [0,5] (large effect or practically significant) (Ellis & Steyn, 2003:54). Guidelines for the practical interpretation of the strength of correlation coefficients, or "r", according to Ellis and Steyn (2003) are the same as those for the phi-coefficient.

In this study the p-values were reported as if random sampling had been done. This was not a comparative study, but the p-values made it look like it had been comparative.

- **Mean.** This is the total of all the scores, divided by the number of scores that were calculated (Burns & Grove, 2009:472; Schmidt & Brown, 2012:302; Polit & Beck, 2008:758).

- **Standard deviation.** This involves the calculation of the square root of the variance (Burns & Grove, 2009:723; Polit & Beck, 2008:766). In this study the standard deviation was not clinically significant.

The abovementioned concepts were discussed to assist the reader in being clear on the discussion that follows after Table 4.1. Table 4.1 contains the results of the research, followed by a detailed discussion of findings.

TABLE 4.1   ANALYSED DATA

Subsections of waiting-time list	Pre-assessment of waiting times (1)/Post-assessment of waiting times with pilot intervention (2)	n	mean	Standard deviation	p-value (when random sampling is assumed)	Effect size (Cohen's d-value)
Time of arrival and waiting time to receive their duplicate record	1	360	35.34	37.65	0.0001	0.34
	2	360	22.66	30.12		
Time that it took for administrative staff to issue duplicate record	1	360	16.19	29.09	0.0080	0.19
	2	360	22.32	32.57		
Waiting time before vital signs are assessed	1	360	57.15	55.76	0.0001	0.47
	2	360	88.96	67.64		
Assessment of vitals	1	360	5.70	4.25	0.3792	0.5
	2	360	6.22	10.32		
Waiting time before consultation by professional nurse or physician	1	360	69.22	61.59	0.0001	0.53
	2	360	36.86	38.42		

Subsections of waiting-time list	Pre-assessment of waiting times (1)/Post-assessment of waiting times with pilot intervention (2)	n	mean	Standard deviation	p-value (when random sampling is assumed)	Effect size (Cohen's d-value)
Time taken for consultation and dispensing of medicine by professional nurse or physicians	1	360	11.68	15.06	0.0073	0.180
	2	360	8.98	11.58		
Time that patient leaves the clinic	1	360	4.70	11.31	0.0001	0.12
	2	360	3.30	3.13		
TOTAL	1	360	199.98	98.98	0.1196	0.11
	2	360	189.30	84.34		

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4.3.1   Arrival time

The arrival time referred to the time that it took to obtain the patient's duplicate record. The administrative staff wrote the names of the patients in the clinic register and searched for the duplicate records. During this time, the patients were seated in the waiting room. In this study the mean time for administrative staff being ready to issue the patient's duplicate and original record was 35 minutes during the baseline assessment of waiting times, and 23 minutes with the pilot intervention triage waiting-time assessment.

The two sets of arrival times showed a significant difference in waiting times, yet no intervention occurred while the duplicate and original records were being issued to the patients. The effect size indicated a value of 0.34, and to be practically significant, the effect size should be at least 0.5 (Ellis & Steyn, 2003:55). In the view of the researcher, not doing the pilot intervention on the same day as the baseline waiting-time assessment led to this difference in the number of minutes that patients waited for their records. For example, it is much quicker for administrative staff to issue duplicate Road to Health Booklets than to issue duplicate records to patients visiting the clinic for a chronic condition or a minor ailment, as there are many records. The filing systems used in clinics also do not use an alphabetical order. Each clinic has its own filing system. The peer-reviewed literature revealed no literature that assessed arrival times and the issuing of duplicate records.

4.3.2   Time for issuing files

During this time, the administrative staff issued the original file and the duplicate record to the patient. After that, the patient could go to the vital-signs room if it was his/her turn. The time required to issue the original and duplicate records to the patients was quite long, as the administrative staff received the duplicate records for all the patients only when the clinic opened for the day.

While the patients were waiting for their records, the clinic staff started off the day with prayer and worship. This was followed by the professional nurse providing health education on the service the clinic was rendering that day. If there was a health problem in the geographical area that the PHC clinic concerned served, health education was given to address the health problem, e.g. proper waste management and environmental hygiene. After the health-education session, there were a lot of records to be handed out. The mean

time for patients to get their duplicate records was therefore 22 minutes in the study. However, the Cohen effect size was 0.19, which was small and not practically significant (Ellis & Steyn, 2003:55). The pilot intervention with the CTS system was not applied during this stage.

4.3.3   Waiting time before vital signs were assessed

The waiting time before the vital signs of the patients were assessed indicated that there was still a period of waiting. The mean waiting time for patient's vital signs to be assessed during the baseline assessment of waiting times was 57 minutes, and the mean time during the pilot intervention with the CTS system was 89 minutes. At this stage the pilot intervention had not been implemented yet. The effect size was 0.47, which was close to 0.5 and indicated a medium effect, but it was still not practically significant. To be practically significant the Cohen d-value should be >0,8 (Ellis & Steyn, 2003:55).

A possible reason for patients having to wait so long was that on some of the days on which the researcher collected data there were patients to be seen by the physician and the professional nurse. Patients to be seen by the physician were booked for an appointment that day. The auxiliary nurses therefore had to ensure that the vital signs of both groups of patients were assessed in time, otherwise the professional nurse and physician had to wait before they could see their patients. The researcher did not collect the data on the same days of the week during the initial assessment and the pilot intervention triage. On certain days during the week the number of patients visiting the clinic was higher than on other days, depending on the reason why they attended the clinic.

4.3.4   Assessment of patient's vital signs

The time that it took to assess the vital signs of the patients was also recorded for the baseline assessment and the pilot intervention with the CTS system. It took only a few minutes for the two auxiliary nurses to assess the patient's vital signs. The mean time during the baseline assessment of waiting times and the pilot intervention with the CTS system was 6 minutes, and this stayed more or less the same. During the assessment of the patient's vital signs the researcher applied the pilot intervention with the CTS system. The effect size was 0.5, which indicated a medium effect (Ellis & Steyn, 2003:55). The researcher assumed

that even if the time had stayed the same, the opportunity to triage patients in the vital-signs area helped to sort the patients and led to a better flow. The auxiliary nurses were also interested and cooperated well with the researcher.

4.3.5 Waiting time for patients before consultation

The waiting time before consultation for patients during the baseline assessment of waiting times was much longer than during the pilot intervention with the CTS system. The mean waiting time for patients during the baseline assessment was 69 minutes, and the mean waiting time during the pilot intervention with the CTS system was 37 minutes. The effect size was 0.5, which indicated a medium effect (Ellis & Steyn, 2003:55). The researcher experienced that the pilot intervention with the CTS system had an influence on the waiting time of the patients, and the triaging of the patients in order of seriousness to be seen by the professional nurses and physicians shortened the waiting time.

During the pilot intervention with the CTS system, the researcher used different coloured stickers to colour code the patients on the basis of their main complaint, vital signs, the TEWS calculator and the discriminator list. The researcher found that 96.38% of the 360 patients who were included in this study were colour coded with green. These were patients who visited the PHC clinics for chronic conditions like diabetes, hypertension, etc., for first visits and for ante-natal follow-ups. That indicated that those patients were supposed to be seen in less than 240 minutes.

The other 1.38% of patients were colour coded with a yellow sticker, which indicated that the patient had to be seen in less than 60 minutes. The yellow colour code included conditions like abdominal pain, closed fractures, etc.

The orange colour code, a percentage of 1.94%, indicated that the patients had to be seen by a professional nurse or physician in less than 10 minutes. Conditions like shortness of breath, blood in the stool, etc. were involved here.

Only 0.27% of patients were colour coded with a red sticker, which indicated that those patients needed immediate help. Conditions like hypoglycaemia (glucose levels of less than 3 mmol/l) were involved here.

The researcher experienced that the implementation of the pilot intervention CTS system shortened waiting times, particularly for the patients classified with the red, orange and yellow colour codes. The reason for this was that patients from these groups were referred to hospital, as their condition needed more specialised management. The researcher was of the opinion that the percentage of yellow, orange and red codings was very low due to the fact that community members know that in case of emergency, patients are taken directly to the Emergency Department of a local hospital.

4.3.6 Time for consultation and dispensing of medication

The time for consultation and dispensing of medication showed a small difference of 3 minutes between the baseline assessment of waiting times and the pilot intervention with the CTS system. The mean during the initial assessment of waiting times was 12 minutes, and during the pilot intervention triage it was 9 minutes. The effect size was 0.18, which was small and not practically significant, as was indicated by the mean time expressed in minutes (Ellis & Steyn, 2003:55).

The researcher assumed that the pilot intervention with the CTS system helped the professional nurses to see more seriously ill patients first, as was mentioned in 4.3.5. Physicians visited the PHC clinics in this study only once a week. During the pilot intervention with the CTS system the researcher was able to use triage to timeously identify patients who needed to see the physicians at the PHC clinic, because after lunch the physicians went back to the hospital. Patients with serious conditions needed to be referred to be seen by a physician, as indicated by protocol. If the physician was still at the PHC clinic, the patient was seen at the clinic, and in some cases the physician also had to refer the patients with serious conditions.

4.3.7 The time that the patients left the clinic

The time that the patients left the clinic indicated that most left the clinic immediately after consultation. The mean time during the baseline assessment of waiting times was 5 minutes, and during the pilot intervention with the CTS system it was 3 minutes. The Cohen effect size was 0.12, which was small and not practically significant (Ellis & Steyn, 2003:55).

4.3.8   The total waiting time for patients visiting the PHC clinic

The total waiting time of patients visiting the clinic from their arrival until the patients left the clinic indicated that there was not a practically significant difference between the baseline assessment of waiting times and the pilot intervention with the CTS system. The mean time during the baseline assessment was 200 minutes, and the mean time during the pilot intervention with the CTS system was 189 minutes, which was more or less the same. The effect size was 0.11, which was not practically significant (Ellis & Steyn, 2003). The reason for patients waiting the same time during the baseline assessment and the pilot intervention with the CTS system indicated that the CTS system does not lead to the shortening of waiting times.

4.4   CHAPTER SUMMARY

In this chapter the validity of the checklist and the reliability of the data were discussed. This was followed by an in-depth discussion of the data analysis and other concepts like the time of arrival, time of issuing of files, waiting time before vital signs were assessed, assessing of the patient's vital signs, waiting time for patients before consultation, time of consultation and dispensing of medication, time that patient left the clinic and the total waiting time for patients visiting the PHC clinic. Chapter 5 contains the evaluation of the study, the limitations and recommendations for practice, education and research.

CHAPTER 5

EVALUATION OF STUDY, LIMITATIONS AND RECOMMENDATIONS FOR NURSING PRACTICE, EDUCATION, RESEARCH AND POLICY

5.1   INTRODUCTION

In this chapter the study is evaluated with specific reference to the objectives. Contributions towards nursing science are identified and explained. Any limitations are identified and recommendations are made for using the findings in nursing practice, education, research and policy.

The following objectives were explored during this study to see if triage could shorten waiting times in PHC clinics:

•   To determine the current waiting times for patients visiting PHC clinics

•   To conduct a literature review to understand PHC waiting times, triage and related constructs

•   To introduce a pilot intervention with the CTS system, to determine whether the pilot CTS system effectively contributed to shortening the waiting time for patients in PHC clinics.

5.2   EVALUATION OF STUDY

The study was evaluated in terms of the objectives as set (Chapter 1, see Table 1.1) and achieved during the study. The first objective involved a baseline assessment of waiting

times in PHC clinics. A baseline assessment of waiting times was essential for this research to determine whether the pilot intervention CTS system contributed towards shortening patient waiting times.

The next objective involved a literature review. From the peer-reviewed articles the researcher concluded that there was no history that triage had ever been utilised in PHC clinics. The scientific data obtained was scrutinised to understand the different components of PHC waiting times, triage and related constructs. The literature review assisted the researcher in adapting the CTS system for use in a PHC clinic during the pilot intervention.

The last objective was achieved because the different components of the waiting period of patients attending the PHC clinics during the study indicated that those times where the pilot intervention with the CTS system was applied shortened waiting times. The pilot intervention with the CTS system was applied in the assessment of the vital signs by the auxiliary nurse. The shortening of the waiting time for patients before consultation was practically significant. The CTS system contributed to a better flow of patients afterwards, as the colour coding ensured that very ill patients were attended to first. Although the research study indicated that the overall waiting time from the time that the patient arrived at the clinic to the time they left the clinic was not practically significant, the component where the pilot intervention triage was implemented did show a significant practical improvement relating to the waiting time. The researcher concluded that implementing the CTS system alone would not shorten the overall waiting time of patients visiting PHC clinics. All the components that were measured with the waiting-time list need to be addressed separately to determine how the overall waiting times can be shortened.

5.3 LIMITATIONS OF STUDY

The researcher identified specific limitations:

- Delayed ethical clearance to carry on with the data collection meant that it took a long time before the researcher could collect data in the two PHC clinics in the Potchefstroom sub-district.

- In each of the two PHC clinics there was only one room to assess the vital signs of patients. Even if there were two auxiliary nurses assessing vital signs on two patients at the same time, the physician or professional nurses sometimes had to wait for a while to see the patients as their vital signs still had to be assessed.

- The shortage of staff also caused long waiting times for patients attending the PHC clinics. It took longer to help every patient sitting in the waiting room.

- The researcher had a full-time job and that limited her attendance at the clinic on any day. The researcher visited the two PHC clinics only on certain days during the week until she had collected the 360 waiting-time survey checklists. This was also the reason why random sampling could not be used.

5.4   RECOMMENDATIONS FOR PRACTICE, EDUCATION, RESEARCH AND POLICY

The following recommendations are provided to promote the role of the CTS triage system to reduce waiting times in PHC clinics in practice, education, research and policy.

5.4.1   Recommendations for practice

The researcher introduces the following recommendations for practice:

- That two rooms be used in the early morning for about two hours to assess the vital signs of the patients. That all staff in the clinics, for example the auxiliary nurses and others (nursing students of the University and nursing colleges visiting the clinics on a regular basis who are allowed as part of their scope of practice), be allowed to assess the vital signs of patients. This will prevent physicians or professional nurses from having to wait to see the patients.

- That those clinics that use a non-alphabetical filing system be requested to adjust their staff training to promote the filing of duplicates files in strict alphabetical order. This step can make it easier to find the duplicate records of the patients and will shorten this component of waiting time markedly in practice.

- That, for example, chronic patients visiting the PHC clinic for controlled hypertensive and diabetic ailments be followed up every three months instead of every month. Then it will only be necessary to help those patients with uncontrolled hypertension and diabetes mellitus every month.

- That the SANC formulate a regulation stating that it is compulsory for all professional nurses who currently work in PHC clinics to complete the Clinical Nursing Science, Health Assessment, Treatment and Care course. Professional nurses with better skills can improve the quality of the service, be more productive and thus shorten the patient waiting times.

- That efficient staff allocation during tea and lunch breaks be ensured to guarantee that service delivery continues without any breaks.

- That staff meetings be scheduled for the end of the day and not in the early mornings when there are a lot of patients waiting for assistance.

5.4.2   Recommendations for education

The following recommendations are proposed for education:

- That universities and nursing colleges include in their curriculum the importance of excellent service delivery and specifically focus on shortening patient waiting times.

- That the Department of Health offers excellent service-delivery courses, including the monitoring of the implementation, which currently seems to be lacking.

- That the South African Nurses Education Association invest in ways in which the Diploma in Clinical Nursing Science, Health Assessment, Treatment and Care can be offered to more nurses who work in PHC clinics to fully equip them to work effectively.

5.4.3   Recommendations for research

The following recommendations can be made with respect to research:

- That further research be done on all components identified in the waiting-time survey checklist relevant to patients visiting PHC clinics.

- That after completion of the abovementioned suggestion, further research be aimed at developing a model for the implementation of the CTS system in PHC clinics to shorten the overall waiting times for patients.

5.4.4   Recommendations for policy

No recommendations for policy can be made on the basis of this particular research, but further research in which the specific components of the waiting-time survey are addressed can lead to recommendations for policy formulation.

5.5   CHAPTER SUMMARY

This chapter gives an overview of the research objectives as set for this research study. The conclusion was drawn that the pilot intervention with the CTS system was practically significant only during the intervention stage at the vital-signs station. The patients were colour coded according to their condition and thereafter referred to the physician or professional nurse for consultation. A description was given of the limitations of the study and recommendations were made for nursing practice, education, research and policy.

REFERENCES

Allen, M., Titsworth, S. & Hunt, S.K. 2009. Quantitative research in communication. First ed. USA: Sage publications, Inc.

Anon. 2010/2011. Annual report of Tlokwe city council.
Http://www.potch.co.za/pdf2012/Budget/Tlokwe%20Annual%20 Date of access: 6 April 2013.

Anon. 2011. North West Kennith Kaunda profile. http://www.health-e.org.za/documents/d8120f2461d19a3b10b23388d4c7fef1.pdf Date of access: 6 April 2013.

Ardagh, M.W., Cooper, K., Lyons, R., O'Donovan, P., Patterson, R. & Wells, J. 2002: Effect of a rapid assessment clinic on waiting time to be seen by a doctor and the time spent in the department, for patients presenting to an urban emergency department: a controlled prospective trial. *The New Zealand medical journal*, 115(1157):1- 7.

Augustyn, J.E. 2006. An investigation into the implementation of an emergency unit triage system in a selected private hospital. Cape Town:UNISA. (Dissertation- MA).

Augustyn, J.E. 2011. The South African triage scale: a tool for emergency nurses. *Profesional nursing today,* 15(6):24-29.

Babbie, E. & Mouton, J. 2011. The practical of social research. 12th edition. Southern Africa: Oxford university press.

Blitz, J.J., Geyser, M.M., Rauf, A. & Rauf,W. 2008. Quality improvement cycles that reduced waiting times at Tshwane District hospital Emergency department. *SA Fam Pract,* 50(6):43- 43e.

Boeije, H. 2010. Analysis in qualitative research. First ed. London: Sage publications Ltd.

Bracken, J. 2003. Triage in SHEEY'S Emergency Nursing: principles and practice. 5th edition. St Louis: CV Mosby.

Brink, H. 2009. Fundamentals of research methodology for health care professionals. Cape town: Juta.

Burns, N. & Grove, S.K. 2010. The practice of nursing research: appraisal, synthesis and generation of evidence.6th ed. St. Louis: Elsevier.

Castelnuovo, B., Babigumira, J.,Lamorde, M.,Muwanga, A.,Kambugu, A. & Colebunders, R. 2009. Improvement of the patient flow in a large urban clinic with high HIV seroprevalence in Kampala, Uganda. *International Journal of STD & AIDS,* 20:123-124.

Colebunders, R., Bukenya, T., Parker, N., Smith, O., Boeynaems, V., Waldron, J., Muganzi Muganga, A., Twijukye, C., Mcadam, K. & Katabira, E. 2007. Assessment of the patient flow at the infectious diseases institute out-patient clinic, Kampala, Uganda. *Aids care*, 19(2): 149-151.

Coughlan, M., Cronin, P. & Ryan, F. 2007. Step-by-step guide to critiquing research. Part 1: quantitative research. *British journal of nursing*, 16(11):658-663.

Couper, I.D., Hugo, J.F.M., Tumbo, J.M., Harvey, B.M. & Malete, N.H. 2007. Key issues in clinic functioning – a case study of two clinics. *South African medical journal*, 97(2):124-128.

Crookes, A. & Davies, S. 2007. Research into practice: Essential skills for reading and applying research in nursing and health care. 2nd ed. China: Elsevier Limited.

Dennil, K. & Rendall-Mkosi, K. 2012. Aspects of primary health care. 3 rd ed. Cape Town: Oxford University press.

REFERENCES

Department of Health. 2011. Integrated Management of Childhood illness guidelines. South Africa.

Department of Health. 2002. Guidelines for maternity care in South Africa: a manual for clinics, community health centers and district hospitals. Second ed. Pretoria

De Villiers, A., Koko-Mhlahlo, K. & Senekal, M. 2005. Nutritional well-being of young children in Duncan Village, East London, South Africa: accessibility of primary health care clinics. *Public health nutrition*, 8(4):520-532.

De Vries, S., Gottschalk, S.B., Wallis, L.A. & Wood, D. 2005. The Cape Triage Score: proposal from the Cape Triage score Group to implement a new system for Cape Town. *Nursing update*, 29(7):38- 43.

Edwards, N.C., Kahwa, E., & Kaseje, D., Mill, J., Webber, J. & Roelofs, S. 2007. Strengthening health care systems for HIV and AIDS in Sub-Saharan Africa and the Carribean: a programme of research. *Caribbean journal of nursing & midwifery*, 2(2):29-36.

Eilers, G.M. 2004. Improving patient satisfaction with waiting time. Journal of American college health, 53(1):41- 43.

Ellis, S.M. & Steyn, H.S. 2003. Practical significance (effect sizes) versus or in combination with statistical significance (p-values). *Management Dynamics*, 12(4):51-53.

Finamore, S.R. & Turris, A. 2009. Shortening the wait: A strategy to reduce waiting times in the emergency department. *Journal of emergency nursing*, 35(6):509-514.

Gotschalk, S. 2004. Triage- a South African perspective: The burden of acute and medical trauma presentations requiring emergency treatment by ambulance personnel and emergency units in South Africa is overwhelming. *CME*, 22(6):325-327.

Howell, E., Widra, L & Gail Hill. M. 1988. Foundation for trauma nursing. Comprehension trauma nursing: theory and practice. Glenview, illinois: Scott & Foresman.

IkeOluwapo, O.A. 2002. Patients ' waiting time at an outpatient clinic in Nigeria- can it be put to better use? *Patient education and counselling*, 47:121-126.

Jones, E., Lucey, C. & Wadland, L. 2000. Triage: a waiting list initiative in a child mental health service. *The Psychiatrist*, 24: 57-58.

Kerry, T. 2005. A review of integrated management of childhood illness. *SA fam pract,* 47(8):32-38.

Klopper, H.C. 2008. The qualitative research proposal. *Curationis,* 31(4): 62-72.

Lai, K.Y.C. 2006. The establishment of triage system in a child and adolescent psychiatric clinic in Hong Kong. *Child and adolescent mental health*, 11(4): 204-207.

Langford, R.W. 2001. Navigating the maze of nursing research.first ed. United states of America: Mosby, Inc.

Leedy, P.D. & Ormrod, J.E. 2010. Practical research: Planning and design. 9th ed. New Jersey: Pearson education international.

Lewis, M., Eskeland, G. & Traa-Valerezo, X. 2004. Primary health care in practice: is it effective? *Elsevier,* 70:303-325.

Ligthelm, T., Hardcastle, T., Stander, M., Bonner, B., Van Hoving, D & Wessels, V. 2011. Major incident management in the pre- hospital environment. (*In* Wallis, L. & Smith, W., *ed.* Disaster management. South Africa: Juta & Company Ltd. p. 27- 55).

Maltby, J., Williams, G., McGarry, J & Day, L. 2010. Research methods for nursing and healthcare. first ed. Great Brittain: Pearson education limited.

95

REFERENCES

Mash, B., Blitz, J., Kitshoff, D & Naude, S. 2010. South African, clinical nurse practitioner's manual. First ed. Pretoria: Van Schaik Publishers.

Mashia, E.O. & Van Wyk, N.C. 2004. Accessibility of district health nursing services in the greater Bronkhorstspruit. *Health SA*, 9(1):36-46.

McCarthy, K., McGee, H.M. & O'Boyle, C.A. 2000. Out-patient clinic waiting times and non-attendance as indicators of quality. *Psycology, health and medicine*, 5(3):287- 292.

Muller, C.E. 2010. Nurse led change to influence HIV and AIDS workplace policy. Potchefstroom:NWU. (Thesis- PhD).

Naledi, T., Barron, P. & Schneider, H. 2011. Primary Health-care in South Africa since 1994 and implications of the new vision for PHC re-engineering. *South African health review*, p.9

Nieswiadomy, R.M. 2002. Foundations of nursing research. 4th ed. New Jersey: Pearson education, Inc.

Nursing Act see South Africa.

NWU (North West University): Library services, Potchefstroom Campus. 2012. NWU reference guide. Potchefstroom.

Panter, A.T. & Sterba, S.K. 2011. Handbook of ethics in quantitative methodology. First ed .USA: Mathworks, Inc.

Patel, A., Panchal, H., Patel, R. & Keith, L. 2008. Decreased waiting periods in a public pregnancy termination clinic. *Elsevier,* 77:105-107.

Polit, D.F. & Beck, C.T. 2008. Nursing Research: Generating and assessing evidence for nursing practice. 8th ed. Australia: Lippincott Williams & Wilkins, a Wolters Kluwer business.

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REFERENCES

Polit, D.F. & Hungler, B.P. 1997. Essentials of Nursing research: Methods, appraisal and utilization. 4th ed. Philadelphia: Lippincott.

Prescott, C.A.J 2009. Handbook of ENT: Disease and disorders of the Ear, Nose and Throat. 4th ed. South Africa: Oxford University Press.

Qolohle, M.D., Conradi, H.H., Ogunbanjo, G.A. & Malete, N.H. 2006. A qualitative study on the relationship between doctors and nurses offering primary health at KwaNobuhle(Uitenhage). *South African Family Practice,* 48(1):17.

Rauf, W., Blitz, J.J., Geyser, M.M. & Rauf, A. 2008. Quality improvement cycles that reduced waiting times at Tshwane District Hospital Emergency Department*. South African Family Practice,* 50(6):43-43e.

Rhoda, K.W., Wagner, G., Alamo, S., Amanyire, G., Ouma, B., Kwarisima, D., Sunday, P., Wabwire-Mangen, F. & Kamya, M. 2010. Evaluation of the efficiency of patient flow at three HIV clinics in Uganda. *AIDS patient care and STDs*, 24(7):441-446.

SAS Institute Inc. 2011. The SAS System for Windows Release 9.3 TS Level 1MO Copyright by SAS Institute Inc., Cary, NC, USA

Schmeltzer, S.C., Bare, B.G., Hinkle, J.L. & Cheever, K,H. 2010. Brunner and Suddarth's Textbook of Medical-Surgical Nursing. 12 th ed. Philadelphia:Wolters Kluwer Health/Lippincott Williams & Wilkins.

Schmidt, N.A. & Brown, J.M. 2012. Evidence-based practice for nurses: apraisal and application of research. 2 ed. United States of America: Jones & Barlett learning, LLC.

Shah, P.R., Barker, R. & Haray, P.N. 2007. Implications of subspecialisation on the waiting times of general surgical clinics. *The Royal Colleges of Surgeons of Edinburgh and Ireland*, 5(4):206-208.

South Africa. 1978. Nursing Act 50 of 1978. Pretoria: Government Printer.

South Africa. 1997. White Paper on Transforming Public Service Delivery(Bathopele) Whitepaper, No 18340. Pretoria: Government printer.

South African Nursing Council. 2005. Nursing Act 33 of 2005**.** Pretoria: Government Printer.

South African Nursing Council . 1982. Registration of an additional qualification, Regulation 48 of 1982. Pretoria: Government Printer.

South African Nursing Council. Scope of practice. Government notice No 2598, as amended by R. 1469, No R. 2696 and No R. 260.

Taylor, B., Kermode, S. & Roberts, K. 2007. Research in nursing and health-care: evidence for practice. 3Th ed. Austalia: Nelson Australia Pty limited.

Thandrayen, K. & Saloojee, H. 2010. Quality of care offered to children attending primary health care clinics in Johannesburg. *South African journal of child health*, 4(3):73-77.

Tollman, S.M., Kahn, K., Sartorius, B., Collinson, M.A., Clark, S.J. & Garenne, M.L. 2008. Implication of mortality transition in rural South Africa. *Lancet*, 372:893-901

Uys, L.R. 2004. Fundamental nursing. Fourth ed. Cape Town: CTP Book Printers.

Van Rensburg, H.C.J. 2004. Health and health care in South Africa. Pretoria. Van Schaik publishers. 626 p.

Vogt, W.P. 2007 Quantitative research methods for professionals. USA. Pearson Education, Inc.

Wallis, L. & Twomey, M. 2005. Medicine division faculties of health science. *Cape triage score hospital provider manual.* 1:31.

Waiting time survey of the health-care division, PHC policy program and compliance management, City of Tswane. Permission was obtained from Dr. E.Oosthuizen to adapt the waiting time survey for own use via email.

Welman, C., Kruger, F. & Mitchell, B. 2005. Research methodology. Cape Town: Oxford University press.

Wood, M.J. & Ross-Kerr, J.C. 2011. Basic steps in planning nursing research:from question to proposal. USA: Jones and Bartlett Publishers,LLC.

Woods, D.L. 2010. IMCI revisited. *South African journal of childhealth*. 4(2):28-30.

Woolwich, C. 2000: Accident and emergency: practice into theory. London. Balliliere Tindall.

Zimmermann, P.G., & McNair, R.S. 2006. Triage essence and process. (*In* Zimmermann, P.G. & Herr, R., *ed.* 2006. Triage nursing secrets: Your triage questions answered by experts you trusts. First ed. USA, Mosby Elsevier. p. 3- 14).

Zweigenthal, V.,Puoane, T., Reynolds, L., London, L., Coetzee, D., Alperstein, M., Duncan, M., Atkins, S., Loveday, M., Hutchings, C., Geiger, M., Petersen, L., & Ferguson, G. 2009. Primary healthcare: fresh perspectives. Cape Town. Pearson Education and Prentice Hall.

ANNEXURE A:

APPROVAL LETTER 1

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health
Department of
Health
North West Province
REPUBLIC OF SOUTH AFRICA

2ND Floor Tirelo Building
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Tel: (018) 387 5757
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POLICY, PLANNING, RESEARCH, MONITORING AND EVALUATION

To	: Mrs. A Swart
From	: Policy, Planning, Research, Monitoring & Evaluation
Subject	: Approval Letter-The role of triage to reduce long waiting times in Primary Health Care clinics.

Purpose

To inform the researcher that permission to undertake the above mentioned study has been granted by the North West Department of Health. The researcher is expected to issue this letter to the districts or health facilities as proof that the Department has granted approval of the study.

Arrangements in advance with managers at district level or facilities shall be facilitated by the researcher. The department expects to receive the final research report upon completion.

Kindest regards

Director: PPRM&E
Mr L Moaisi

23/05/2013
Date

DEPARTMENT OF HEALTH
PRIVATE BAG x2068

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SUPERINTENDENT GENERAL
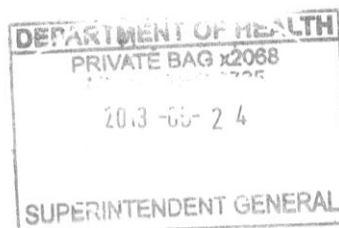
Healthy Living for All

1

ANNEXURE B:

APPROVAL LETTER 2

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health

Department of
Health
North West Province
REPUBLIC OF SOUTH AFRICA

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POLICY, PLANNING, RESEARCH, MONITORING AND EVALUATION

To : Ms Petra Bester

From : Policy, Planning, Research, Monitoring & Evaluation

Subject: Approval Letter: Leadership and governance as mechanism toward excellence in South African health system.

Purpose

To inform Ms Petra Bester that permission to undertake the above mentioned research programme has been granted by the North West Department of Health. The researcher is expected to present the following studies which are within the research programme as independent studies for approval:

- Reminder messages to improve antiretroviral treatment compliance in a primary health care setting in the North West Province (Quantitative).
- Supply-chain analysis for intravenous Augmenting ® 1.2g in a medical unit in a public hospital, North West Province (quantitative and qualitative).
- The use of triage principles to decrease the waiting time in PHC facilities in the North-West Province. (Quantitative and qualitative design).

The researcher is expected to arrange in advance with the chosen districts or facilities, and issue this letter as prove that permission has been granted by the Provincial office. Upon completion, the department expects to receive a final research report from the researcher.

Kindest regards

Acting Director: Policy, Planning, Research, Monitoring & Evaluation   Date
Mr L. Moaisi

10|06|2013

Healthy Living for All

1

ANNEXURE C:

LETTER

ME SWART

You are welcome to adapt the tool.

We start to use this tool to measure average waiting time per clinics and also to determine the bottlenecks in the clinics between different health workers

We cannot provide statistical proof on the reliability and validity of the results eminating from the utilisation of the instrument?

Dr. E. Oosthuizen

Director Health Information, Training and Research

Health and Social Development Department | Room L2015 | Es'kia Mpahlele Library | Cnr Madiba and Sisulu Streets | Pretoria | PO Box 234 | Pretoria | 0001 | www.tshwane.gov.za

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ANNEXURE D:

WAITING TIME SURVEY 2012

WAITING TIME SURVEY 2012

Name of the clinic:

Date:

The time when the patient arrived at the PHC clinic (time has to be written for example 13:00 instead of 1:00 pm)	Arrive:	
File is issued to the patient	Start:	End:

Enrolled auxilliary nurse takes the following, as applicable on adults:
  * Bloodpressure:
  * Pulse:
  * Respiration:
  * Temperature:
  * Peakflow:
  * Hemoglobien(Hb):
  * Bloodglucose:
	Start:	End:

Chilldren and babies:
  * Pulse:
  * Respiration:
  * Temperature:
  * weight:
  * Body mass index:
	Start:	End:

Patient is seen by a Professional nurse	Start:	End:

Patient is referred to multi-disciplinary member:
  * Doctor
  * Dietician:
  * Councelor:
  * Other:
	Start:	End:

Patient is seen by other health workers e.g to do dressings of wounds or remove stitches:	Start:	End:
Referral to hospital	Start:	End:
Waiting for ambulance:	Start:	End:
Patient leaves the PHC clinic	Leave:	

ANNEXURE E:

THE CAPE TRIAGE GROUP

THE CAPE TRIAGE GROUP

JOINT EMERGENCY MEDICINE DIVISION

FACULTIES OF HEALTH SCIENCES

UNIVERSITY OF CAPE TOWN   **STELLENBOSCH UNIVERSITY**

CAPE TRIAGE SCORE

HOSPITAL PROVIDER MANUAL

CONTENTS

PREFACE

In 2004, the Cape Triage Group (CTG) was convened under the auspices of the joint Division of Emergency Medicine at the Universities of Cape Town and Stellenbosch. The aim of the CTG was to produce a triage score for use throughout South Africa. The group was multi-disciplinary and comprised doctors, nurses and paramedics. The result of the CTG's activities is the Cape Triage Score (CTS), a physiology and symptom based score which prioritises into one of five colours and can be used both in hospital Emergency Units and pre-hospital. The CTS will be implemented throughout the Western Cape from January 2006, in three versions: adult, paediatric and infant.

A sub-group of the CTG worked to establish a training programme for the nurses and doctors who will be using this tool. This manual (and the training course that goes with it) is the result of that group's work. The provider course for those staff who will be doing the actual triage consists of a half day theoretical training, a half day of clinical scenarios and on the job refresher training.

The members of the training sub group, and authors of this manual, are:

Dr Stevan Bruijns   Dr Sean Gottschalk
Dr Shaheem De Vries   Dr David Haas

They are to be commended for their continuing commitment to the development of triage in South Africa, their contribution to the CTS, and for this excellent manual. On behalf of the CTG, I hope that you enjoy reading this manual and attending the training course that goes with it. Please feed back to us on any suggestions of improvements, and on your experience using the CTS. Emails may be directed to capetriage@bvr.co.za – these will be used as part of our ongoing quality assurance and monitoring process. Happy triaging!

Dr Lee Wallis   **Michele Twomey**
Chair of the Cape Triage Group   Implementation Manager
Cape Town, 2005   082 4700046

1: INTRODUCTION TO TRIAGE

Terminology and important concepts

1. **Triage**, from the French word "trier", literally means: "to sort". The aim is to bring "the greatest good to the greatest number of people" – this is achieved through prioritising limited resources to achieve the greatest possible benefit. Patients are sorted with a scientific triage scale in order of urgency - the end result is that the patient with the greatest need is helped first.

2. **Patient to triage**: when a patient appears relatively stable and is able to mobilise him/herself to the designated triage area. This will be the type of triage used in most of the cases.

3. **Triage to patient**: here the patient is usually unstable. The patient is unable to mobilise him/herself to the designated triage area and should be referred directly to the resus room. Triage should be performed at the bedside and documented in retrospect. This type of triage will be used less often.

4. **TEWS**: Triage Early Warning Score.

5. **High energy transfer**: in our context this refers to excessive acceleration - deceleration injuries. Examples are: fall from a height (≥ 2 meter) and high speed motor vehicle accidents (≥ 50 km/h).

6. **Threatened limb**: this refers to any acute insult leading to a pale, pulseless, cold limb and includes a sensory / motor deprived limb.

7. **Facial / inhalation burns**: a high suspicion for inhalation burns must be suspected when the following information is present from the history / observations from a patient who has been exposed to a fire: entrapment in a confined space, skin burns above the shoulder, searing of facial hair (nose hairs, eye brows and lashes), carbonaceous material in mouth or on hard and soft palate, cough producing soot/ black coloured sputum.

8. **Physiology**: refers to the normal functioning of the different body systems. Some of the physiology can be readily measured (e.g. pulse, blood pressure, respiratory rate, temperature).

9. **Streaming**: the use of dedicated healthcare resources for each priority group of patients. For green patients, this may be a doctor or nurse practitioner: this person needs their own space to see these patients.

10. **Anteroom**: the front room of the emergency unit.

11. **Pain**: **Severe** pain is unbearable, the worst pain the patient has ever felt. It may be associated with sweatiness, paleness, and altered level of consciousness. **Moderate** pain is intense, but bearable. **Mild** pain is any other pain. Remember to make a pain assessment on **every patient** that you see.

The benefits of triage

The aim of an efficient triage system is:

1. To expedite the delivery of time-critical treatment for patients with life-threatening conditions,
2. To ensure that all people requiring emergency care are appropriately categorized according to their clinical condition,
3. To improve patient flow
4. To improve patient satisfaction
5. To decrease the patient's overall length of stay
6. To facilitate streaming of less urgent patients
7. To be user-friendly for all levels of health care professionals.

By introducing triage at a public urban hospital in Cape Town, mean waiting times for patients coded as red was reduced by almost 600% (583.78 % to be exact). Waiting times for patients coded green did not show a remarkable reduction although the mean overall reduction for all codes was 160% (161.64%).

Nursing triage

Nurse-based triage has been successfully implemented worldwide in the countries of North America, Europe, the Middle East and Australasia since the development of Emergency Medicine as a speciality about 30 years ago.

Table 1 shows the number of medical practitioners and nurses per unit of population in South Africa, compared to some "developed" countries. Given the significantly lower doctor : nurse ratio in South Africa compared to countries where nurse triage is widely practiced, it is apparent that the development of nurse-based triage should be a priority in our setting.

Country	Rate per 100,000 population/ year		
	Doctors	**Nurses**	**Doctor: Nurse ratio**
South Africa	56.3	471.2	1 : 8.0
Canada	229	897	1 : 4.0
Australia	240	830	1 : 3.4
Israel	385	613	1 : 1.6
UK	164	479	1 : 3.0

Table 1: Doctor and nurse rates per 100,000 population per annum for selected countries

Nurses currently play no part in the decision-making, although they are the first medical contact for the patients attending the EU in most instances. In the same public urban hospital referred to earlier the correlation between doctor and adequately trained ENAs (Enrolled Nursing Auxiliaries) was comparable with international standards of nursing triage.

The triage method should be known and applied by all health care professionals involved in the EU. The triage provider can be the medical officer, the registered nurse, the staff nurse or the ENA. The purpose of this training program is to empower the individual who participates with the knowledge to triage. It will only be through practice and repetition that a provider will become skilled with triage. Successful providers are therefore encouraged to participate in triaging as frequently as possible in order to stay in practice and up to date.

Triage is simple to do: **table 2** shows the equipment needed for the process.

Location	Equipment	Additional equipment
Privacy: Screen, partition or separate room.	Gloves, face masks & other barrier protective devices	Pulse oximeter
Safety: Security/protected	Wall clock	ECG
Size of area: Walkers, wheelchairs, stretchers	Low reading electronic/ mercury thermometer	Finger prick glucotest & finger prick haemoglobin
Accessibility	Electronic blood pressure & pulse analyser (Dynamap or digital)	Urine dipsticks & urine pregnancy tests
	Dry dressings/ bandages	Urine pregnancy tests

Table 2: Requirements for adequate / efficient triage

The discriminator list

The second part or the discriminator list is shown in **table 6**. This is the part that generates the actual triage colour (red, orange, yellow, green, blue) which will determine severity level and essentially also when the patient will be attended to. As with the TEWS, there are separate versions of this for infants, children and adults as seen in **table 7 and 8** respectively.

The TEWS score will only identify and classify a patient into an appropriate triage code if the physiology of the patient is altered from normal. The TEWS will be effective for most of the cases presenting to the triage provider.

There are however some **discriminators** that require **special attention**. It has been found that physiology alone does not pick up and classify patients with these discriminators safely and effectively. These discriminators therefore serve as a **safety net** for those patients with severe enough pathology to be seen more urgently, but who's physiology did not respond to the insult and therefore did not generate an a urgency appropriate TEWS. They are reclassified after the TEWS has been calculated. This process is explained in the next section.

By comparing the observed basic vitals of the patient with a parameter on the TEWS calculator (horizontally) a score can be read off (vertically). These scores are added together which gives the provider a total TEWS. See **example 1**.

Example 1:

Patient in **wheelchair**	With help scores	1
Respiratory rate= **18**	15-20 scores	1
Heart rate= **118**	111-129 scores	2
Blood pressure= **208**/112	>200 scores	2
Temperature= **36.5**	35-38.5 scores	0
Patient **Alert**	Alert scores	0
No **Trauma**	Scores	0
	Total	**6**

> **FYI: Calculating the respiratory rate**
> Count the amount of breaths taken by the patient over 30 seconds and multiply by 2

INFANT TRIAGE SCORE								
	3	**2**	**1**	**0**	**1**	**2**	**3**	
Mobility				Normal for age		Stretcher/ Immobile		Mobility
RR	less than 20	20-25		26-39		40-49	50 or more	RR
HR	less than 70	70-79		80-130		131-159	160 or more	HR
SBP	less than 60	60-69		70-110		111 or more		SBP
Temp		less than 35		35-38.4		38.5 or more		Temp
AVPU				Alert	Reacts to Voice	Reacts to Pain	Unresponsive	AVPU
Trauma				No	Yes			Trauma
younger than 3 years / smaller than 95cm								

child 0-5 years

Table 4. The infant TEWS calculator

CHILD TRIAGE SCORE								
	3	**2**	**1**	**0**	**1**	**2**	**3**	
Mobility				Walking	With Help	Stretcher/ Immobile		Mobility
RR	less than 15	15-16		17-21	22-26	27 or more		RR
HR	less than 60	60-79		80-99	100-129	130 or more		HR
SBP	less than 70	70-79		80-130	131-149	150 or more		SBP
Temp		less than35		35-38.4		38.5 or more		Temp
AVPU				Alert	Reacts to Voice	Reacts to Pain	Unresponsive	AVPU
Trauma				No	Yes			Trauma
3 to 12 years old / 96 to 150 cm tall								

5 - 12 years

Table 5. The child TEWS calculator

Edition 1, 2005

Colour	RED	ORANGE	YELLOW	GREEN	BLUE
TEWS	7 or more	5-6	3-4	0-2	DEAD
Target time to treat	Immediate	less than 10 mins	less than 60 mins	less than 240 mins	
Mechanism of injury		High energy transfer			
Presentation		Shortness of breath - acute			DEAD
		Coughing blood			
		Chest pain			
		Haemorrhage - uncontrolled	Haemorrhage - controlled		
	Seizure - current	Seizure - post ictal			
		Focal neurology - acute			
		Level of consciousness reduced			
		Psychosis / Aggression			
		Threatened limb			
		Dislocation - other joint	Dislocation - finger or toe	ALL	
		Fracture - compound	Fracture - closed	OTHER	
		Burn over 20%		PATIENTS	
	Burn - face / inhalation	Burn - electrical	Burns - other		
		Burn - circumferential			
		Burn - chemical			
		Poisoning / Overdose	Abdominal pain		
	Hypoglycaemia - glucose less than 3	Diabetic - glucose over 11 & ketonuria	Diabetic - glucose over 17 (no ketonuria)		
		Vomiting - fresh blood	Vomiting - persistent		
		Pregnancy & abdominal trauma or pain	Pregnancy & trauma		
			Pregnancy & PV bleed		
Pain		Severe	Moderate	Mild	
	Senior Healthcare Professional's Discretion				

Table 6. The adult discriminator list

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ANNEXURES

COLOUR	RED	ORANGE	YELLOW	GREEN	BLUE
TEWS	7 or more	5-6	3-4	0-2	DEAD
Target time to treat	Immediate	less than 10 mins	less than 60 mins	less than 240 mins	
Mechanism of injury		High energy transfer			
Presentation	Drooling	Shortness of breath			
	Stridor	Wheeze			
		Haemorrhage – uncontrolled	Haemorrhage – controlled		
	Seizure – current	Seizure – post ictal			DEAD
		Focal neurology – acute		ALL OTHER PATIENTS	
		Level of consciousness reduced			
		Floppy infant			
		Purpura			
		Dislocation – other joint	Dislocation – finger or toe		
		Fracture – compound	Fracture – closed		
			Unable to weight bear		
	Burn – face / inhalation	Burn over 10%			
		Burn – electrical	Burn – other		
		Burn – circumferential			
		Burn – chemical			
		Poisoning / Overdose	Abdominal pain		
	Hypoglycaemia – glucose less than 3				
		PR bleeding	Vomiting – persistent		
			Not feeding		
			Not urinating		
			Inappropriate history		
			Prolonged or uninterrupted crying		
Pain		Severe	Moderate	Mild	
	Senior Healthcare Professional's Discretion				

Table 7 . The infant discriminator list

The child under 5 years

COLOUR	RED	ORANGE	YELLOW	GREEN	BLUE
TEWS	7 or more	5-6	3-4	0-2	DEAD
Target time to treat	Immediate	less than 10 mins	less than 60 mins	less than 240 mins	
Mechanism of injury		High energy transfer			
Presentation	Drooling	Shortness of breath		ALL OTHER PATIENTS	DEAD
		Stridor			
		Wheeze			
		Haemorrhage - uncontrolled	Haemorrhage - controlled		
	Seizure - current	Seizure - post ictal			
		Focal neurology - acute			
		Level of consciousness reduced			
		Exhaustion			
		Purpura			
		Dislocation - other joint	Dislocation - finger or toe		
		Fracture - compound	Fracture - closed		
	Burn - face / inhalation	Burn over 10%	Burn - other		
		Burn - electrical			
		Burn - circumferential			
		Burn - chemical			
		Poisoning / Overdose	Abdominal pain		
	Hypoglycaemia - glucose less than 3	Diabetic - glucose over 11 & ketonuria	Diabetic - glucose over 17 (no ketonuria)		
		PR bleeding	Vomiting - persistent		
			Inappropriate history		
Pain		Severe	Moderate	Mild	
Senior Healthcare Professional's Discretion					

Table 8. The child discriminator list ⇒ 5 to 12 years

3: STEPWISE APPROACH TO THE USE OF THE CTS

Figure 1 shows how simple it is to calculate the triage code for a patient by simply following the stepwise approach. This approach allows the triage provider to code patients both effectively and safely in the minimum time period. Triage providers should always use this approach unless directed otherwise by a senior health care professional.
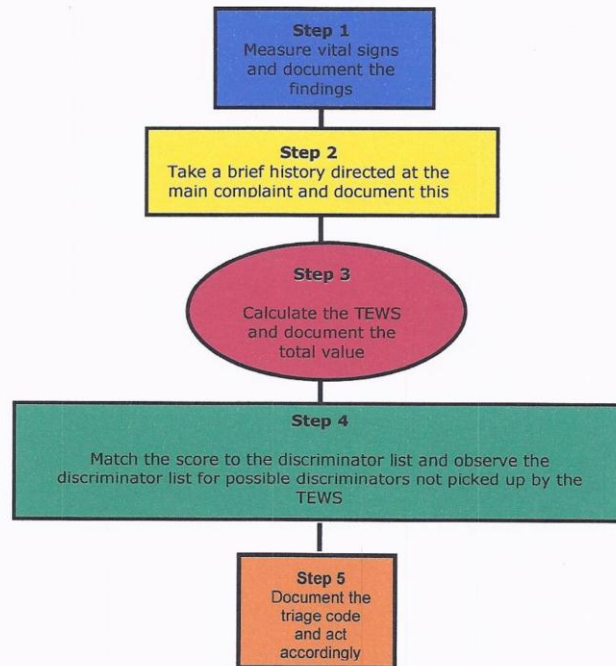

Figure 1. The stepwise approach for triage providing

Step 1: The vitals

The first step is to perform the observations required by the TEWS.

1. The triage provider can use a mechanical blood pressure/ heart rate analyser (Dynamap) or a manual blood pressure cuff to perform the first two vital signs.

2. The respiratory rate needs to be calculated by counting the patient's breaths for 30 seconds and then multiplying by two.

3. The temperature is measured using either an electronic or mercury thermometer (preferably a low-reading thermometer).

4. AVPU is observed by talking (verbal stimulus) to the patient, or by producing a painful stimulus if no response is observed by talking. If there is no response to either verbal or pain stimuli the patient is labelled as unresponsive.

Edition 1, 2005

FYI:
AVPU concerns the **highest response** level observed. If a patient is **not alert** he/she will either respond **only** to verbal/ painful stimuli or **not at all**.

5. Mobility is observed by noting the mode in which the patient has to be mobilised

FYI:
If a patient is **not walking** or **not on a stretcher**, he/she is assisted (**with help**).

6. Trauma is present if there is ANY injury to the patient.

Step 2: The history

The history concerns the **main** presenting complaint. This information can be gained by questioning the patient (or escort if the patient is unable to give a history) or by reading a referral letter. The triage provider should always ask the patient what their emergency is. This question will assist the provider in finding the core of the presenting complaint. It will also point out non emergencies. This decision should however not be taken until the whole stepwise approach has been completed.

FYI:
Always ask the question: **What is your emergency?**

The history along with the vitals now has to be **documented**.

Step 3: The TEWS calculator

Look at **example 1** again:

* Patient in **wheelchair**
* Respiratory rate= **18**
* Heart rate= **118**
* Blood pressure= **208**/112
* Temperature= **36.5**
* Patient **Alert**
* No **Trauma**

Score	3	2	1	0	1	2	3
Mobility				Walking	With help	Stretcher	

Patient in wheelchair. The patient is not walking on his/her own or on a stretcher. He/she is assisted (wheelchair in this case but could just as well be a crutch, kierie, walking aid or even assisted by another person). We will therefore score **1** for mobility.

Score	3	2	1	0	1	2	3
Respiratory rate		Less than 9		10-14	15-20	21-29	More than 29

Respiratory rate= 18. The respiratory rate is between 15 and 20. We will therefore score the patient **1** for respiratory rate

Edition 1, 2005

Cape Triage Score

Score	3	2	1	0	1	2	3
Heart rate		Less than 41	41-50	51-100	101-110	111-129	More than 129

Heart rate= 118. The heart rate is between 111 and 129. We will therefore score the patient **2** for heart rate

Score	3	2	1	0	1	2	3
Systolic BP	Less than 71	71–80	81-100	101-199		More than 200	

Blood pressure= **208**/112. The systolic is more than 200. We will therefore score the patient **2** for systolic BP

Score	3	2	1	0	1	2	3
Temp		Less than 35		35-38.4		More than 38.5	

Temperature= 36.5°. The temperature is between 35° and 38.5° (35- 38.5). We will therefore score the patient **0** for temperature

Score	3	2	1	0	1	2	3
AVPU				Alert	Reacts to **V**oice	Reacts to **P**ain	Unresponsive

Patient Alert. The patient is alert. We will therefore score **0** for AVPU

Score	3	2	1	0	1	2	3
Trauma?				No	Yes		

No Trauma. We will therefore score **0** for Trauma

The calculation: Simply write down all your findings and add the scores to generate the TEWS total. **Table 9** below is a section of the observation sheet used by the triage provider to triage this patient. The provider has already completed both step 1 and step 2 and has calculated the TEWS total (step 3).

Parameter:	Finding:	Score:	Date: 27/05/2005 History:
Mobility	With help	1	Patient arrived on a wheelchair and complained of
Respiratory Rate	18	1	weakness on the left side of the body. The patient
Heart Rate	118	2	is a known hypertensive and diabetic. The patient
Systolic BP	208	2	has a Glucotest value of 1.5 on finger prick testing.
Temperature	36.5	0	
AVPU	Alert	0	
Trauma?	No	0	TEWS total: 6

Step 1. measure   Step 2: History   Step 3: calculate

Table 9. Section of observation sheet showing vitals, history and TEWS total for example 1

Edition 1, 2005

Step 4: The discriminator list

Now that the TEWS total has been calculated the provider can move on to the second part of the triage coding which concerns the discriminator list. Step 4 can be easily achieved by dividing it up into two additional steps.

A. The TEWS total and the triage colour code:

The TEWS total has to be matched with a specific triage colour code. Compare the TEWS total to the triage colour code references. Look at example 1 again. In step 3 the triage provider calculated the TEWS total to be six (6). Looking at our discriminator list we notice that a TEWS total of between five and six is an ORANGE triage code.

Triage code for
Example 1
TEWS= 6

COLOUR	RED	ORANGE	YELLOW	GREEN	BLUE
TEWS	7 or more	5 to 6	3 to 4	0 to 2	

B. The discriminators:

After the triage code according to the TEWS has been selected, the triage code along with the discriminators listed in the same column, get covered by the triage provider's right hand. The column(s) to the left of the providers hand are now examined and compared with the history taken in step 2. If there is a discriminator listed to the left of the provider's hand that corresponds with the history taken from the patient, the triage code is changed to the corresponding code of the column that discriminator was found in. If no discriminator is found, the triage colour code according to the TEWS is used.

> FYI:
> The triage provider can now also prompt specific questions to the patient about the discriminators on the part of the list not covered by the provider's right hand

Consider example 1 again. The TEWS was six, which corresponds to a triage colour code ORANGE. We learned from the history that the patient is a diabetic with a finger prick glucotest measuring 1.5. By covering the orange category now with the provider's right hand the column to the left can be compared with the patient's history.

It is now revealed (see below) that the patient is **hypoglycaemic** with a glucotest less than 3. Hypoglycaemia falls in the RED triage code and the patient is therefore **triaged up** from ORANGE (this is what the TEWS of six indicated) to a triage code RED (as the discriminator list indicated).

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Step 5: The final triage code

After step 4, the final triage coding is documented along with the patient's observations. The patient can now be referred for management by the attending doctor. The triage code is always the highest triage code derived from first calculating the TEWS (step 1- 3) and then analysis of the discriminator list (step 4).

Triaging up is essential to the process and must be done where discriminators out-triage the TEWS. **Triaging down** is not be part of the triage provider's duty. Triaging down can only be done by the senior health care provider (doctor) and will then be his / her responsibility.

FYI:
The triage provider must document who and when a senior health care professional changes the triage category of any patient

Edition 1, 2005

4: MANAGEMENT AND TRIAGE AIDS

Management of the patient starts when the triage provider's analysis starts. It is therefore critical that this management continues after the triage process has been completed. **Table 10** indicates the appropriate management of the different triage categories by the triage provider.

COLOUR	Management
RED	Refer to the resuscitation room for **emergency** management
ORANGE	Refer to the anteroom for **urgent** management
YELLOW	Refer to the anteroom for management
GREEN	Patient for potential **streaming**
BLUE	Refer to doctor for certification

Table 10. Appropriate management of the different triage codes

It is also possible for the triage provider to commence management when treatment is readily available and the provider's registration / qualification allows the intervention. Appropriate interventions directed at observed abnormalities during triage decreases the patient's morbidity and increases patient satisfaction.

A triage provider may also, time permitting, use triage aids to enhance the triage sensitivity. Triage aids will assist the senior health care professional later; after the patient has been referred according to the criteria set in **table 10** above. Triage aids (**compulsory**) should be performed, time permitting, whenever available but is not essential for the triage itself. **Table 11** indicates appropriate interventions that must be commenced by the triage provider as well as triage aids that can be used to enhance the triage process (**optional**).

FYI:
Triage aids (**compulsory**) are **additional tasks** that should be undertaken by the triage provider. These aids provide **additional information** which can be used to enhance the triage diagnosis. The triage provider should only perform triage aids if this will not prolong the waiting time of the patient being triaged or that of other patients waiting to be triaged.
Triage aids should be performed, time permitting, whenever available

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PROBLEM	COMPULSORY	OPTIONAL
Respiratory rate scores 1 point or more	1. Pulse oximetry (saturation) 2. Finger prick glucotest if patient is diabetic 3. Refer to anteroom and give oxygen	
Temperature 38.5° or more	1. Paracetamol 1g orally stat (document in the notes) (children – discuss with sister or doctor)	
Temperature 35° or less	1. Blankets	
Altered level of consciousness (AVPU score other than A)	1. Refer to anteroom and hand patient over to senior health care professional 2. Finger prick glucotest	
Unable to sit up/ need to lie down	1. Refer to anteroom and hand patient over to senior health care professional 2. Finger prick glucotest	
Chest pain	1. Immediate ECG and present to senior health care professional	
Active bleeding	1. Apply pressure to site of trauma with a dry dressing and take to anteroom	
Active seizure / fitting	1. Refer to anteroom and hand patient over to senior health care professional 2. Finger prick glucotest	
History of diabetes	1. Finger prick glucotest	
Diabetes and Hyperglycaemia (glucotest 11 or more)	1. Urine dipsticks to check for ketones	
Hypoglycaemia (glucotest 3 or less)	1. Refer to anteroom and hand patient over to senior health care professional	2. If the patient is alert, give food or drink orally
History of bleeding		1. Finger prick haemoglobin
Bleeding PR, PO or from a site of trauma		1. Finger prick haemoglobin
Abdominal pain or backache: male		1. Urine dipsticks
Abdominal pain or backache: female		1. Urine dipsticks 2. Urine pregnancy test
PV bleeding		1. Urine dipsticks 2. Urine pregnancy test 3. Finger prick haemoglobin

Table 11. Interventions to be carried out at triage

Edition 1, 2005

5: SUMMARY

Triage is an essential first step in the efficient and effective running of any Emergency Unit – whether in the public or private arena. A robust triage tool will help to save lives and reduce morbidity. The Cape Triage Score has been derived by a panel of 20 experts in Emergency Medicine (doctors, nurses and paramedics), and is scientifically proven. It has been shown to improve waiting times and make the EU run more smoothly. However, attention needs to be paid to those patients triaged Green, especially in peak times, and the CTG recommends the use of streaming with a Nurse Practitioner or doctor to see this group.

The CTS has been validated as part of a Masters in Philosophy (MPhil) with 700 public sector patients, a MPhil with 2000 private sector patients, and an audit of 18000 primary care public sector. The children's' versions have been derived and validated as part of a PhD. Feedback following publication in four major journals has also contributed to the process.

However, we accept that the tool may not be perfect and that is why your feedback is so important. In addition, there will be ongoing research aimed at keeping the tool accurate and appropriate. If necessary, second and subsequent editions will follow.

In 2006, there is an intention to form a national triage group to take this process to the next step: a South African Triage Score! There will also be a website developed for updates and information – look out for details.

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ANNEXURE F:

ETHICAL APPROVAL FROM NWU

UMBRELLA RESEARCH PROGRAM

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13 Augustus 2012

Geagte Prof./Dr./Mnr./Me.

Etiekaansoek: NWU-00050-12-S1

"Leadership and governance as mechanisms towards ecxellence in South African health systems"

Die komitee is tevrede dat die kommentaar van die paneel voldoende aangespreek is en etiese goedkeuring word aanbeveel.

Vriendelike groete

Evli' (H.H.) Vorster

Prof. H.H. Vorster
Voorsitter

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