UNIVERSITY *of the*
WESTERN CAPE

FACULTY OF NATURAL SCIENCE

School of Pharmacy

**AN INVESTIGATION INTO THE IMPACT OF TRAINING PHARMACISTS'
ASSISTANTS IN EARLY RECOGNITION AND REFERRAL PROCEDURES ON
TUBERCULOSIS REFERRAL RATES IN THE CAPE TOWN METROPOLE.**

A thesis submitted in partial fulfilment of the requirements for the degree of Magister
Pharmaciae in the School of Pharmacy, University of the Western Cape

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By: Lyzelle Dalais

Supervisor: Prof N. Butler

ABSTRACT

**AN INVESTIGATION INTO THE IMPACT OF TRAINING PHARMACISTS'
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Due to the resurgence of TB globally, in 2006 the WHO and the STOP-TB partnership
launched a Global plan to STOP TB. This is a 10 year plan which aims to save 14 million
lives between 2006 and 2015. Specific targets were set which aims to halt and begin to
reverse the incidence of TB by 2015. The targets were to detect at least 70% of new
sputum smear-positive TB cases and to cure at least 85% of these cases by 2005, and to
reduce TB prevalence and death rates by 50% relative to 1990 by 2015 and to thus
eliminate TB as a public health problem (1 case per million population) by 2050 (WHO,
2006). Most individuals tend to approach a pharmacy to obtain information, advice or
medication as it is easily accessible. The purpose of this study was to train Pharmacists'
assistants' in TB symptom recognition and referral procedures and to measure its effect
on referral rates.

Methods: A convenience sample of (n=28) Phamacists' assistants (PA) from community
pharmacies in the Cape Town Metropole region was selected to participate in the study.
For the purpose of this study PAs were trained on referral procedures when recognising
TB symptoms, the use of referral cards and the TB suspect register and appropriate
referral to TB clinics for sputum tests. Pre-test and post1-test questionnaires covered the
relevant questions pertaining to knowledge of TB and recognition of TB symptoms. The
PAs were re-assessed using a post2-test questionnaire 4 months after the training to
determine whether the knowledge gained in the training session was sustained.

Part 2 of the methodology was a supplementary sample of 3 pharmacies in which the PAs
(n=12) were trained using a summarized but more intensive training method, which
focused on the key aspects of the TB training to determine if the outcomes would be the

same. Both samples reflected a decline in participants for the post2-test. This decrease was N=15 and N=8 from N=28 and N=12 respectively.

The trends in knowledge scores between the two samples were similar. For sample N=15, an increase in knowledge from the pre-test questionnaire to post1-test questionnaire (27.2%) and a decrease in knowledge from post1-test to post2-test (11.9%) was seen. Although there was a decrease in knowledge, it was still higher than the initial pre-test knowledge. For the sample N=8 there was an increase in knowledge from pre-test to post1-test (28.6) and a decrease in knowledge of 7.4% from post1-test to post2-test. This decrease in knowledge was still above the initial knowledge gained. There was a smaller decrease in mean knowledge scores for N=8 than the decrease noticed in the sample N=15. The behaviours regarding utilization of the referral system was unsuccessful in both samples. In study sample N=15 only 1 PA had referred patients using this method. In study sample N=8 none of the PA had referred patients using the referral system.

Results & conclusion: It was found that there was an increase in knowledge after the intervention but a decrease in knowledge for the post2-test of both samples. The study sample N=12 training reflected a visibly higher maintenance of the mean knowledge from the post1-test to post2-test. According to the data from the post2 questionnaires patients were referred but the actual utilization of the referral procedures by means of record keeping was not implemented effectively in both samples. It is thus recommended that future studies should investigate the issue of documentation within pharmacies among pharmacy staff and that the movement of staff to different pharmacies is also considered.

Key words: TB referrals by pharmacists' assistants, TB recognition by pharmacists' assistants, TB referrals in community pharmacies, TB Referrals from private to public sector.

DECLARATION

I, Lyzelle Dalais, hereby declare that *An Investigation Into The Impact of Training Pharmacists' Assistants In Early Recognition and Referral Procedures On Tuberculosis Referral Rates In The Cape Town Metropole* is my own work, that it has not been submitted for any degree or examination in any other university and that all the sources I have used or quoted have been indicated and acknowledged as complete references.

Lyzelle Judith Dalais

Signed:………………………………………..

Date:………………………

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DEDICATION

I would like to dedicate this thesis to God who has given me the strength to make it through each day and has guided me to complete my thesis.

To my Uncle Brian who afforded me this wonderful opportunity. I thank you dearly from the bottom of my heart. Words cannot express my gratitude. May God richly bless you.

To Mum, Dad (Valery and Tyrone Dalais) and family for your encouragement, love and support

To Earl Woldson for your support, encouragement and help during the toughest times of my research.

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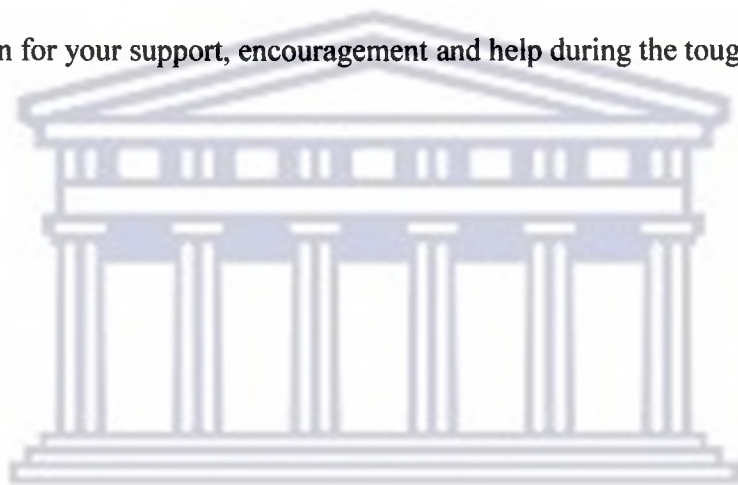
ACKNOWLEDGEMENTS

- Supervisor, Prof. N.C. Butler- my research supervisor for her guidance and patience throughout this process
- The pharmacists' assistants for giving their time to learn and for participating in the study
- The Pharmacists for allowing their assistants to attend the workshops
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- To the Woldson family for your consideration and care which you have provided me with especially in my final days of writing.

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ACRONYMS

AFDOT	African Dots Project
ARV	Anti-retroviral
CPD	Continuous Professional Development
DHS	District Health System
DOH	Department of Health
DOTS	Directly Observed Treatment, Short- course
DTU	District TB Unit
GPP	Good Pharmacy Practice
MDG	Millennium Development Goals
MDR-TB	Multi-drug resistant tuberculosis
MMWR	Morbidity and Mortality Weekly Report
MRC	Medical Research Council
NHS	National Health System
NTP	National TB Programme
PA	Pharmacists' Assistant
PHC	Primary Health Care
PSSA – CWP	Pharmaceutical Society of South Africa – Cape Western Province Branch
PTB	Pulmonary Tuberculosis
SAPC	South African Pharmacy Council
STI	Sexually Transmitted Infection
TB	Tuberculosis
TBRP	National TB Research Programme
WHO	World Health Organisation
XDR-TB	Extensively drug resistant tuberculosis

TERMS AND DEFINITIONS

(For the purposes of this study)

Appropriate Referral

Patients who are referred to primary health care facilities based upon the recognition of their suspected TB symptoms.

Effectiveness

Increasing the knowledge of pharmacists' assistants and increasing the referral rates with respect to TB.

Health

Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. (WHO Fact sheet no.2, p.100)

Patient

Any person who enters the community pharmacy and is a potential TB infected individual.

Pharmacist's Assistant (PA)

The staff that is authorized, by a responsible pharmacist, to provide information to consumers, including such persons that are registered with the South African Pharmacy Council (SAPC) for Post Basic A/B level training as well as those who assist the pharmacist (front shop assistants), but are not registered with Council. The scope of practice of a pharmacists' assistant (both basic and post basic) includes the provision of information to individuals in order to promote health (Government Gazette No.21754, 20 November 2000)

Smear positive

A case in which *Mycobacterium tuberculosis* bacilli are visible in the patient's sputum when examined under the microscope.

INTRODUCTION

Tuberculosis (TB) is an infection with *Mycobacterium tuberculosis*, which most commonly affects the lungs (pulmonary TB). *Mycobacterium tuberculosis* is found in the sputum of an infected individual and is spread via the inhalation of these droplets through sneezing, coughing, talking or spitting. Only a small number of bacilli need to be inhaled to infect another individual. This person may now be either an asymptomatic latent TB or an active TB infected individual. A person with TB disease will infect on average between 10 and 15 people every year if left undiagnosed and untreated. The immune system 'walls off' the TB bacilli which, protected by a thick waxy coat, can lie dormant for years. When an individual's immune system is weakened, the chances of contracting the disease are greater (WHO, 2006).

TB has been around for many ages and can be dated back as far as 17 000 years ago (Rothschild *et al.*, 2001). TB, commonly known as 'consumption' at the time caused widespread public concern in the 19th and 20th centuries as an endemic disease of the urban poor. In England in 1815, one in four deaths was of consumption; by 1918 one in six deaths in France was caused by TB. In the 1880s the disease was established to be contagious and was made a notifiable disease in Britain. Campaigns such as prohibiting people from spitting in public places, and encouraging those infected to enter sanatoria were attempts to minimize the spread of the disease (McCarthy, 2001). Over one-third of the world's population now has the TB bacterium in their bodies and new infections are occurring at a rate of one per second (WHO, 2006). Not everyone who is infected develops the disease; asymptomatic latent TB infection is most common. One in ten latent infections will progress to the active TB disease which, if untreated, will kill more than half its victims. In 2004, 14.6 million people had active TB and there were 8.9 million new cases and 1.7 million resulted in death, majority of which mostly occurred in developing countries (WHO, 2006). This increase in the number of people

infected is due to the fact that they are immunocompromised by immunosuppressive drugs, substance abuse or HIV/AIDS. The rise in HIV infection levels and the neglect of TB control programmes have caused a resurgence of TB. In many areas of the world, tuberculosis (TB) is re-emerging as a serious public health threat. Drug-resistant strains of TB have emerged and are spreading. Multi-drug resistant tuberculosis (MDR-TB) is a virulent, mutated type of TB that is much more difficult to treat. Its spread is often accelerated by HIV infections. Each year there are about 400,000 new cases of MDR-TB, although very few of these are diagnosed and treated (Carlevaro, 2005).

South Africa has one of the highest burdens of TB in the world. The Medical Research Council (MRC) National TB Programme indicated in 1999 that this trend in the epidemic would continue unless effective control was achieved; they estimated that there would be 3,5 million new cases of tuberculosis over the next decade and at least 90 000 deaths (Fourie *et al.*, 1996 ; SA Health Info, 2007). Given that more than US$100 million are being spent annually on tuberculosis in South Africa, a reduction in incidence for the future would reduce costs for treatment. TB hits hardest among the working age population, therefore also contributing to a loss of economic productivity. On the other hand, significant reductions in transmission of HIV infection together with effective tuberculosis control would mean a turn-around in the TB epidemic. It is in this regard that it was recommended that sustainable low cost methods should be developed in order to stop the spread of TB

From the abovementioned statistics and facts, it is clear that while TB is a global problem, it is an even greater problem in South Africa, which is a country with many disadvantages ranging from poverty and disease to socio-economic disabilities. With one of the highest HIV/AIDS infection rates in the world, it is easy to see the difficulties that the country faces with regards to the opportunistic TB infections. The costs to fund treatment in the country are astronomical and are further influenced by the rise of MDR-TB and the more recent Extensive Drug Resistant Tuberculosis (XDR-TB).

The drugs currently available for TB treatment are good, but rely heavily on the strict adherence of the patient to the regimen. Any discontinuation results in the patient being placed on a new and longer regimen. One of the most common reasons for non-adherence is that patients become too sick and cannot handle the side effects of these drugs.

It has been pointed out in the literature that the business community can play a pivotal role in increasing TB and MDR-TB detection, early diagnosis and treatment. In partnership with The World Economic Forum, awareness and educational tools are in development to help employees better understand prevention components and to reduce stigma. Workplace health care staff would also be trained on treatment options based on national protocols. The various tools would be tested then adapted for business communities in high burden TB countries (Carlevaro, 2005).

Pharmacists in South Africa have been given guidelines on their TB-related role. An article in Phamaciae (Pharmaciae, 2003), the official publication of the South African Pharmacy Council, pointed out that because of the community service nature of pharmacies, pharmacists and pharmacy support personnel are often in the frontline when it comes to treating illnesses. Patients will often approach a pharmacist with a health query before they see a medical practitioner. This can be used as an opportunity to become involved in the fight against TB and HIV/AIDS (Pharmaciae, 2003). Pharmacists, together with their personnel, are urged to familiarize themselves with the symptoms of TB (persistent coughing, night sweats, and fever, coughing up blood, chest pains, loss of appetite, fatigue and weight loss) and encourage the patient to seek proper diagnosis and treatment if TB is suspected as a possible cause. They should also be familiar with community clinics and hospitals in their area that offer free treatment to TB sufferers. All TB sufferers should also be encouraged to be tested for HIV. Pharmacies should be a source of information since this, together with education, is a valuable tool to eradicate stigmatization. The latter is tragically still the reason why many patients refuse treatment and counselling, and end up putting themselves and others at risk. The same applies to discrimination. As trained health care professionals they

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could help to eradicate distrust and misinformation. The Department of Health (DOH) has free information brochures on TB and HIV/AIDS which could be made available for distribution in pharmacies. (Pharmaciae, 2003)

Research has shown that patients who are identified, referred and diagnosed early to start their TB treatment have a greater cure rate than those who have not (Lönnroth *et al.*, 1999). It is thus imperative that early symptom recognition is emphasized in order to obtain a diagnosis for patients to enter the National TB programme to attain the desired outcome of curing the disease before it is spread to others.

The main aim of the study was therefore to investigate whether the training of pharmacists' assistants in TB recognition and referral procedures in community pharmacies would improve TB referral rates to TB clinics.

Chapter description

Chapter 2 gives an overview of the South African health care systems, the role of the community pharmacist and the need for further expansion of TB programmes and thus the rationale for the study.

Chapter 3 is a summary of the literature which creates a picture of the burden of TB in Cape Town and the role of Private community pharmacies and their engagement with primary health care facilities with respect to TB. This chapter substantiates the relevance of expanding the involvement of private community pharmacies in National TB programmes.

Chapter 4 provides an overview of the research methods and how these were applied in the study.

Chapter 5 is a presentation and description of the main results and findings of the study and is presented in figures, graphs and tabular form.

Chapter 6 discusses the outcomes of the study and the various issues as well as the main findings and limitations of the study.

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Chapter 7 concludes the research findings and is a culmination in the expression of the author opinions and recommendations for future studies.

CHAPTER 2

BACKGROUND & RATIONALE

This chapter serves to create a milieu for the proposed study. It generates further insight to the various issues that affect TB management. The chapter gives a broad representation of health care systems, public/private partnerships, the role of the community pharmacist and the need for further expansion of TB programmes in this regard. It further elaborates on the rationale, use and motivation of the established methods selected for the study.

2.1 Rationale for the Study

The underlying principles which were highlighted from the subject matter have pointed to the resurgence of a disease which has become both a national and international threat.

2.1.1 Why TB?

In recent years, the resurgence of TB has become a challenge to global efforts on combating the disease. South Africa has one of the highest burdens of the disease in the world (WHO, 2008). A revised strategy which was implemented in 1996, after TB was declared a national emergency, resulted in a concerted effort to reform TB control in South Africa. Despite these efforts, over the ensuing decade, the fight against TB has become increasingly difficult with the rise in MDR-TB cases, the more recent outbreaks of XDR-TB and a threefold increase in case-fatality rates (WHO, 2006). The determinants of the worsening TB epidemic in South Africa are diverse and multifactoral due to a historical legacy of neglect, poor management of patients and fragmented health services (Weyer *et al.*, 1999).

2.2 Motivation for the Study

It is evident that tuberculosis is still a disease which requires further research and intervention in lieu of the rising number of cases of infected individuals and hence the increasing costs of treatment. There is insufficient direct involvement from community pharmacies at the moment. Coughs are viewed as minor symptoms by clients and it is for this reason that community pharmacies are their first port of call when seeking medical advice. Pharmacists have the ability, within their scope of practice, to differentiate between minor and major ailments and to thus make informed decisions such as when to treat and when to refer. Pharmacists are also required to promote health through the provision of information to the public (Regulations to Pharmacy Act, 2000). This would thus entail providing both verbal and written sources of information to promote public health. This is usually provided in the form of leaflets, brochures, posters and newsletters. More importantly, a basic knowledge about prevailing health conditions and disease threats is required for a pharmacy to be seen as a provider of health care. It is in

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this regard that pharmacists' assistants are also encouraged to be knowledgeable about the range of coughs they will encounter at the pharmacy. They can thus be given the tools to attain the competence to make this differentiation by means of training and can thus also appropriately refer clients.

Both the pharmacists' and pharmacists' assistants' role in the retail community pharmacy seems to be underutilised with regard to their immediate capacity to identify symptoms related to public health threats such as tuberculosis. Early symptom recognition results in reduced time of exposure of undiagnosed, untreated individuals to the public and thus deters its spread. This approach to the management of the disease may become a more cost-effective and life saving alternative that, in theory, is certainly a sustainable one. It would thus be logical to assume that the earlier the symptoms are recognized at a retail community pharmacy, the earlier a patient could be referred and thus the earlier they would be diagnosed and treated.

Another study (Colvin *et al.*, 2003) revealed the success of TB management by involving Traditional healers; an assumption can be drawn in a sense that this could also pose similar satisfactory results in TB symptom recognition and referral by pharmacy personnel. Since both Community Pharmacists and Traditional healers are the first points of reference to patients, shouldn't the same improvement rates by Pharmacists be expected? There are few published studies examining the role of private pharmacies in tuberculosis detection and control (Adams *et al.*,2006; Rajeswari *et al.*,2002; Lönnroth *et al.*,2000; Lönnroth *et al.*,2003). This is the first study investigating the effects of training pharmacists' assistants on referral practices in South Africa and Cape Town.

2.3   Methods chosen

Employee training and development initiatives can transform organizations; providing extra skills to employees. Not only do they increase safety and productivity, but a higher level of job satisfaction, with improved performance, can be observed. Valuable training also includes situational training that provides

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personnel the skills sets that allow them to make timely, knowledgeable decisions that benefit both the customer and the pharmacy. The most important aspect of this training would encompass TB symptom recognition and appropriate referral, since it would be unproductive referring everyone who presents with a cough to a clinic, but on the other hand it would be ineffective if patients' symptoms were not recognized or dismissed as minor, and they were sent back home, thus resulting in the progression of the infection.

A previous study has revealed an increase in knowledge of the trained participants and has stated that patients do go to the clinics to which they were referred (Adams *et al.*, 2006). However, this data was acquired from the PAs themselves and there was no evidence at the clinics to indicate whether these patients did indeed go or not. The study also indicated a significant improvement in knowledge of the PAs who participated in the training workshop, as compared to those who did not. There was however no indication of the sustainability of the knowledge a few months after the workshop.

A more accurate method of measurement would be to utilize the procedures demonstrated by Lönnroth *et al.* (2003) in a study whereby TB suspects had been referred from private (retail) community pharmacies. The use of referral cards to trace referred TB suspects was obtained primarily from this study.

2.3.1 Defined areas

Although South Africa as a whole is inundated with the burden of tuberculosis, the Western Cape and Kwa-Zulu Natal remain the two heaviest burdened provinces. At the time of selecting a location for this study (2007), the literature available had indicated that Western Cape had the highest TB incidence in the country (as revealed in the literature review). Kwa-Zulu Natal has since surpassed this incidence rate and is now the highest burdened province in the country. This is in lieu of the fact that it has the highest HIV burden as well.

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2.3.1.1 Choice of location for the Study

Cape Town is a city of extremes with both abject poverty and extreme affluence. For the overall population in 2006: 14% occupy informal housing, 4% do not have weekly refuse removal, 7% do not have piped water, 4.5% of households have no electricity supply, 21% are unemployed and 38% of households live below the poverty line. Amongst the leading causes of death are TB and HIV, which accounted for 11% of all deaths (City of Cape Town, 2006). Due to the fact that the Western Cape has thus far achieved the highest cure rates nationally, this points to a system that is working reasonably well and could therefore handle more referrals (Health Systems Trust, 2006a).

2.3.1.2 Choice of pharmacies

The pharmacies selected were all from the Cape Town Metropole Region as it was easier to access them from a research perspective.

2.3.1.3 Choice of participants

Pharmacists would have been the ideal choice for participation in this study; however, front shop staff are just as important in recognising symptoms of minor conditions as they are often approached by clients who request cough mixtures or cold and flu remedies. Another barrier to pharmacists' participation in this study is the fact that many of them are managers in their pharmacies and when asked to attend the training workshops had stated that they were unable to find the time.

2.4 Research Question

Can the training of pharmacists' assistants in TB recognition and referral procedures in community pharmacies improve TB referral rates to TB clinics?

2.4.1 Aim

The aim of this study is to improve the knowledge of pharmacists' assistants in TB symptom recognition and to test whether this would increase the number of appropriate referrals to the nearest and/or most convenient TB clinics.

2.4.2 Objectives

The primary objectives of this thesis were therefore:

1. To assess the knowledge of pharmacists' assistants with regard to recognizing TB symptoms

2. To train pharmacists' assistants in early symptom recognition and referral to an appropriate referral site

3. To assess the effectiveness of training by means of a pre-test, post1 test and post2-test questionnaire and to measure appropriate referral rates

4. To design a referral card and to track and assess its effectiveness (i.e. did referred people actually present to clinic)

5. To determine the accuracy of recognition by determining the number of referred patients who are diagnosed with TB.

2.5 Hypotheses

2.5.1 Null Hypotheses

I. TB training will have no effect on knowledge of pharmacists' assistants before and after training

II. Knowledge from TB training will not increase the referral rates of patients to TB clinics

2.5.2 Alternative Hypotheses

I. TB training will have an effect on knowledge of pharmacists' assistants before and after training

II. Knowledge from TB training will increase the referral rates of patients to TB clinics

2.6 Conclusion

The retail pharmacy and healthcare structure is evidently developed to explore the possibilities of collaboration in combating infections such as TB which threaten public health in South Africa such that the collaboration would promote a mutually beneficial approach to health care in the country.

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CHAPTER 3

LITERATURE REVIEW

This chapter provides a review of the literature. It provides insight into the burden of TB both internationally and nationally with a particular focus on the Western Cape and Cape Town Metropole. The literature supports the fact that TB has become a major priority in the South African and international health care systems. It reviews literature on collaborative efforts between all partners in healthcare, making special reference to the role of the pharmacist in a private retail pharmacy setting. It also looks at the structures of the healthcare system in the Western Cape, how referrals work within the public sector and how TB is currently referred in the Western Cape.

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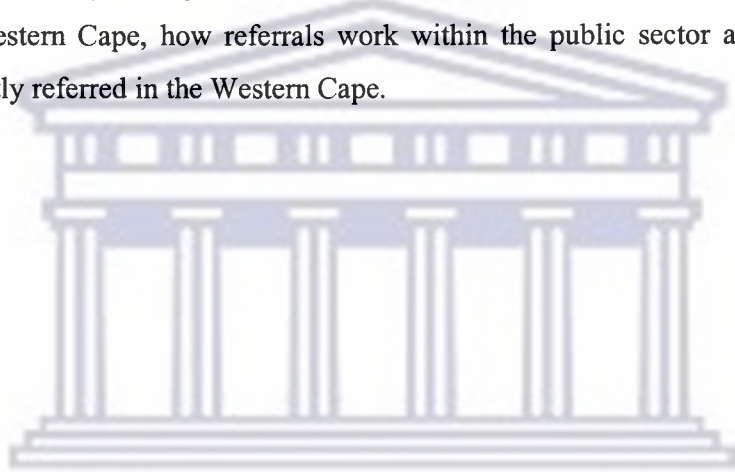
3.1 TB in a South African context and its impact on the population in the Western Cape Region

Tuberculosis is a significant public health problem in South Africa. In 2006 South Africa was ranked fourth in terms of incident cases among the world's 22 high-burden TB countries according to the World Health Organization (WHO) (WHO, 2008). Although the figures, with respect to the numbers of the population affected, are lower than India and China (who are the highest burden countries), the incidence per year was the highest at 940 per 100 000 population per year (WHO, 2008). The prevalence was 998 per 100 000 which was also the highest. The mortality was 218 per 100 000 population per year in 2006 (WHO, 2008).

According to WHO, in 2004 the country with the highest incidence of TB was South Africa, with 718 cases per 100 000 people (a major increase from 338 per 100 000 from 1998), with the Western Cape having the highest TB infection rate in the World (WHO, 2006). This had increased to 1037.2 per 100 000 in 2005 (Health Systems Trust, 2006)). The incidence of TB varies with age and in Africa, TB primarily affects adolescents and young adults. Known factors that make people more susceptible to TB infection include HIV. Co-infection with HIV is a particular problem in Sub-Saharan Africa, due to the high incidence of HIV in these countries. In South Africa an estimated 44% (almost half) of new TB cases were HIV positive in 2006 (WHO, 2008). Although South Africa only has 0.7% of the world's population, it has 28% of the global number of HIV-positive TB cases and 33% of HIV positive cases in the African Region (WHO, 2008). Since South Africa adopted Directly Observed Treatment Short-Course (DOTS) in 1996, all districts have implemented the core DOTS components. Despite these efforts, treatment success remains low. TB-HIV co-infection rates are high, with as many as 60 percent of adult TB patients being HIV positive (USAIDS, 2006).

With a total population of 42.388 million in 1996, South Africa had 212 cases per 100 000 with 89 861 new cases of TB annually and a cure rate of only 58%. The Western Cape alone had an incidence rate of 559/100 000 (higher than the national figures) of which 27% were co-infected with HIV and a cure rate of 66.4% (SATCI, 1996). Pulmonary TB cases have remained at 72% of all TB cases

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in Cape Town from 1997 to 2003 (City of Cape Town, 2004). It was clear to see that there was much room for improvement from the 1996 reported results, with regard to the approach towards the treatment of TB.

In 2007, the cure rate in Cape Town had increased to 71.9% which was the highest in the country (Department of Health, 2007); this may be indicative of a health care system that is working (although this is still below the WHO goal). However, if one looks at the incidence (case detection) rates from 1997 which was 521 per 100 000 with an increase up to 678 per 100 000 in 2003 (Cape Town, 2004) this is indicative of increasing trend in the incidence rates.

3.1.1   TB exposure, Transmission and Risk factors
Tuberculosis is an airborne disease primarily spread through droplets containing Mycobacterium tuberculosis produced by patients with tuberculosis of the respiratory tract. Exposure to an infectious case is a prerequisite for becoming infected. Exposure is defined as contact between two individuals close enough to have a conversation, or within confined spaces, with inadequate ventilation (Rieder, 1999; Munch *et al.*, 2003). Smoking more than 20 cigarettes a day also increases the risk of contracting TB by 2-4 times.

3.1.2   Infection Control
The National TB Strategic Plan for South Africa includes infection control as one of the objectives. This gives a responsibility to each provincial Department of Health to ensure that surveillance, prevention, management and control of TB is included in the annual report on the health status of the province. It states that every health facility, both private and public, should have an infection control plan, which includes TB, and a regularly monitored implementation process (National TB strategic plan 2007-2011).

Health care providers are urged to ensure that:
- All TB suspects and contacts are examined and investigated

- Any person with confirmed TB is started on treatment and those who may be a risk to the community are hospitalised for treatment
- All confirmed TB patients are notified
- They are familiar with infection control policies and adhere to these policies

(National TB strategic plan 2007-2011)

3.1.3 Treatment

Currently the standard treatment regimen for TB consists of 4 drugs taken for 2 months (Intensive phase): Rifampicin, Isoniazid, Pyrazinamide and Ethambutol and 2 drugs taken for 4 months (Continuation phase): Rifampicin and Isoniazid. (SAMF 7th edition). Attempts to eliminate TB have become increasingly difficult since the rise of drug-resistant strains in the 1980s, for e.g., TB cases in Britain, fell from about 50 000 to 5 500 from 1955 to 1987, but there were over 7000 confirmed cases in the year 2000. There was also a resurgence of TB in New York (NY) in the late 1980s due to the elimination of public health facilities and the emergence of HIV. The number of those failing to complete their course of drugs was high. NY had to cope with more than 20 000 TB-patients with Multi Drug resistant strains (MDR) (i.e. resistant to at least both Rifampicin and Isoniazid). The resurgence of tuberculosis resulted in the declaration of global health emergency by the World Health Organization (WHO) in 1994 (Paolo *et al.*, 2004). The guidelines for treating MDR-TB include drugs like Kanamycin, Pyrazinamide, Ethionamide, Ofloxacin and Ethambutol or Terizidone or Cycloserine given as a 6 month intesnsive phase daily followed by a 12-18 months continuation phase consisting of Ethionamide, Ofloxacin and Ethambutol or Terizidone or Cycloserine. For the more resistant Extensively Drug-Resistant TB (XDR-TB) treatment includes Capreomycin, Ethionamide, Pyrazinamide, PAS and Cycloserine or Ethambutol or Terizidone given as a 6 month intensive phase followed by Ethionamide, Pyrazinamide, PAS and Cycloserine or Ethambutol or Terizidone taken over 12-18 months continuation phase. It is also further recommended that both MDR-TB and XDR-TB patients taking Terizidone or Cyclocerine should be given Pyridoxine (Vitamin B_6) daily (SAMF 8th edition).

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4.   Engaging all care providers

5.   Empowering people with TB, and communities

6.   Enabling and promoting research

The Global Plan is a comprehensive assessment of the action and resources needed to implement the Stop TB Strategy and to achieve the following targets:

- Millennium Development Goal (MDG) 6, Target 8: Halt and begin to reverse the incidence of TB by 2015
- Targets linked to the MDGs and endorsed by the Stop TB Partnership:
- By 2005: detect at least 70% of new sputum smear-positive TB cases and cure at least 85% of these cases
- By 2015: reduce TB prevalence and death rates by 50% relative to 1990
- By 2050: eliminate TB as a public health problem (1 case per million population)(WHO,2006)

The South African Government spends more than R500 million on TB control and treatment every year in an attempt to eliminate TB in South Africa. TB diagnosis and treatment is free in all public health facilities. The Government adopted DOTS, a strategy developed by the World Health Organization (WHO); this is a patient- centred approach that helps support TB patients by observing them while they take their medication and ensuring that they complete their treatment.

In South Africa there is currently an African DOTS Project (AFDOT), (Allen *et al.*, 1999) which aims to evaluate the effectiveness of Directly Observed Treatment (DOTS) in tuberculosis patients in sub-Saharan Africa for which the Western Cape has been selected as one of the two geographical sites. The study includes the development of a multi-faceted patient centred package of care:

- Providing staff with training for improving consultation skills
- Providing patients with brief motivational interviewing
- Providing patients with a health education booklet
- Providing user friendly pre-packaging of TB medication
- Providing patients with an adherence chart

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3.3.2 Guidelines for the Stop TB strategy within the National TB Programme (NTP)

There are currently guidelines for the Stop TB strategy within the NTP policy which are as follows:

PRINCIPLES

▪ The national TB control policy should spell out ways of promoting community empowerment and recommend the use of indicators related to their contribution to health promotion, improvement of case detection and treatment adherence, impact on stigma and discrimination, political commitment and mobilization of resources for TB control. Promoting community involvement is a medium to long term process. Building ownership requires time but pays in terms of sustainability and impact of health interventions.

▪ COMMITMENT:

o An expression of commitment of the health services and of all stakeholders is crucial in order to propose and build a sustainable operational partnership.

o In the context of the partnership building process there must be clear expression of how active involvement of the community will benefit all its members.

▪ COLLABORATION: it is necessary to identify and discuss criteria for membership of a national-level multi-sectoral "Vision Team" in order to be able to include persons with the appropriate qualities (e.g. real interest in the task, willingness to learn and to participate, and team spirit) and qualifications e.g. community leader, doctor, nurse, manager. Qualities and attitudes are more important as skills can be acquired through on the job training. The vision team must be representative of all relevant stakeholders.

▪ ORIENTATION: Guiding principles give an effective orientation to an enabling institutional and policy framework. Empowerment cannot remain a vague commitment. Fostering community empowerment through partnership building and promoting responsibility of community members for their own health is a concrete opportunity to translate political commitment into practice, responding to

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the needs of people, leading to self-reliance, encouraging community life, moving services outwards to where people live, helping bring about behavioural change, aiming at and contributing to a community order based on justice, equity, unity.

It can be seen that there is an effort of inter-disciplinary collaboration required between the various health-care professionals, but there is no mention of the pharmacists' role within this framework.

3.3.3 A comparison of the Millennium Development Goals with that of the Western Cape

The TB epidemic appears to be on the threshold of decline globally, since the implementation of the STOP TB strategy. However, despite these efforts, Cape Town has had a 47% increase in the number of registered TB cases over a 6 year period. In 2006, 27 017 TB clients were registered. In the Western Cape the TB incidence was 867/100 000 population (in contrast to Europe with an incidence of 50/100 000 and USA with 39/100 000). The increases have been disproportionately higher in geographic areas with poorer socio-economic conditions and high HIV prevalence rates, with 3 sub-districts carrying almost half of the TB caseload, namely Khayelitsha (21%), Klipfontein (15%) and Eastern (14%) (City of Cape Town, 2006).

By 2005, the treatment cure rate was only 69% which was 16 % below the set goal. The cure rate in 2006 was 76%, which was an increase compared to 2005 but was still below the 2005 goal. The most significant cure rates improved in Khayelitsha sub-district; 72% in 2006 from 55% in 2005. This can also be attributed to the fact that the city has made more resources available to the highest burden and most under-resourced sub-districts (www.capetown.gov.za/health).

3.4 Increasing awareness of TB and MDR-TB

The business community can play a pivotal role in increasing TB and MDR-TB detection, early diagnosis and treatment. In partnership with The World Economic Forum, awareness and educational tools are in development to help employees better understand prevention components and to reduce stigma. Workplace health care staff will also be trained on treatment options based on

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national protocols. The various tools are to be tested then adapted for business communities in high burden TB countries (Carlevaro, 2005).

The article points out that because of the community service nature of pharmacies, pharmacists and pharmacy support personnel are often in the front line when it comes to treating illnesses. Patients will often approach a pharmacist with a health query before they see a medical practitioner. This can be used as an opportunity to become involved in the fight against TB and HIV/AIDS (Pharmaciae, 2003). Pharmacists are urged to make sure that they and their personnel working in the pharmacy are familiar with the symptoms of TB; (persistent coughing for > 2 weeks, coughing up blood, loss of appetite, weight loss, extreme fatigue, night sweats, chest pains, and blood in sputum). They should encourage the patient to seek proper diagnosis and treatment if they suspect that the patient is suffering from the disease. They should also be familiar with community clinics and hospitals in their area that offer free treatment to TB sufferers. All TB sufferers should be encouraged to have themselves tested for HIV, but when discussing testing, the following conditions should be borne in mind:

- Testing is voluntary
- Counselling must be done by trained professionals
- Pre-test counselling must be provided to enable the patient to make an informed decision to have the test done or not
- Post-test counselling must be provided to discuss the result, share information and provide support
- Continuing counselling and support are available to patients who are HIV-positive.

Pharmacies should be a source of information as information and education are valuable tools to eradicate stigmatization. Stigmatization is tragically still the reason why many patients refuse treatment and counselling, and they end up putting themselves and others at risk. The same applies to discrimination. As trained health care professionals they can help to eradicate distrust and

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misinformation. The DOH has free information brochures on TB and HIV/AIDS available for distribution in pharmacies.

3.5 Traditional healers involved in TB treatment

In a country as culturally diverse as South Africa, it is common practice, especially in the rural communities, for patients to first consult a traditional healer for any health related problems. There are many reasons why this is still the most common practice in the country. In the rural district of Hlabisa in KwaZulu-Natal, admissions of adults to health facilities with TB increased by 360% between 1991 and 1998 due to the involvement of traditional healers. A study was conducted to evaluate the usefulness of using traditional healers as TB supervisors in a community-based DOTS programme. The study comprised of twenty-five traditional healers who volunteered to participate in the study and attend two training workshops on the management of TB (Colvin *et al.*, 2003).

The study showed that 89% of those supervised by traditional healers completed their treatment as compared to the 67% of those supervised by others. Clients treated by traditional healers expressed a high level of satisfaction with their care. The major advantage of this type of care was seen to be the easy access to traditional healers, who typically lived near to clients, and the short waiting times when attending for treatment. Other reasons for client satisfaction were related to the caring attitude of the traditional healers who enquired about their clients well being and who often conducted home visits to those too ill to leave their homes. The death rate among those supervised by traditional healers was 6%, compared to 18% for those for those supervised by others (Colvin M *et al.*, 2003).

3.6 The current role of the Pharmacist in TB management

The South African Pharmacy Council (SAPC), which is the statutory body that governs the profession of pharmacy, stated that pharmacists have an important role to play and that pharmacies can provide information and advice on rational drug use to prescribers and patients on a one-to-one basis as well as through campaigns and workshops. The management of TB treatment may be improved by using pharmacies as centres for the DOTS approach.

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Their Position paper on the "Role of the pharmacist in the management of HIV/AIDS, TB and STIs", stipulated that pharmacists who deal with these patients should be linked to their local community based support programmes and therefore should be able to refer patients to these, when appropriate. The conclusion was that pharmacists do have an important role in the management and prevention of HIV/AIDS, TB and STIs as well as improving drug related outcomes such as adherence to therapy and educating patients about the disease.

There is however nothing in the SAPC guidelines for community pharmacies to work with, with regards to TB recognition and referral; the focus was rather more on prevention and treatment (SAPC Position paper, The Role of the pharmacist in the management of HIV/STIs & TB, 2003).

Although it is well acknowledged that pharmacists have a role to play in the health sector regarding TB there is insufficient evidence regarding their direct involvement in referring possible TB patients. The International Pharmaceutical Federation (FIP) (Gharat & Rennie, 2009) has acknowledged that Pharmacists have played an integral role in educating patients about the disease and how to prevent its spread and in the public sector have contributed in the treatment thereof. The article does however acknowledge that there is an opportunity to provide a service as DOTS providers. This method of combating the disease is currently being implemented across North East London (UK) and in Mumbai (India) which is a good example of public-private mix activity strengthening national TB control programmes (Gharat & Rennie, 2009). It further provides expert medicines care and support, convenience and a greater patient choice. It must be noted that in South Africa TB is treated strictly by the public sector, and is discouraged due to the threat of lack of control over TB patients in the private sector and it's threat of spreading resistant strains even further.

As mentioned by the SAPC, the FIP (Gharat & Rennie, 2009) further state that pharmacists have a role in: Creating awareness, Case detection of pulmonary symptomatic cases and latent TB infection, Monitoring of treatment and supportive care and Participating in TB Control as DOTS provider (Not currently

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practiced in South Africa). The most important point is that in order to perform the roles above, pharmacists will require training to ensure that they are proficient in recognising symptoms of TB as well as side effects of TB medications, diagnosis and treatment of TB and familiarity with the wider Government programmes and relevant guidelines (Gharat & Rennie, 2009).

3.7 Benefits of early symptom recognition and diagnosis

Prompt, accurate diagnosis and effective treatment are not only essential for good patient care - they are the key elements in the public health response to tuberculosis and the cornerstone of tuberculosis control. Thus the sooner a patient is diagnosed, the sooner they get to be treated, and the less chance there is of the disease being spread (Tuberculosis Coalition for Technical Assistance, 2007).

Training of the Pharmacists' assistants should encompass the recognition of the main symptoms, which would aid in the appropriate referrals of patients. These symptoms are:

- Coughing for, usually, more than two weeks
- Cough with sputum which is occasionally blood stained
- Loss of appetite and weight
- Fever
- Dyspnoea, night sweats, chest pain and hoarseness of voice (all of which are not common)

3.8 Private/Public collaboration efforts and early referral

The National Health Act, 61 of 2003 provides for the establishment of a National Health System (NHS), which encompasses public, private and non-governmental providers of health services and which should provide the population of the Republic of South Africa with the best possible health services that available resources can afford (TB strategic plan 2007-2011). It also sets out the rights and duties of both health care providers and users. With respect to collaborative efforts in the area of TB, only a few studies have investigated these relationships in other high burden countries. A study conducted in Ho Chi Minh City, Vietnam, to describe pharmacists' attitudes towards referring TB suspects to their National

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TB Programme and to evaluate the feasibility of a new referral system, found that 40% of the targeted pharmacies participated actively by referring at least one TB suspect. It was also found that only 28% of referred patients actually went to a District TB Unit (DTU) for diagnosis and that only 7% of the referred patients were in fact sputum positive. Even though this may seem low, it was concluded that pharmacists do have an important role in the referral of TB suspects, but an emphasis should be placed on the appropriateness of referral (Lönnroth *al.,* 2003).

3.8.1 Barriers to referrals in private pharmacies

A number of potential barriers to the involvement of private pharmacies can be identified such as: limited knowledge and formal education in TB diagnosis and treatment by pharmacy staff; pharmacy staff giving medical advice concerning suitable diagnostic tests, medical doctors may feel an encroachment on their professional boundaries (Gilbert, 1998).

It has been shown (Lönnroth *et al.,* 2003) that it is possible to involve private pharmacies in TB control. A similar study conducted in the Western Cape by Adams and co-workers in 2006 showed that there is room for improvement in the knowledge of TB in community pharmacies. A training workshop was attended by 29 PAs who showed a statistically significant increase (p<0.0001) in knowledge gained with a mean average of 8.2% in the pre-training test and 12.3% in the post training test. The increase in self-reported TB referral rate by PAs was also statistically significant (p<0.0001). The results showed that a TB training workshop is an effective means of increasing TB knowledge and improving referral behaviours by PAs (Adams *et al.*, 2006). However certain gaps can be identified within the study that need to be addressed such as: recording of referrals in the TB clinics to ensure that a record of patients who are referred from the private pharmacies are kept in order to determine whether patients do indeed go to the clinic. Lönnroth *et al.*(2003) managed to address these limitations in their study, however basic TB education, including training on simple identification of TB aspects could have been addressed more thoroughly since of the 28% of the referred patients, only 7% were sputum positive indicating that many of the referrals were in fact inappropriate (Lönnroth *et al.*, 2003). It had been shown that

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1% of people with TB diagnosed within the NTP have bought anti-TB drugs at private pharmacies before consulting the NTP. This indicated that it was uncommon to be treated with anti-TB drugs before diagnosis in the NTP (Lönnroth *et al.*, 1999).

3.8.2 Private pharmacies and case detection

It has been shown that private pharmacies are a common first point of contact for people with TB, who are later diagnosed in the NTP of Ho Chi Minh City. The study also shows that lack of skill among pharmacists and drug sellers in the identification of TB symptoms contributes to the delay in diagnosis for TB; the researchers thus managed to identify that pharmacists are an important but weak link in the referral chain (Lönnroth *et al.*, 2000). Another study by Holdford *et al.* (1998) concluded that although collaboration between private pharmacies and public services appears possible, it does not seem an efficient way to increase the number of patients screened for TB, and to shorten delays to TB diagnosis and treatment (Holdford *et al.*, 1998). Although this was true for other studies, it may not be the case in the Western Cape and hence the reason for conducting this study.

3.8.3 Choice of method to describe quality and characteristics of care in private pharmacies

Lönnroth *et al.* (2000) interviewed pharmacists/drug sellers by means of a questionnaire. However the interviewees knew that the study was about drugs for respiratory illnesses, but did not know that the focus was on TB. A case description was presented in order to assess skill in detecting TB suspects before direct questions about TB and anti-TB drugs were asked to minimize expectation bias. The results obtained indicated that 17.7% of the interviewees mentioned TB as a possible diagnosis the case description. 87.8% said that a proper medical examination and or visit to a doctor, health centre or a hospital were needed to ascertain the diagnosis. 37.4% mentioned smear only as best diagnostic test for pulmonary TB, 22.4% mentioned X-ray only, 21.1% mentioned both smear and X-ray and 19.0% mentioned neither smear nor X-ray. When asked to recommend a specific health facility for a medical consultation for suspected TB, 29.9%

recommended the TB hospital while none mentioned the DTU, which is operational in each of the 22 districts in Ho Chi Minh City. 12.2% recommended a private physician, while other recommendations were various health centres and general hospitals. About two-thirds of the interviewees knew about the NTP, while 43.5% knew about the DTU in the district where the pharmacy was situated. The questionnaire included information on whether the pharmacy stocked anti-TB drugs, selling anti-TB drugs without prescriptions and to recommend a TB treatment regimen despite the fact that they thought it inappropriate for a pharmacist/drug-seller to prescribe a regimen. These researchers described a situation in which customers may buy whatever anti-tuberculosis drugs they wish and an unknown proportion of these are dispensed to people who do not have TB. It acknowledged that this may lead to inappropriate treatment and in turn contribute to the development of MDR-TB and a waste of resources. Knowledge about symptoms of TB and diagnosis of TB was quite good in the interviews but when presented with the fictitious case, only 18% of the interviewees mentioned TB as a possible cause of the symptoms (Lönnroth *et al.*, 2000).

Due to observation bias, self reported practice does not generally correspond well to actual practice and is a problem in the private sector of low-income countries, which leads to research approaches where the study subject is unaware of being observed. A simulated client method is one of these (the undercover seeker method), which has been applied widely to investigate drug dispensing in private pharmacies for respiratory illnesses and diarrhoea. This method is however difficult in terms of obtaining informed consent and it is difficult to implement any intervention aimed at improving quality of care in the same study setting. However, it has been argued that not obtaining informed consent may be justified as long as the identity of the study subjects is protected (Lönnroth *et al.*, 2000).

A previous study investigated the delay to diagnosis of TB patients, particularly within the private sector. It described this delay to be due to the inability of private sector individuals to direct suspected cases to facilities where they could be properly diagnosed and concluded that referral chains need to be strengthened and co-ordinated (Lönnroth *et al.*, 1999).

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Most private pharmacies dispense prescriptions for anti-TB drugs made out by private practitioners and it is common that these private patients do not enter the DOTS programme. This indicates that pharmacies, as a crucial link in the health care chain as providers of these drugs, need to play a more informed active role in TB management (Rajeswari *et al.*, 2005).

3.8.4 Barriers to the involvement of private pharmacies in TB control

The aspect of involvement of private pharmacies in TB control is one which needs to be explored, not just with regards to TB control, but also with regards to their involvement in CPD and in improving other aspects of practice with respect to other disease states. Some of the barriers include the limited knowledge and formal education of pharmacy staff in TB diagnosis and treatment. Some of the pharmacy staff are often not pharmacists or trained PAs and may sometimes lack the type of medical training which enables them to recognise certain medical conditions. There may be an issue surrounding the uncertainties about the limits of the professional role of pharmacists perceived by the public, for e.g. when pharmacy staff gives medical advice, patients, may find it awkward to be advised to go the TB-clinic. Both nationally and internationally from the literature it becomes clear that the private pharmacies are generally not involved in national TB control strategies. Apart from the barriers mentioned above, there are many other reasons for this. NTPs in many countries do not incorporate private pharmacies; this is true for South Africa as well. It is an aspect in which it is naturally expected for private sectors to refer patients; however, this is due to the professional capacities of the individuals and not due to a formalised process.

3.9 TB-Drug Resistance

The most common reason for patients not being cured is that they do not finish their treatment. TB patients are required to take their medicine regimen for six months in order to be cured of the TB infection. The problem is that after a few weeks people feel so well that they stop their medication, but they are not cured of the TB infection. Since the TB bacterium in the person's body has already been exposed to TB drugs, the bacteria may develop a resistance. This means that repeating the treatment with the same drugs will not cure the infection. This is

known as Multidrug- resistance (MDR). Not only will the person continue to have TB, but they will also continue to infect others with the TB bacteria. In order to stop TB in South Africa, over 80% of people with TB must be cured at the first attempt of taking their medicines, so that they do not infect others (MRC, 2006).

The term Multidrug-resistance is used to describe a TB infection that will not respond to the drugs normally used to treat TB. MDR-TB is defined as resistance to the two most effective first line drugs: Rifampicin and Isoniazid (Sobero *et al.*, 2006). According to the Medical Research Council of South Africa (MRC) Policy brief in January 2006, MDR-TB emerges when a TB patient receives inappropriate or ineffective treatment, which allows naturally-occurring resistant TB bacteria to survive and multiply and can be transmitted directly to susceptible individuals such as children and those also infected with HIV. Patients may decide not to take the drugs and thus do not complete the course of medication given to them. People may decide that they feel better, or the side effects of the medicine make them feel unwell, and they stop taking the TB treatment. The person still has TB and at some later stages seeks new treatment for their TB. The medicines given the second time around do not work and the TB infection cannot be treated. It is a dangerous practice to stop taking TB medicines as patients are at risk of dying from TB. Completely different and expensive drugs are used to treat this and treatment is for 18-24 months in a hospital and the patient may or may not be cured; the chance of a cure is only 50%. One of the objectives of the National TB Research Programme (TBRP) of the MRC is to improve the relationship between TB patients and health care workers to ensure that DOTS is effective. If this is effective then MDR-TB and XDR-TB could be prevented.

3.10   XDR-TB

On September 1 2006, WHO announced that a deadly new strain of extensively drug-resistant tuberculosis (X-DR-TB) had been detected in Tugela Ferry (a rural town in KZN). Two-hundred-and-twenty-one patients had MDR-TB of which 53 were identified as XDR-TB, defined as resistance to three or more of the six classes of second-line drugs, in addition to MDR (Sobero *et al.*, 2006).

The following revised definition for XDR-TB was published on November 3, 2006 in an MMWR notice to readers: "XDR-TB is defined as the occurrence of TB in persons whose *Mycobacterium tuberculosis* isolates are resistant to Isoniazid and Rifampicin plus Fluoroquinolone and at least one of the three injectable second-line drugs (Amikacin, Kanamycin, Capreomycin)" (CDC, 2006).The median survival from the time of sputum specimen collection was 16 days for 52 of the 53 infected individuals; this included 6 health workers and those on ARVs. Since MDR-TB can be spread to a previously uninfected person; if the same should happen in the case of XDR-TB then this is a definite grave concern.

In the Western Cape, testing for XDR-TB only started in January 2007 and has identified 64 XDR-TB cases; of which 20 have died, 4 are in Correctional Facilities and are being treated, 39 are in Brooklyn Chest Hospital and 1 patient absconded from Brooklyn Chest Hospital and has subsequently disappeared (DOH Imbizo, 2008).

"National TB control programmes and health agencies in lower-and middle-income countries must, as a priority, begin to address the risks of TB transmission among health care workers, says a study in the Medicine journal" (DOH Imbizo, 2008). Important emphasis has been placed on this by WHO and the Stop TB partnership, with efforts to update existing guidelines and to highlight the need to further develop programmes suitable for resource-limited countries.

3.11   Related planning, capacity building and investigation efforts

In 2006 the WHO had developed contracts with two supranational TB reference laboratories to investigate the magnitude of XDR-TB globally, and particularly in Southern African countries.   Second-line anti-TB drug susceptibility testing is now being incorporated into routine drug resistance surveys by supranational TB reference laboratories. Discussions were under way at the time, for the placement of a WHO officer in South Africa for two years to work closely with the national TB control programme on XDR-TB.   South African TB control staff recently

completed an MDR-TB management course, funded by Eli Lilly, at the WHO MDR-TB collaborating centre in Latvia (Sobero *et al.*, 2006).

According to an article in the Washington Post (2007), Africa is the only continent where TB rates are increasing and where the disease is being complicated by high rates of HIV infection. The enormity of the challenge of both MDR-TB and XDR-TB, and how HIV amplifies this, is definitely being noticed on an international level. People are aware of the issues of low adherence rates and the challenges of keeping these patients in hospitals while also taking into consideration their basic human rights as well as their danger to public health. The main conclusion was that unless there is a massive investment in new drugs, we may not see much of an improvement and it is thus in our capacity to "do the best we can with what we have".

3.12 Referrals to TB clinics

There seems to be limited success when it comes to referring patients from private pharmacies to the public clinics. Although literature around this aspect seems to be limited, studies conducted in Vietnam and Kathmandu investigated the referral efforts from private pharmacies to TB-clinics. Both these studies had limited success (Lönnroth *et al.*, 2003; Hurtig *et al.*, 2002). Regardless of the results obtained, it remains a field that should still be explored and the public-private collaborative efforts and relationships need to be improved.

3.13 Delay in diagnosis and the current referral system

It is not uncommon for clients to approach a private pharmacy to seek medical advice. A study which had recorded this sort of behaviour was conducted by Lönnroth *et al.* (1999) in Vietnam in which they had concluded that the delay in diagnosis was due to the inability among health-care providers to detect TB, rather than to the under-utilisation of health care services (Lönnroth. *et al.*, 1999). The study had also looked at private physicians' use of diagnostic tools and reported that many of them utilized X-rays as a primary tool to diagnose TB. It was thus a recommendation by them that diagnostic procedures needed to be improved and

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referral chains needed to be strengthened, particularly among private providers. Low-income areas host clients who cannot afford doctor's consultation fees or to sit in long queues at clinics before being attended to, approach private retail pharmacies. When these clients attend private pharmacies with a symptom such as a cough, it is highly likely that the staff would treat any of the accompanying symptoms symptomatically, without further investigation by probing into the possibility of a pulmonary disease such as tuberculosis. The client may then come back to the pharmacy after using the prescribed medications, such as a cough mixture and anti-pyretic, and ask for "something stronger". The PAs have two choices, they could either change the treatment by giving the client another cough mixture and a higher dosed anti-pyretic, or they could refer. PAs generally refer patients to the pharmacist within the pharmacy where they can give their advice or recommended treatment. Should the pharmacist identify these symptoms as TB, the usual referral is to the nearest doctor (depending on the economic status of the patient, i.e. someone with medical aid or who can afford consultation fees would go to a private doctor and someone not having the financial means would generally be recommended to a day-hospital clinic). By the time clients get to the doctor there is still the possibility of an incorrect diagnosis and treatment with the usual short course of antibiotics such as amoxicillin being given. Patients may then go back to the doctor to get further investigated and tested and finally diagnosed and treated for TB. The time from which the symptoms first occurred up until the time at which a patient is diagnosed has created a delay in actually diagnosing the patient. This could have been avoided from the beginning if the PA knew how to probe and ask specific questions and refer patients to the TB clinics directly.

3.14   Global TB control 2007

TB is still a major cause of death worldwide, but the global epidemic is on the threshold of decline. The "Stop TB Strategy" is a mechanism for building links between NTPs, health-care providers and communities. It is also states that connections should be made through community based care, public-private mix, DOTS and the Practical Approach to Lung Health has been shown to improve

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access to diagnosis and treatment. But since no country has succeeded in making all of these activities fully operational on a national scale, it can be seen that there is room for improvement but it may be a more challenging task for this collaboration.

3.15 TB Healthcare facilities in the Western Cape

There are six TB hospitals, these are: Brooklyn Chest (Milnerton), Harry Comay (George), DP Marais (Retreat), Brewelskloof (Worcester), Sonstraal (Paarl) and the Infectious Disease Hospital (Malmesbury), three of which are MDR-TB Units. A list of TB clinics in the Cape Town Metropole can be found on the Z-card (APPENDIX IX).

3.16 Conclusion

TB is a global problem, but it is an even bigger burden to South Africa, in particular the Western Cape. Millions of rands are being spent (Hausler *et al.*, 2006) on treatment and research, but South Africa has still not yet met the 85% cure rate target. There has been an improved treatment rate by trained traditional healers in TB recognition and referral. Community Pharmacists are usually the first consultants to patients in the early stages of disease manifestation. There is a need for strengthening the referral chain.

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CHAPTER 4

RESEARCH METHODS USED IN THE STUDY

This Chapter provides insight on how the study was carried out. The reader will notice that the study has been conducted in two parts. The first part of the methodology was part of the original study as planned. The methods were implemented bearing in mind the expected results. Based on the findings of Part 1, it was decided to conduct a supplementary study (Part 2) which is discussed further in chapter 4. The supplementary study is a more intense and concise approach, using a sample of 3 pharmacies in which all the front shop staff were trained and evaluated.

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4.1 Current referrals of patients and the procedures involved in referring them.

From personal experience, in practice most pharmacy personnel refer their clients to a doctor in a private practice and sometimes to the Primary Health Care (PHC) clinics; this was also pointed out by Adams *et al.,* (2006).

This type of behaviour raised a few questions regarding the current practices in community pharmacy, such as:

- What are the current guidelines for referring patients?
- Is there a Good Pharmacy Practice (GPP) procedure?
- What conditions are usually referred?
- When do pharmacists' assistants refer?
- What sort of documentation is kept with regard to referrals?

The truth is that there is no precise procedure to follow when it comes to referring TB patients, neither is any documentation process specified in this regard.

4.2 Patient Education

In the Cape Town Metropole Region there are essentially 3 main languages which are spoken *viz.* English, Afrikaans and Xhosa. In explaining symptoms and giving instructions to patients, it is important that the symptoms get explained in a language and manner that they could understand. This would aid in imparting the correct information to the patient regarding their symptoms and ensuring that they understand why they are being referred.

4.3 Description of the Target Population

The target for this study was the community retail pharmacies in the Cape Town Metropole region. Any PAs who were willing to participate in the study from this area were included. PA's typically live in the same vicinity or in a surrounding area to the pharmacy. Their educational level ranged from matric level of education to a qualification as a post-basic pharmacists' assistant approved by

SAPC. All the roles are performed under the personal supervision of the pharmacist.

4.4 Design and Sampling

The study design can be summarized schematically as follows:

Figure 4.4.1: Diagram illustrating the study design

TRAINING

4 MONTHS
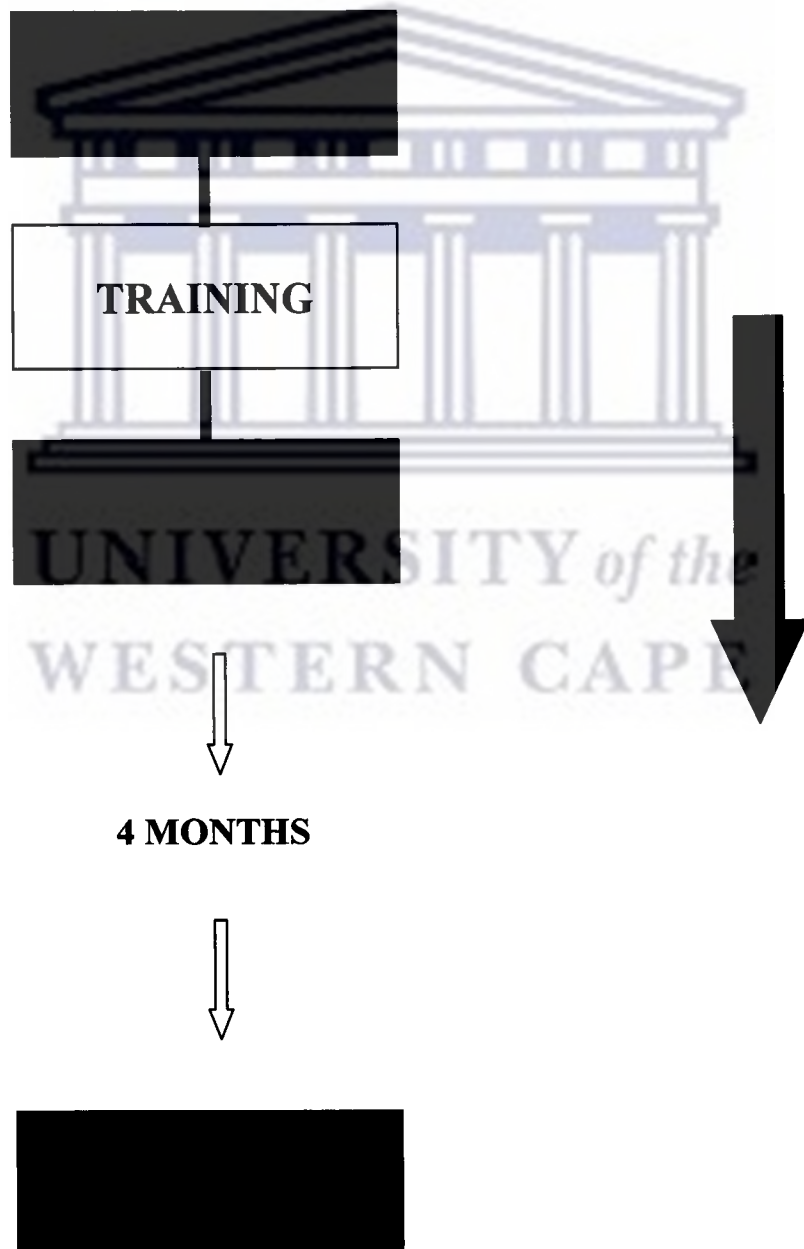
4.4.1 Part 1

Since a similar study was conducted by Adam *et al.* (2006), the method of training pharmacists' assistants in TB symptom was comparable; however the actual training has been extended to include a practical component which would aid in measuring the actual referral rates. The Sandoz sales representative (Carmen Christian) for the TB division prepared a Power-Point presentation which encompassed information which imparted a basic knowledge of TB. These included methods to recognise TB symptoms accurately and thus refer patients to the appropriate health care facility (TB clinics). This information was also correlated to the questionnaire so that pertinent information was imparted. Judy Caldwell, who was head of the TB division of City Health at the start of the study in 2007, aided and gave guidance in drafting the referral cards and TB suspect registers as well as informed the nursing sisters of the various TB clinics that such a study was to be carried out and to expect patients who were referred from retail pharmacies. Research assistants were also recruited from the UWC School of Pharmacy to aid in the recruitment of PAs as well as to assist during the workshops and the telephonic follow up.

4.4.2 Sampling

A group of study subjects (Pharmacists' Assistants) were approached to participate in the study. These assistants included both those registered and not registered with the SAPC. The latter group, the so-called "front-shop assistants" commonly see clients who purchase cough medicines, and it was thus deemed necessary to include them in the sample. Each pharmacy was informed by means of a letter to the responsible pharmacist as well as the PA (APPENDIX I & II). This process was facilitated by requesting the help of the professional pharmacy organisation, the Pharmaceutical Society of South Africa - Cape Western Province branch (PSSA-CWP), who informed pharmacists about the study and encouraged them to participate in the study by allowing their PAs to attend the training programme. This was done by means of publishing an informative article focusing around the area of TB in the "Tincture Press" a monthly publication by the PSSA-CWP (Tincture Press, 2007a & 2007b). In addition, the research assistants were

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given a list of all the pharmacies located in the Western Cape and had to phone as many pharmacies as they could within a given time frame of 1-2 weeks before the workshop, to obtain more volunteers. The research assistants were requested to first phone pharmacies that fell within the high TB burden areas in descending order of burden (City of Cape Town, 2003) and then later, the pharmacies within the Metropole region. All the pharmacies who had agreed to participate in the study were faxed a copy of the consent form, to obtain both the consent of the pharmacist/ pharmacy manager as well as the PAs, which had to be filled out and faxed back to the researcher. They were then called one or two days before the workshop to confirm their participation. (Pharmacists' were not used in this study because it is difficult to assemble a group of pharmacists to attend workshops at the same time).

4.4.3   Research Tools
4.4.3.1   Questionnaire
A questionnaire was designed to cover a range of information regarding TB. Proposed outcomes of the workshop were considered, in order to develop questions that were covered within the questionnaire. The main aim was to assess both knowledge and behaviour around TB and to determine the demographics of the study group. The study group were asked questions which included: knowledge of the various strains of TB, the symptoms of a TB infected individual and their referral practices i.e. when and where to refer (APPENDIX VI).

4.4.3.2   TB-Referral card
The TB referral card is a small double-sided A5 sized leaflet designed to record important details of the suspected TB patient. The contents of the card included the following:
On the one side was a message explaining to the suspect that the symptoms which they have experienced could be due to TB and a request that they go to the TB clinic nearest to them (with the name of the clinic indicated on the card) to get tested. The card also included the operating days and times of the clinics.

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On the reverse side was a message to the Sister at the clinic. The Sister would thus have knowledge of the pharmacy which the patient had first presented at, the date of consultation and the symptoms experienced. In this regard they were requested to investigate further. The card was designed to include a tick box for each of the symptoms for the sake of simplicity and ease of reading. The Sister would see which of the symptoms were ticked off, indicating that the patient possibly had TB (APPENDIX VII).

4.4.3.3.   TB-suspect register

This is a landscape A4 sized one-page document which was issued to the PAs as a means of keeping a record of the referred patients and the clinic to which they were referred. It contained information such as: The date the patient consulted the PA, the name of the patient, the age/date of birth, the positive findings i.e. the symptoms which the patient experienced and the clinic to which they were referred. All this information was relevant as it correlated with the TB-referral card and would thus act as a tracking system through which patients within this referral system could be traced (APPENDIX VIII).

4.4.3.4.   Z-card

A "Z-card" is a TB information brochure which was designed and issued by the City of Cape Town, Health Department as part of their STOP TB campaign. It is almost an A4 double sided colour printed leaflet which has been folded into a pocket sized booklet in the form of a "Z", hence it's name. The information on the leaflet acted as a reinforcement of what the assistant would have explained to the clients. Should the PA not have had time to explain everything in detail, the client was then able to read more about TB from the leaflet which included:

- An explanation of what TB is
- How TB is spread
- The effect it has on the body
- The signs and symptoms
- How it is diagnosed
- What will happen to them should they have TB?

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- The importance of completing the full course of treatment
- How to prevent the spread of TB
- The link between HIV & TB

On the reverse side of the card is a list of all the TB facilities in the Cape Town Metropole Region. It was used to assist in locating clinics for the TB-suspect referral (APPENDICE IX).

4.4.4. Workshop/Training

The Training workshop was conducted in 2 sessions.

During the first session, the attending PAs answered a questionnaire which had 15 minutes to completion period. They were then given an introduction to TB and the necessary information required to equip PAs to have a basic understanding of TB symptoms, its progression and how it is treated. This was aimed to increase their knowledge and provide the PAs with the tools to refer these suspects to the necessary TB-clinics.

The second session was a practical session in which the PAs had to role play what they had learnt by means of a case study. They were re-introduced to the purpose of the study and informed of their importance as the "first-line" of contact with these possible suspects. They were then introduced to the 3 tools used for implementation of a referral system for the purpose of the study (i.e. TB referral card, TB-suspect register, Z-card) and how to apply their knowledge to the process of referring patients. Depending on the size of the group attending the workshop, they were divided into groups of 3 or 4 individuals. They had to then elect one person to role play the PA and another to role play the patient for the given scenario. In this scenario a patient walked into the pharmacy and presented with symptoms similar to that of TB, the PAs had to use the 3 tools provided in order to tick off the symptoms correctly if they suspected this person of having TB and to record all the necessary information in both the referral card and TB-suspect register and thirdly they had to take out the Z-card in one of the 3 languages which they best understood. The PA had to also find out which was the

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nearest TB-clinic to the patient as indicated on the Z-card and record that on both the TB-suspect register and the TB-referral card (APPENDIX V & XIII).

4.4.5 Implementation

The objectives of this study were achieved by means of a questionnaire and training programme. This questionnaire was used to assess the pre-test and post-test knowledge of the PA regarding coughs, TB symptoms and including knowledge around important facts about TB. Pre-test and post-test questionnaires were identical, allowing knowledge and behaviour levels to be compared across time.

A referral card was also developed and given to clients together with a "Z-card" which was to aid in referring patients suspected of being TB-infected to the nearest TB clinic. Patients were to be instructed by the PA to hand in the card at the facility which they attended. These patients were to be tracked to confirm whether or not they presented to the clinic by checking if the referral card was given in at the clinic. The referral cards were to be collected from the TB clinics once it was found that patients had in fact been referred by the trained PAs, using the procedures learned and a summation of all the data recorded. Permission for facilities to keep the referral cards were requested from the Director of City Health in Cape Town, so that each facility concerned was aware and informed of the study that was being conducted at the sites while at the same time being assured that all they needed to do was to keep the referral cards safe and to write down the folder number of the patient. They were assured that it would not increase their work load.

The Sisters in charge at each of the clinics concerned were informed of the study by the Cape Town Department of Health and requested to retain the referral cards brought in by patients, in a PHC folder if the patient was TB sputum negative or in a TB folder if the patient was TB sputum positive.

Each pharmacy was to keep a register which contained:

- the name of the pharmacy,

- the date in which the patient was referred,

- the name of the client,

- the physical address of the patient,

- gender,

- age/date of birth,

- the symptoms which have been recognised by the pharmacists' assistant and

- The clinic to which the client was referred.

This register was to be used for cross-reference when collecting the referral cards from the TB clinics. The information retained was to determine the delay from when a client was referred and when they presented at the TB-clinic (APPENDIX VII).

Upon conclusion of the second session of the training workshop the participants were given the same questionnaire as at the start of the workshop. They were further informed of a post2-test questionnaire which would follow 4 months later, to test whether their knowledge was sustained. During that time they were asked to return their TB-registers or to fax them back for the tracking to take place.

The post2-test questionnaire was conducted telephonically as this was the simplest means of obtaining the data based on time availability of PAs. Upon conclusion of the questionnaire, the assistants were all requested to fax the TB register with the suspects or to physically return them.

4.4.6. Part 2

After the second follow up session with the post2-test questionnaires, very few PAs from the original sample had returned the Suspect Register and of those returned, very few contained any information. It was then decided that perhaps training an entire pharmacy staff complement, rather than just one or two, would help to address this problem and could possibly assist in improving the referral system and hopefully result in its success.

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In this part of the study 3 pharmacies participated, in which the manager/pharmacist in charge agreed to allow their staff to be trained and be part of the study. The training was conducted in each of the pharmacies respectively and the staff members were trained at the times which were most convenient for the manager i.e. when they were least busy. The time for each training session was 1 hour. In each pharmacy we had trained 2 PAs per session, so that there was always someone available on the pharmacy floor to work. The format was very similar to that of the workshops held at the School of Pharmacy, in which we started off with a pre-test questionnaire and then a condensed version of the training which was more intense yet covered only the important facts. We then moved on to the part in which I demonstrated how to apply the knowledge gained by utilizing the study tools i.e. TB-suspect register, TB-referral card and the Z-card. There was a short question and answer session followed by the post-test questionnaire.

4.5   Pilot study

The questionnaire was tested on individuals related to pharmacy and those that are not, to assess the design and comprehension of the questionnaire. No changes were deemed necessary.

This questionnaire was compiled in English (even though there are three commonly used official languages in the Western Cape namely: English, Afrikaans and Xhosa) since the training was conducted in English.

4.6   Sample size

The final sample for part 1 of the study consisted of N=28 PAs who were based in the Cape Town Metropole Region, the final sample of N=15 participated in the post1-test questionnaire. Part 2 of the study comprised of N=12 participants of which N=8 completed the post2-test questionnaire.

4.7   Sample areas/ Locations:

The sample area was confined to the Cape Town Metropole Region. The sampling frame would ideally have been based on the TB statistics provided by

the Department of Health. These areas were based on statistics for the areas with the highest infection rates as well as the likelihood of patients going to other pharmacies out of their area due to accessibility and social perceptions within their community surrounding the issue of TB.

It should be noted that the TB incidence rate is not consistent throughout the study region. The following refers to the TB case load per district in the Cape Town Metropole Region (*This was the only available data at the time of commencement of the study in 2007 which was used for the purpose of sampling*):

- Khayalitsha 20%
- Nyanga 15%
- Oostenberg 13%
- Tygerberg West 8%
- Tygerberg East 8%
- South Peninsula Metropole 8%
- Blaauwberg 7%
- Helderberg 6%
- Central 6%
- Athlone 5%

(City of Cape Town, 2003)

From a methodological perspective, it would have been preferred to select a stratified sample, based on the above TB incidence data, but it was found that the number of pharmacies and not match the number of TB patients in areas such as Khayalitsha and Nyanga, where there are no or at most one or two community retail pharmacies and patients have to consult pharmacies in other areas. Issues of transport, such as commonly used routes, would have to be explored in order to determine where these patients would commonly consult. It would have been preferable to select pharmacies using the stratification process and supplemented with pharmacies situated at or near identified public transport hubs, however, the pharmacies participating in the research would also need to give their permission to partake in the study. Given the poor response from pharmacists to the invitation to participate, the stratification process would not have yielded a sufficiently large

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sample. Due to this reason, the participation of any pharmacy from which consent was obtained, was accepted. Thus a convenience sample was used.

4.8 Incentives

Each participant was awarded a certificate for their participation and competence in recognising TB symptoms on condition that the TB registers were submitted and the post2-test questionnaire completed. They were also given promotion materials such as TB "Z-cards", which contain positive information regarding TB. This includes: TB symptoms, how TB is spread and that TB can be cured.

4.9 Measurements
4.9.1 Variables

Predictor variables: Training

Outcome variables: Increased TB recognition and knowledge

Increased referral rates

Appropriate referral

Strategies to maximize precision and accuracy:

1)   Standardize methods

2)   Using only one questionnaire to assess pre-test and post1-test and post2-test knowledge

Confounding variables:

- Participants had TB previously

- Participants lived with someone or were in close contact with someone who had TB

- Participants had previously attended seminars on TB

- Participants had knowledge of HIV which could influence knowledge about TB.

- Training may have no impact on knowledge because pre-test knowledge levels were already high as a result of any of the above.

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4.10   Data Analysis

The data was entered onto a Microsoft Excel spreadsheet sheet (APPENDIX XII).
The data was then further categorised:

- To evaluate the number of respondents who answered a particular question (Tables 5.1.1, 5.2.1, 5.3.1 and 5.4.1)
- To evaluate test scores for each participant.

4.10.1 Evaluations

4.10.1.1   Pre-test, post1-test and post2-test evaluations

The questionnaires were collected, marked and scored. A maximum of 37 marks could be obtained from the questionnaire. A description of the data was evaluated by a summation of answers for each question and the comparison between pre-test, post1-test and post2 test results. SPSS (SPSS Inc.) software was used to analyse the data.

4.10.1.2   TB register recordings

The register was taken in and investigated further by approaching the clinics to which the client was referred and looking at patient records

4.10.2 Hypotheses

4.10.2.1   Null hypotheses

I.   TB training will have no effect on knowledge of pharmacists assistants before and after training

II.   Knowledge from TB training will not increase the referral rates of patients to TB clinics

4.10.2.2   Alternative Hypotheses

I.   TB training will have an effect on knowledge of pharmacists assistants before and after training

II.   Knowledge from TB training will increase the referral rates of patients to TB clinics

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4.10.3 Testing of Hypothesis

4.10.3.1 T-test

A T-test was used to analyse pre-test and post-test knowledge differences for sample N=28. This was used to determine whether there were significant differences in knowledge before and after training.

4.10.3.2 ANOVA and Scheffe

ANOVA was used to analyse the data where there were more than 2 variables (pre-test, post1-test and post2-test). It provided one-way analysis of variables. Scheffe was used to analyse the test scores between 3 factors i.e. pre-test, post1-test and post-2-test knowledge differences. It made use of multiple comparisons (APPENDIX X).

4.11 Research Staff

This included the staff at the TB clinics, the Pharmacists' assistants who participated, the UWC pharmacy students who collected post2-test questionnaire data and the researcher.

4.12 Training

Sandoz, a leading pharmaceutical manufacturing company, sponsored this project, by providing the training for the PAs, since they use the same training in practice during their marketing of the anti-TB drugs. Carmen Christian, who is an established and accredited trainer in TB programmes for Sandoz, conducted the training. This is efficient in terms of continuity since the same training was conducted in a similar manner during a previous study (Adams *et al.*, 2006). The second part of the training which demonstrated the practical application of the study was conducted by the researcher.

4.13 Facilities

-       Venues for workshop (UWC School of Pharmacy)
-       TB clinics for referrals

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4.14 Legal compliance

The TB training falls within the SAPC's prescribed scope of practice for pharmacists' assistants. In this study, it falls within the usual practice of assistants working in the health care environment of a retail community pharmacy in order to promote health.

4.15 Ethics clearance

Confidentiality of the pharmacies, patients and pharmacists' assistants was ensured as each pharmacy and pharmacists' assistant was given a number, not a name, and referred to as such in the report. Only the researcher knew which number matched the pharmacy and pharmacists' assistants. The TB Suspect Register was kept under the responsibility of the Responsible Pharmacist for maintaining the confidentiality of the patient. Data collection was obtained by means of questionnaires, a TB suspect register and referral cards distributed by the PAs, which were to be collected and kept at the TB clinic by the sister-in-charge, who was expected to maintain patient confidentiality (as per usual codes of practice for health care professionals).

Informed consent was obtained from both the pharmacist and pharmacists' assistants regarding participating in the study. They were fully informed of the nature of the study and what was expected of them (APPENDIX I & II).

Incentives were of non-monetary value and cannot be construed as being an undue inducement towards participation. The workshop merely offered an opportunity to enhance knowledge and to obtain a certificate for each pharmacy and pharmacists' assistant at the end of the study.

Permission to access patient records and folders at the TB clinics was obtained by from the then Director of City Health, the late Dr Ivan Toms (APPENDIX III).

Ethics clearance was obtained from the UWC Research Ethics committee.

CHAPTER 5

RESULTS

PRESENTATION & DISCUSSION

This chapter summarizes and discusses the findings of the study. This is presented in figures, tables and text. The results are discussed in two parts. Part one discusses the results of the original study sample that were trained and tested and Part 2 reflects the results of the supplementary study. Demographics are indicated in figures 5.1-5.3 to describe the sample. The tables represent the results from the pre-test, post1-test and post2-test questionnaires.

From the study, 67.9% were female and 32.1% were male participants
The following figures give a description of the sample demographics:

Figure 5.1: **Age distribution (in years) of the pharmacists' assistants in the original study sample (N=28)**

14%

39%

- <20yrs
- 20-29yrs
- 30-39yrs
- 40-49yrs
- >50yrs
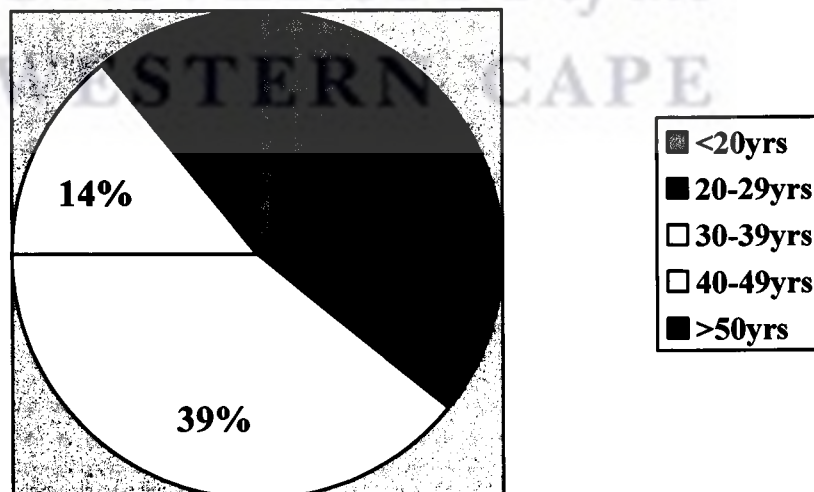
Figure 5.2:   Years of Working as an assistant (N=28)

Legend:
- ▨ <1yr
- ■ 1-5yrs
- □ >5yrs

53%
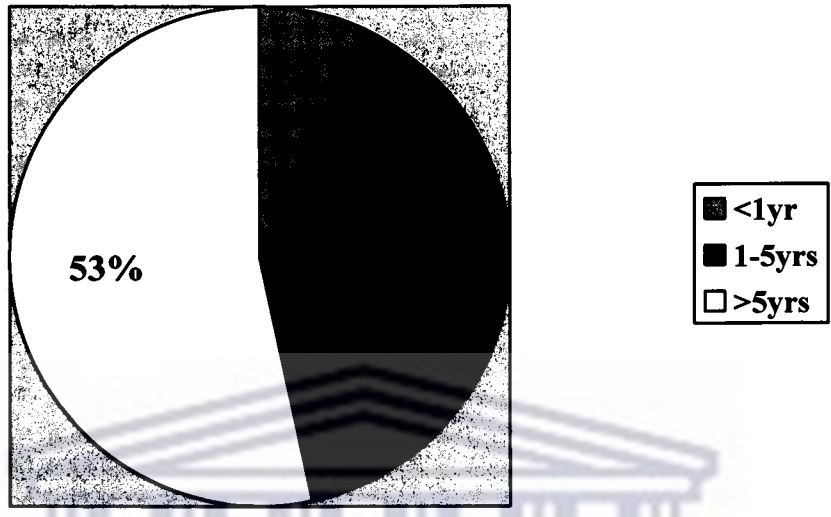
Figure 5.3:   Type of Pharmacists' assistant (N=28)
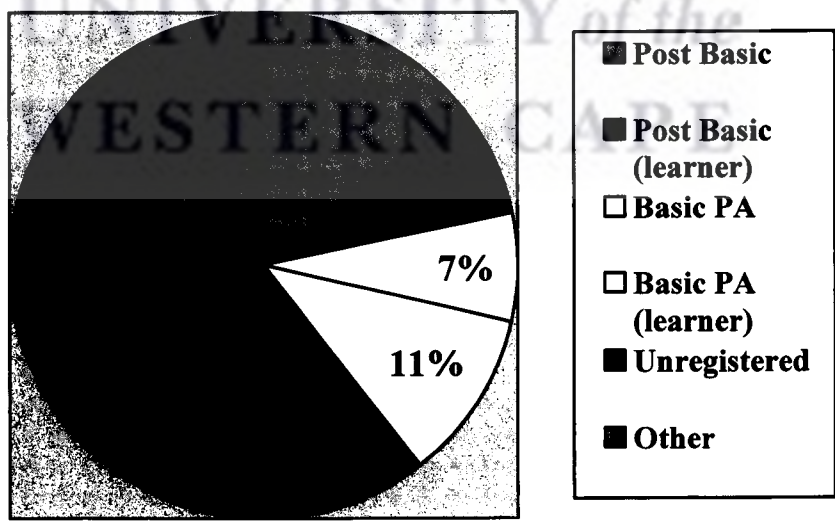
Legend:
- ▨ Post Basic
- ■ Post Basic (learner)
- □ Basic PA
- □ Basic PA (learner)
- ■ Unregistered
- ■ Other

7%

11%

SAPC. All the roles are performed under the personal supervision of the pharmacist.

4.4 Design and Sampling

The study design can be summarized schematically as follows:

Figure 4.4.1: Diagram illustrating the study design

PRE-TEST

TRAINING

POST-TEST

4 MONTHS

POST2-TEST
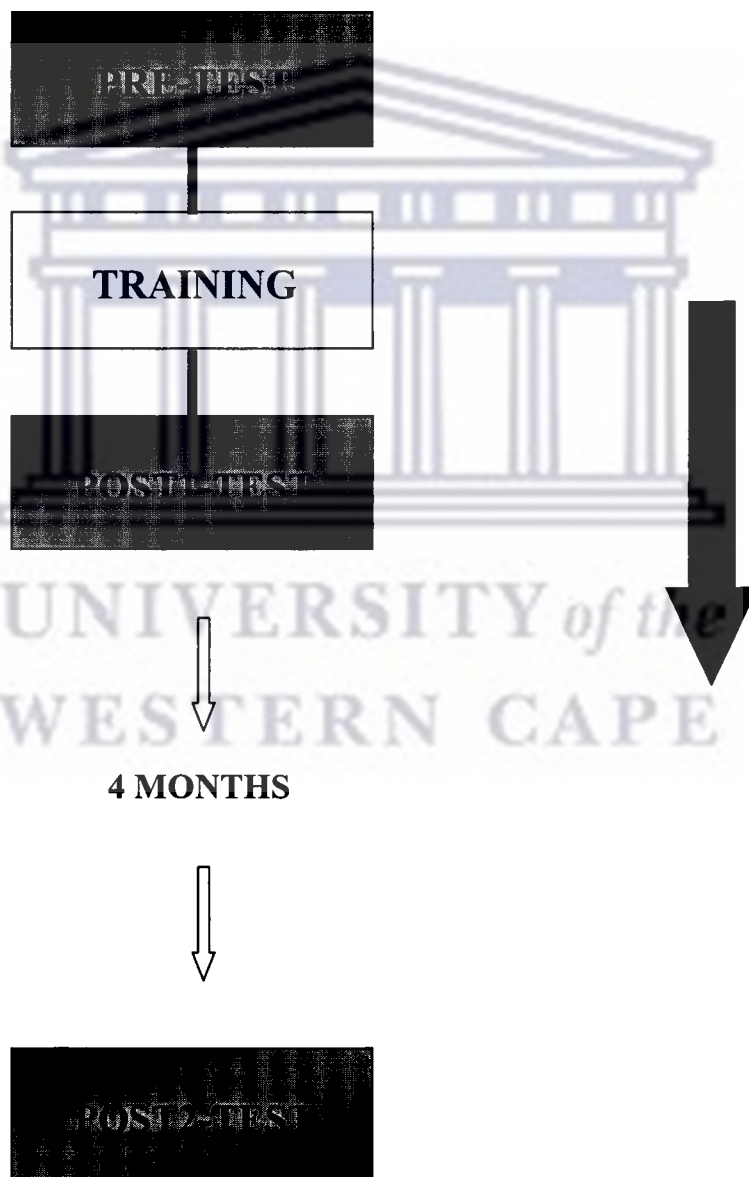
Part 1

5.1 Results extrapolated from the total original sample of PAs who were trained N=28.

Table 5.1.1: Pre-test and post1-test results extracted from questionnaires (Q1-Q25) for original Study sample (Ss) where N=28

Questions 1-25 extracted from the questionnaires	Study-Sample N=28	Study-Sample N=28
	n(%)	n(%)
	Pre	Post1
1.Gender		
Male	9 (32.1)	
Female	19 (67.9)	
2.Age		
<20years	2 (7.1)	
20-29	8 (28.6)	
30-39	11 (39.3)	
40-49	4 (14.3)	
>50	3 (10.7)	
3.Years working as assistant		
<1 year	3 (10.7)	
1-5 years	10 (35.7)	
>5years	15 (53.8)	
4.Type of Pharmacists assistant		
Post Basic PA	4 (14.3)	
Post basic PA (learner)	2 (7.1)	
Basic PA	2 (7.1)	
Basic PA (learner)	3 (10.7)	
Unregistered PA	12 (42.3)	
Other	5 (17.9)	

5. When someone asks you for a cough medicine, do you ask the consumer about their cough?		
Always	27 (96.4)	
Sometimes	1 (3.6)	
Never		
6.Identify a dry cough		
Could	28 (100)	28 (100)
Could not	0 (0)	0 (0)
7.Identify a wet cough		
Could	25 (89.3)	28 (100)
Could not	3 (10.7)	0 (0)

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8.All coughs should be treated with medication		
Always	22 (78.6)	6 (21.4)
Sometimes	5 (17.9)	21 (75.0)
Never	0 (0)	1 (3.6)
9. What is Tuberculosis?		
Infectious disease caused by bacteria in lungs	24 (85.7)	24 (85.7)
1 incorrect	4 (14.3)	3 (10.7)
2 incorrect		1 (3.6)
10.Signs and Symptoms of TB		
9 correct	7 (25.0)	13 (46.4)
8 correct	5 (17.9)	14 (50.0)
7 correct	5 (17.9)	0 (0)
<7 correct	11 (39.3)	1 (3.6)
11.Risk factors to contracting TB		
2 correct	15 (53.5)	24 (85.7)
1 correct	11 (39.3)	1 (3.6)
0 incorrect	13 (46.4)	14 (50.0)
1 incorrect	8 (33.3)	10 (35.7)
2 incorrect	5 (17.9)	3 (10.7)
3 incorrect	2 (7.1)	1 (3.6)
12. How is TB spread?		
1 correct	24 (85.7)	26 (92.9)
2 correct		
0 incorrect		
1 incorrect	16 (57.1)	13 (46.4)
2 incorrect	3 (10.7)	2 (7.1)
3 incorrect	1 (3.6)	1 (3.6)
13. Identify Early and Late symptoms		
9 correct	1 (3.6)	6 (21.4)
8 correct	0 (0)	5 (17.9)
7 correct	1 (3.6)	6 (21.4)
<7 correct	26 (92.9)	11 (39.3)
0 incorrect	10 (35.7)	12 (42.3)
1 incorrect	4 (14.3)	9 (32.1)
2 incorrect	5 (17.9)	4 (14.3)
3 incorrect	5 (17.9)	2 (7.1)
>3 incorrect	4 (14.3)	1 (3.6)
14a.Connection between HIV and TB		
Yes	21 (75.0)	27 (96.4)
No	3 (10.7)	0 (0)
Don't know	4 (14.3)	1 (3.6)
14b.Identified the connection between HIV and TB		
Correct	16 (57.1)	22 (78.6)
Incorrect	5 (17.9)	5 (17.9)

15.Have you personally come into contact with someone who had/has TB		
Yes	14 (50.0)	
No	7 (25.0)	
Don't know	7 (25.0)	
16. Do you think TB can be cured?		
Yes	25 (89.3)	28 (100)
No	0 (0)	
I don't know	3 (10.7)	
17. Could Identify TB treatment?		
0 correct	6 (21.4)	1 (3.6)
1 correct	22 (78.6)	27 (96.4)
0 incorrect	22 (78.6)	22 (78.6)
1 incorrect	6 (21.4)	5 (17.9)
2 incorrect		1 (3.6)
18.What is MDR-TB		
2 correct	6 (21.4)	20(71.4)
1 correct	13 (46.4)	5 (17.9)
0 incorrect	23 (82.1)	24 (85.7)
1 incorrect	5 (17.9)	4 (14.3)
2 incorrect		
19.What causes MDR-TB		
Correct	16 (57.1)	23 (82.1)
Incorrect	12 (42.3)	5 (17.9)
20.What is XDR-TB		
Correct	15 (53.8)	27 (96.4)
Incorrect	13 (46.4)	1 (3.6)
21. ID the nearest TB clinic to the pharmacy		
Knew	15 (53.8)	27 (96.4)
Did not know	13 (46.4)	1 (3.6)
22.Why do you need to refer a person with TB symptoms to a clinic		
0 correct	4 (14.3)	3 (10.7)
1 correct	24 (85.7)	25 (89.3)
1 incorrect	1 (3.6)	1 (3.6)
2 incorrect	2 (7.1)	3 (10.7)
>2 incorrect	24 (85.7)	24 (85.7)
23.Refer TB suspects to		
Pharmacist	3 (10.7)	0 (0)
Doctor	3 (10.7)	0 (0)
TB clinic	11 (39.3)	26 (92.9)
Treat them yourself		
Give more cough medicine		
Other (more than one)	11 (39.3)	2 (7.1)

24.Most accurate tool(s) for TB diagnosis		
Correct	25 (89.3)	28 (100)
0 incorrect	16 (57.1)	17 (68.0)
1 incorrect	8 (28.6)	7 (25.0)
2 incorrect	4 (14.3)	4 (14.3)
3 incorrect		
25. No. referrals to a TB clinic in past month		
None	12 (42.3)	
1-4	11 (39.3)	
6-10	1 (3.6)	
>10	1 (3.6)	
Never referred anyone	3 (10.7)	

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Table 5.1.2: Test scores indicating knowledge for pre-test and post1-test questionnaire N=28

TEST SCORES AND PERCENTAGES						
N	PRE	POST1	MAX SCORE	PRE%	POST1%	MEAN DIFF
1	17	30	37	45.9	81.1	35.1
2	8	19	37	21.6	51.4	29.7
3	22	23	37	59.5	62.2	2.7
4	17	16	37	45.9	43.2	-2.7
5	14	23	37	37.8	62.2	24.3
6	24	22	37	64.9	59.5	-5.4
7	19	25	37	51.4	67.6	16.2
8	17	14	37	45.9	37.8	-8.1
9	3	8	37	8.1	21.6	13.5
10	12	25	37	32.4	67.6	35.1
11	12	23	37	32.4	62.2	29.7
12	9	26	37	24.3	70.3	45.9
13	5	18	37	13.5	48.6	35.1
14	10	20	37	27.0	54.1	27.0
15	15	25	37	40.5	67.6	27.0
16	20	25	37	54.1	67.6	13.5
17	11	23	37	29.7	62.2	32.4
18	20	25	37	54.1	67.6	13.5
19	21	28	37	56.8	75.7	18.9
20	19	31	37	51.4	83.8	32.4
21	15	26	37	40.5	70.3	29.7
22	10	20	37	27.0	54.1	27.0
23	11	23	37	29.7	62.2	32.4
24	3	31	37	8.1	83.8	75.7
25	19	31	37	51.4	83.8	32.4
26	12	24	37	32.4	64.9	32.4
27	18	26	37	48.6	70.3	21.6
28	12	18	37	32.4	48.6	16.2
			MEAN SUM	1067.6	1751.4	683.8
			MEAN %	38.1	62.5	24.4

5.2 Results extrapolated from the total original sample of PAs who were trained and completed the pre-test, post1-test and post2-test questionnaires N=15.

Table 5.2.1: Pre-test, post1-test and post2-test results for the original study sample (N=15)

Questions 1-25 extracted from the questionnaires	Study-Sample N=15	Study-Sample N=15	Study-Sample N=15
	n(%)	n(%)	n(%)
	Pre	Post1	Post2
1.Gender			
Male	7 (46.7)		
Female	8 (53.3)		
2.Age			
<20years			
20-29	4 (26.7)		
30-39	6 (40.0)		
40-49	4 (26.7)		
>50	1 (6.7)		
3.Years working as assistant			
<1 year	1 (6.7)		
1-5 years	6 (40.0)		
>5years	8 (53.3)		
4.Type of Pharmacists assistant			
Post Basic PA	3 (20.0)		
Post basic PA (learner)	1 (6.7)		
Basic PA	1 (6.7)		
Basic PA (learner)	0 (0)		
Unregistered PA	8 (53.3)		
Other	2 (13.3)		

5. When someone asks you for a cough medicine, do you ask the consumer about their cough?			
Always	14 (93.3)		14 (93.3)
Sometimes	1 (6.7)		1 (6.7)
Never			
6.Identify a dry cough			
Could	15(100.0)	15(100.0)	13 (86.7)
Could not	0 (0)	0 (0)	2 (13.3)
7.Identify a wet cough			
Could	12 (80.0)	15(100.0)	15(100.0)
Could not	3 (20.0)		

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8.All coughs should be treated with medication			
Always	12 (80.0)	3 (20.0)	6 (40.0)
Sometimes	3 (20.0)	11 (73.3)	9 (60.0)
Never		1 (6.7)	
9.What is Tuberculosis?			
Infectious disease caused by bacteria in lungs	13 (86.7)	11 (73.3)	13 (86.7)
1 incorrect	2 (13.3)	4 (26.7)	2 (13.3)
2 incorrect			
10.Signs and Symptoms of TB			
9 correct	4 (26.7)	6 (40.0)	5 (33.3)
8 correct	2 (13.3)	9 (60.0)	7 (46.7)
7 correct	3 (20.0)		2 (13.3)
<7 correct	6 (40.0)		1 (6.7)
11.Risk factors to contracting TB			
2 correct	9 (60.0)	14 (93.3)	8 (53.3)
1 correct	6 (40.0)	1 (6.7)	7 (46.7)
0 incorrect	7 (46.7)	0 (0)	7 (46.7)
1 incorrect	4 (26.7)	3 (20.0)	2 (13.3)
2 incorrect	3 (20.0)	3 (20.0)	4 (26.7)
3 incorrect	1 (6.7)	0 (0)	2 (13.3)
12. How is TB spread?			
1 correct	13 (86.7)	13 (86.7)	15(100.0)
2 correct	0 (0)	0 (0)	0 (0)
0 incorrect	5 (33.3)	2 (13.3)	7 (46.7)
1 incorrect	8 (53.3)	7 (46.7)	5 (33.3)
2 incorrect	2 (13.3)	1 (6.7)	3 (20.0)
3 incorrect	0 (0)	1 (6.7)	0 (0)
13. Identify Early and Late symptoms			
9 correct	0 (0)	3 (20.0)	2 (13.3)
8 correct	0 (0)	3 (20.0)	4 (26.7)
7 correct	1 (6.7)	5 (33.3)	4 (26.7)
<7 correct	14 (93.3)	4 (26.7)	5 (33.3)
0 incorrect	5 (33.3)	6 (40.0)	2 (13.3)
1 incorrect	4 (26.7)	5 (33.3)	2 (13.3)
2 incorrect	3 (20.0)	4 (26.7)	4 (26.7)
3 incorrect	2 (13.3)	0 (0)	3 (20.0)
>3 incorrect	1 (6.7)	0 (0)	4 (26.7)
14a.Connection between HIV and TB			
Yes	12 (80.0)	15(100.0)	14 (93.3)
No	0 (0)	0 (0)	1 (6.7)
Don't know	3 (20.0)	0 (0)	0 (0)
14b.Identified the connection between HIV and TB			
Correct	10 (66.7)	12 (80.0)	8 (53.3)
Incorrect	2 (13.3)	3 (20.0)	6 (40.0)

15.Have you personally come into contact with someone who had/has TB			
Yes	6 (40.0)	9 (60.0)	12 (80.0)
No	4 (26.7)	2 (13.3)	2 (13.3)
Don't know	5 (33.3)	4 (26.7)	1 (6.7)
16. Do you think TB can be cured?			
Yes	13 (86.7)	15(100.0)	15(100.0)
No	0 (0)	0 (0)	0 (0)
I don't know	2 (13.3)	0 (0)	0 (0)
17. Could Identify TB treatment?			
0 correct	3 (20.0)	0 (0)	1 (6.7)
1 correct	12 (80.0)	15(100.0)	14 (93.3)
0 incorrect	12 (80.0)	13 (86.7)	9 (60.0)
1 incorrect	3 (20.0)	1 (6.7)	6 (40.0)
2 incorrect		1 (6.7)	
18.What is MDR-TB			
2 correct	2 (13.3)	12 (80.0)	11 (73.3)
1 correct	8 (53.3)	3 (20.0)	3 (20.0)
0 incorrect	13 (86.7)	13 (86.7)	14 (93.3)
1 incorrect	2 (13.3)	2 (13.3)	1 (6.7)
2 incorrect			
19.What causes MDR-TB			
Correct	9 (60.0)	13 (86.7)	12 (80.0)
Incorrect	6 (40.0)	2 (13.3)	3 (20.0)
20.What is XDR-TB			
Correct	2 (13.3)	12 (80.0)	10 (66.7)
Incorrect	13 (86.7)	3 (20.0)	5 (33.3)
21.ID the nearest TB clinic to the pharmacy			
Knew	7 (46.7)	15(100.0)	15(100.0)
Did not know	8 (53.3)		
22.Why do you need to refer a person with TB symptoms to a clinic			
0 correct	1 (6.7)		
1 correct	14 (93.3)	15(100.0)	15(100.0)
1 incorrect			
2 incorrect		1 (6.7)	
>3 incorrect	14 (93.3)	14 (93.3)	15(100.0)
23.Refer TB suspects to			
Pharmacist	1 (6.7)		
Doctor	2 (13.3)		
TB clinic	5 (33.3)	14 (93.3)	12 (80.0)
Treat them yourself			
Give more cough medicine			
Other	7 (46.7)	1 (6.7)	3 (20.0)

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24.Most accurate tool(s) for TB diagnosis			
Correct	13 (86.7)	15(100.0)	15(100.0)
0 incorrect	10 (66.7)	8 (53.3)	12 (80.0)
1 incorrect	4 (26.7)	5 (33.3)	1 (6.7)
2 incorrect	1 (6.7)	2 (13.3)	1 (6.7)
3 incorrect			1 (6.7)
25. No. referrals to a TB clinic in past month			
None	6 (40.0)		6 (40.0)
1-4	7 (46.7)		7 (46.7)
6-10			
>10			
Never referred anyone	2 (13.3)		2 (13.3)

Table 5.2.2: Knowledge scores for Study sample N=15

	TOTAL			MAX SCORE	PRE	POST1	POST2	DIFF POST1-PRE	DIFF POST2-POST1	DIFF POST2 PRE
	PRE	POST1	POST2							
1	17	30	20	37	45.9	81.1	54.1	35.1	-27.0	8.1
2	22	23	21	37	59.5	62.2	56.8	2.7	-5.4	-2.7
3	17	16	25	37	45.9	43.2	67.6	-2.7	24.3	21.6
4	14	23	14	37	37.8	62.2	37.8	24.3	-24.3	0.0
5	19	25	18	37	51.4	67.6	48.6	16.2	-18.9	-2.7
6	12	23	16	37	32.4	62.2	43.2	29.7	-18.9	10.8
7	9	26	20	37	24.3	70.3	54.1	45.9	-16.2	29.7
8	15	25	16	37	40.5	67.6	43.2	27.0	-24.3	2.7
9	11	23	23	37	29.7	62.2	62.2	32.4	0.0	32.4
10	20	25	21	37	54.1	67.6	56.8	13.5	-10.8	2.7
11	21	28	27	37	56.8	75.7	73.0	18.9	-2.7	16.2
12	15	26	18	37	40.5	70.3	48.6	29.7	-21.6	8.1
13	10	20	20	37	27.0	54.1	54.1	27.0	0.0	27.0
14	11	23	18	37	29.7	62.2	48.6	32.4	-13.5	18.9
15	3	31	24	37	8.1	83.8	64.9	75.7	-18.9	56.8
				MEAN SUM	583.8	991.9	813.6	407.8	-178.2	229.6
				MEAN %	38.9	66.13	54.2	27.2	-11.9	15.3

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Questions 1-4 were used to capture the demographics of the group i.e. Gender, Age, length of time of occupation, level of education. This would help to describe the level of education and confounding factors. In Tables 5.1.1 and 5.1.2 where N=28 the largest proportion (53.8%)of participants were in the age range of 30-39 and had been working as PAs for more than 5 years and are unregistered PAs, i.e. front shop assistants. This would indicate a sufficient amount of experience within a pharmacy environment.

Only 15 participants from the original study sample where able to complete post2-test questionnaires (The reasons for which will be discussed further on in the thesis). The final demographics for N=15 was 46.7% male and 53.3% female. The largest proportion of participants was still in the age range of 30-39years (40.0) and the majority (53.3%) of the participants had been working as assistants for >5years. The majority of PA's (53.3%) are unregistered i.e. front shop assistants. Despite the loss of participants from the post1-test to post2-test, the group demographics are not different from the original sample.

Questions 5-8 evaluate knowledge, behaviour and perceptions of coughs. 96% of participants answered that they always ask the client about their cough. All PA's could identify a dry cough before and after training, but only 89.3% correctly identified a wet cough before the workshop. This had increased to 100% after the workshop. Initially 78.6% thought that coughs should always be treated with medication and after the workshop this had decreased to 21.4%, indicating a change in their perceptions. There was an increase in their attitudes from 17.9 - 75.0% who thought that not all coughs should be treated with medication.

For N=15 Question 5, 93.3% (both pre-test and post2-test) answered that they always enquire further about a cough. For question 6 there was a decrease in knowledge regarding identification of a dry cough from the pre-test to the post1-test questionnaire (100%) to 86.7. In contrast, more PAs could identify a wet cough from pre-test to post1-test and this knowledge was sustained.

Before the workshop 80% of respondents thought that coughs should always be treated with medication, but this number had decreased after the workshop. After

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the workshop 73.3% had agreed that medicine is only necessary sometimes. This had decreased to 60% 4 months later.

Questions 9-24 evaluated the knowledge around Tuberculosis.

For Question 9, 86.7% knew that TB was caused by bacteria in the lungs. This had decreased to 73.3% after the workshop, but had again increased to 86.7% later. Before the workshop only 40% had identified at least 8 Signs and symptoms of TB (Question 10); after the workshop, all (100%) could identify at least 8 signs and symptoms. This had decreased to 80% later, but was still above their original knowledge, indicating that the knowledge acquired had been sustained. Question 11 referred to their ability to identify the risk factors to contracting TB. Before the study, only 60% could identify both smoking and HIV as risk factors, after the study 93.3% had identified both, although this had decreased to 53% in the post2-test, it was consistent with the results prior to the workshop when all could identify at least 1 risk factor.

In Question 12 Knowledge before and after the intervention remained constant, but had later increased to a point where everybody knew that coughing and sneezing could spread TB. No-one included how this would spread TB. This was needed to earn the 2 marks allocated to that score (i.e. inhaling infected droplets). There seemed to be no consensus with this question because the results point out that a number of the incorrect answers were chosen as well (may be an indication as to their level of confidence or the ability to answer using their own acumen)

Question 13 tested their ability to identify the phase (early or late) of TB. Before the training, only 6.7% of the participants could correctly identify and distinguish between at least 7 symptoms. After the workshop this had increased to 73.3% indicative of a gain in knowledge. This is further supported by the fact that none had more than 3 incorrect options. The Post2-test revealed a decline to 66.7% who correctly identified and distinguished between at least 7 symptoms. This indicates that some knowledge from the training was sustained.

Question 14 was broken down into two parts. 14a tested whether the assistants knew that there was a link between HIV and TB. There was in increase from 80% to 100% for those who agreed that there was a connection between the two. This decreased to 93.3% later, but was still higher than their knowledge before the workshop. 14b examined whether those who had agreed that there was a link between HIV and TB could correctly make that connection, i.e. HIV positive individuals are more at risk to contracting TB. Before the study only 66.7% answered correctly. This increased to 80% after workshop. This knowledge had then decreased to 53.3% which was below the original knowledge. It is possible to explain this phenomenon by making the assumption that in the pre-test many of them had guessed the correct answer. This decrease explains that although the PAs had a decreased knowledge in making that link between HIV and TB, they still knew that there definitely was a link and perhaps couldn't remember the exact connection.

Question 15 measured Personal contact with TB (which may influence knowledge). The results indicated that 50% of the participants had come into contact with TB infected individuals. If they had personally come into contact with TB infected individuals this was recorded as 1 on the data sheet (APPENDIX XI) and paired with their test scores. The pre-test and post1-test scores revealed that this contact had no effect on knowledge.

Before the workshop, only 86.7% thought that TB could be cured. This had increased to 100% immediately after the workshop and remained unchanged 4 months later. This indicates that the workshop has led to a greater awareness that TB is a curable disease.

Question 17 referred to the knowledge around TB treatment. The knowledge around TB treatment had increased immediately after the workshop, but had decreased in the post-post questionnaire. This decrease in knowledge did not drop below the original knowledge, indicative of partial retention. Before the study only 13% had knowledge of what MDR-TB was (Question 18). This had

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increased to 80% after the workshop, and had later dropped to 73.3% indicating a major increase in knowledge after the workshop and good retention.

Question 19 evaluated knowledge of what causes MDR-TB. There was a 26.7% increase in the knowledge of what causes MDR-TB after the workshop, but a 6.7% decrease later. This indicates that there was a great amount of knowledge gained in this regard and although there was a slight decrease from the post knowledge, the difference from the pre-test knowledge was still very high.

Question 20 evaluates the knowledge about XDR-TB. There was an increase in knowledge of XDR-TB from 13.3 to 80% and a slight decline in knowledge to 66.7% 4 months later.

Only 46.7% of the PAs knew where the nearest TB-clinic to their pharmacy was. After the workshop everyone knew where it was and this was maintained after the workshop as well.

Question 22 was formulated to ascertain the reason for referring TB suspects to TB clinics. This question was not answered very well. This could be attributed to the individuals' interpretation thereof. Although the correct answer was that people need to be referred in order to attain a diagnosis, It is suspected that the PAs misinterpreted the question and supplied the outcome should the person not be referred, instead of answering what the main purpose of referral would be.

Question 23 evaluated the PAs referral practices.

From the pre- test, 6.7% reported that they refer their clients to the pharmacist, 13.3% to a doctor, 33.3% to a TB clinic and an alarming 46.7% would merely supply their client with more medicine. Immediately after the workshop, 93.3% said that they should in fact refer clients to a TB-clinic; this had later decreased to 80% in the post2-test. This is indicative that the PAs were now aware of the relevance of referring clients to TB clinics, rather than to a doctor or pharmacist, to prevent delays in diagnosis.

Question 24 tested whether they knew the most accurate tool for a TB diagnosis. There was an increase in knowledge to the point where everyone knew that a

sputum test is the most accurate tool for diagnosing TB, however, there were still high numbers of other incorrect answers supplied. When looking further into the results and re-evaluating the questionnaires, it was found that among those incorrect answers were X-Ray as well as symptom recognition by taking a history. While these methods are used, they did not answer the question accurately i.e. which was the MOST accurate tool. 4 months later, 100% identified a sputum test as the most accurate tool for diagnosing TB and only 3 of PAs had identified incorrect tools in addition to the correct one.

Question 25 evaluated how many PAs were actually referring TB suspects including the number of suspects they had identified and referred. The results remained the same for the pre-test and post2-test study. This indicated that there are PAs who are seeing possible TB suspects since almost half of them (46.7%) said that they had referred 1-4 TB suspects. The actual behaviours of the PAs with respect to their methods of referring clients and utilizing the referral procedures learnt will be discussed further in the discussion section of the thesis.

The results further indicate that for N=28 the score difference between the post1-test and pre-test were significant $p<0.05$. Thus the training produced a significant increase in knowledge (Table 5.1.2). For N=15, the analysis of data indicated significant differences between pre-test, post1-test and post2-test results. The trend in the results showed an increase in knowledge from pre-test to post1-test (mean 27.2%). The results indicated a decrease in knowledge from post1-test to post2-test of 11.9%. This decrease however, did not decline below the pre-test knowledge of the sample showing a mean difference of 15.3%. This implies that some of the knowledge gained from training was retained; the statistical analysis indicates that this difference is significant.

Part 2
This was a supplementary study which was a more intense and concise approach, using a sample of 3 pharmacies in which all the front shop staff were trained and evaluated.

5.3 Results extrapolated from the supplementary study sample who were trained in their respective pharmacies N=12

Table 5.3.1: Pre-test and post-test results extracted from questionnaires (Q1-Q25) for original Study sample (Ss) where N=12

Questions 1-25 extracted from the questionnaires	Study-Sample N=12	Study-Sample N=12
	n(%)	n(%)
	Pre	Post1
1.Gender		
Male	4(33.3)	
Female	8 (66.7)	
2.Age		
<20years	1 (8.3)	
20-29	8 (66.7)	
30-39	1 (8.3)	
40-49	2 (16.6)	
>50	0 (0)	
3.Years working as assistant		
<1 year	4(33.3)	
1-5 years	6 (50.0)	
>5years	2(16.6)	
4.Type of Pharmacists assistant		
Post Basic PA	1 (8.3)	
Post basic PA (learner)	1 (8.3)	
Basic PA	1 (8.3)	
Basic PA (learner)	6	
Unregistered PA	3 (25.0)	
Other		
5. When someone asks you for a cough medicine, do you ask the consumer about their cough?		
Always	9(75.0)	
Sometimes	3 (25.0)	
Never	0 (0)	
6.Identify a dry cough		
Could	12 (100.0)	12 (100.0)
Could not		
7.Identify a wet cough		
Could	12(100.0)	12(100.0)
Could not		

8.All coughs should be treated with medication		
Always	7 (58.3)	7(58.3)
Sometimes	5 (41.7)	5(41.7)
Never		
9.What is Tuberculosis?		
Infectious disease caused by bacteria	12(100.0)	12(100.0)
1 incorrect		
2 incorrect		
10.Signs and Symptoms of TB		
9 correct	0 (0)	5(41.7)
8 correct	2 (16.7)	3 (25.0)
7 correct	1 (8.3)	3 (25.0)
<7 correct	9(75.0)	1 (8.3)
11.Risk factors to contracting TB		
2 correct	2(16.6)	6(50.0)
1 correct	7(58.3)	4 (33.3)
0 incorrect	7(58.3)	6(50.0)
1 incorrect	5(41.7)	6(50.0)
2 incorrect	0 (0)	0 (0)
3 incorrect	0 (0)	0 (0)
12. How is TB spread?		
1 correct	6(50.0)	10 (83.3)
2 correct	0 (0)	0 (0)
0 incorrect	3(25.0)	7(58.3)
1 incorrect	8 (66.7)	4 (33.3)
2 incorrect	1 (8.3)	1 (8.3)
3 incorrect		
13. Identify Early and Late symptoms		
9 correct	0 (0)	3(25.0)
8 correct	0 (0)	3 (25.0)
7 correct	2 (16.7)	1 (8.3)
<7 correct	10 (0)	5(41.7)
0 incorrect	1 (8.3)	5(41.7)
1 incorrect	1(8.3)	3 (25.0)
2 incorrect	5(41.7)	1(8.3)
3 incorrect	4 (33.3)	1(8.3)
>3 incorrect	1(8.3)	2 (16.7)
14a.Connection between HIV and TB		
Yes	6(50.0)	10(83.3)
No	5(41.7)	1(8.3)
Don't know	1(8.3)	1(8.3)
14b.Identified the connection between HIV and TB		
Correct	4 (33.3)	9(75.0)
Incorrect	8 (66.7)	3 (25.0)

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15.Have you personally come into contact with someone who had/has TB		
Yes	6(50.0)	8 (66.7)
No	3 (25.0)	3 (25.0)
Don't know	3 (25.0)	1(8.3)
16. Do you think TB can be cured?		
Yes	10 (83.3)	12(100.0)
No	0 (0)	0 (0)
I don't know	2 (16.7)	0 (0)
17. Could Identify TB treatment?		
0 correct		
1 correct	12(100.0)	12(100.0)
0 incorrect	9(75.0)	10 (83.3)
1 incorrect	1(8.3)	2 (16.7)
2 incorrect	2 (16.7)	
18.What is MDR-TB		
2 correct	4 (33.3)	8 (66.7)
1 correct	3 (25.0)	1(8.3)
0 incorrect	10 (83.3)	11 (91.7)
1 incorrect	2 (16.7)	1(8.3)
2 incorrect		
19.What causes MDR-TB		
Correct	6(50.0)	8 (66.7)
Incorrect	6(50.0)	4 (33.3)
20.What is XDR-TB		
Correct	4 (33.3)	9(75.0)
Incorrect	8 (66.7)	3(25.0)
21.ID the nearest TB clinic to the pharmacy		
Knew	5(41.7)	11 (91.7)
Did not know	7(58.3)	1(8.3)
22.Why do you need to refer a person with TB symptoms to a clinic		
0 correct	3 (25.0)	6(50.0)
1 correct	9(75.0)	6(50.0)
1 incorrect	1(8.3)	2 (16.7)
2 incorrect	4 (33.3)	3 (25.0)
>3 incorrect	4 (33.3)	6(50.0)
23.Refer TB suspects to		
Pharmacist		
Doctor		
TB clinic	9 (75.0)	12(100.0)
Treat them yourself		
Give more cough medicine		
Other	3(25.0)	0 (0)

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24.Most accurate tool(s) for TB diagnosis		
Correct	5(41.7)	12(100.0)
0 incorrect	7(58.3)	7(58.3)
1 incorrect	4 (33.3)	5(41.7)
2 incorrect	0 (0)	0 (0)
3 incorrect	1(8.3)	0 (0)
25. No. referrals to a TB clinic in past month		
None	7(58.3)	7(58.3)
1-4	3 (25.0)	3 (25.0)
6-10		1(8.3)
>10		
Never referred anyone	2 (16.7)	1(8.3)

Table 5.3.2:   Knowledge scores for Study sample N=12

	TOTALS					DIFF POST1-PRE
N	PRE	POST1	MAX SCORE	PRE%	POST1%	
1	12	19	37	32.4	51.4	18.9
2	8	17	37	21.6	45.9	24.3
3	10	30	37	27.0	81.1	54.1
4	7	16	37	18.9	43.2	24.3
5	22	29	37	59.5	78.4	18.9
6	15	25	37	40.5	67.6	27.0
7	7	32	37	18.9	86.5	67.6
8	8	30	37	21.6	81.1	59.5
9	21	28	37	56.8	75.7	18.9
10	11	18	37	29.7	48.6	18.9
11	17	20	37	45.9	54.1	8.1
12	6	7	37	16.2	18.9	2.7
			SUM	389.2	732.4	343.2
			MEAN SUM%	32.4	61.0	28.6

5.4 Results extrapolated from the supplementary study sample who completed the pre-test, post1-test and post2-test questionnaires N=8

Table 5.4.1: Pre-test and post-test results extracted from questionnaires (Q1-Q25) for Study sample (Ss) where N=12

Questions 1-25 extracted from the questionnaires	Study-Sample N=8	Study-Sample N=8	Study-Sample N=8
	n(%)	n(%)	n(%)
	Pre	Post1	Post2
1.Gender			
Male	4(50.0)		
Female	4(50.0)		
2.Age			
<20years	1(12.5)		
20-29	5(62.5)		
30-39	1(12.5)		
40-49	1(12.5)		
>50			
3.Years working as assistant			
<1 year	3 (37.5)		
1-5 years	5(62.5)		
>5years			
4.Type of Pharmacists assistant			
Post Basic PA	1(12.5)		
Post basic PA (learner)			
Basic PA			
Basic PA (learner)	1(12.5)		
Unregistered PA	4(50.0)		
Other	2 (25.0)		

5. When someone asks you for a cough medicine, do you ask the consumer about their cough?			
Always	6 (75.0)		
Sometimes	2(25.0)		
Never			
6.Identify a dry cough			
Could	8 (100.0)	8 (100.0)	8 (100.0)
Could not			
7.Identify a wet cough			
Could	8(100.0)	8(100.0)	7 (87.5)
Could not			1(12.5)

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8.All coughs should be treated with medication			
Always	5(62.5)	5(62.5)	6(75.0)
Sometimes	3(37.5)	3(37.5)	2(37.5)
Never			
9.What is Tuberculosis?			
Infectious disease caused by bacteria in lungs	8(100.0)	8(100.0)	8(100.0)
1 incorrect			
2 incorrect			
10.Signs and Symptoms of TB			
9 correct	0	3(37.5)	1(12.5)
8 correct	2(25.0)	2(25.0)	1(12.5)
7 correct	1(12.5)	2(25.0)	4(50.0)
<7 correct	5(62.5)	1(12.5)	2(25.0)
11.Risk factors to contracting TB			
2 correct	1(12.5)	4(50.0)	4(50.0)
1 correct	5(62.5)	3(37.5)	3(37.5)
0 incorrect	5(62.5)	3(37.5)	6(75.0)
1 incorrect	3(37.5)	5(62.5)	1(12.5)
2 incorrect			1(12.5)
3 incorrect			
12. How is TB spread?			
1 correct	6(75.0)	8(100.0)	8(100.0)
2 correct	0	0	0
0 incorrect	2(25.0)	5(62.5)	5(62.5)
1 incorrect	5(62.5)	2(25.0)	3(37.5)
2 incorrect	1(12.5)	1(12.5)	
3 incorrect			
13. Identify Early and Late symptoms			
9 correct	0	2(25.0)	0
8 correct	0	3(37.5)	0
7 correct	2(25.0)	0	3(37.5)
<7 correct	6(75.0)	3(37.5)	5(62.5)
0 incorrect	0	3(37.5)	1(12.5)
1 incorrect	0	3(37.5)	1(12.5)
2 incorrect	3(37.5)	0	2(25.0)
3 incorrect	4(50.0)	1(12.5)	2(25.0)
>3 incorrect	1(12.5)	1(12.5)	2(25.0)
14a.Connection between HIV and TB			
Yes	5(62.5)	6(75.0)	6(75.0)
No	3(37.5)	1(12.5)	2(25.0)
Don't know		1(12.5)	
14b.Identified the connection between HIV and TB			
Correct	4(50.0)	6(75.0)	6(75.0)
Incorrect	4(50.0)	2(25.0)	2(25.0)

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15.Have you personally come into contact with someone who had/has TB			
Yes	5(62.5)	7(87.5)	8(100.0)
No	1(12.5)	1(12.5)	0
Don't know	2(25.0)	0	0
16. Do you think TB can be cured?			
Yes	6(75.0)	8(100.0)	8(100.0)
No	0	0	0
I don't know	2(25.0)	0	0
17. Could Identify TB treatment?			
0 correct			
1 correct	8(100.0)	8(100.0)	8(100.0)
0 incorrect	5(62.5)	6(75.0)	8(100.0)
1 incorrect	1(12.5)	2(25.0)	0
2 incorrect	2(25.0)		
18.What is MDR-TB			
2 correct	4(50.0)	5(62.5)	6(75.0)
1 correct	2(25.0)	1(12.5)	1(12.5)
0 incorrect	7(87.5)	7(87.5)	8(100.0)
1 incorrect	1(12.5)	1(12.5)	0
2 incorrect			
19.What causes MDR-TB			
Correct	5(62.5)	6(75.0)	5(62.5)
Incorrect	3(37.5)	2(25.0)	3(37.5)
20.What is XDR-TB			
Correct	3(37.5)	6(75.0)	4(50.0)
Incorrect	5(62.5)	2(25.0)	4(50.0)
21.ID the nearest TB clinic to the pharmacy			
Knew	3(37.5)	7(87.5)	7(87.5)
Did not know	5(62.5)	1(12.5)	1(12.5)
22.Why do you need to refer a person with TB symptoms to a clinic			
0 correct	2(25.0)	4(50.0)	1(12.5)
1 correct	6(75.0)	4(50.0)	7(87.5)
1 incorrect	1(12.5)	0	0
2 incorrect	3(37.5)	3(37.5)	4(50.0)
>3 incorrect	4(50.0)	5(62.5)	4(50.0)
23.Refer TB suspects to			
Pharmacist			1(12.5)
Doctor			
TB clinic	6(75.0)	8(100.0)	6(75.0)
Treat them yourself			
Give more cough medicine			
Other	2(25.0)		1(12.5)

24.Most accurate tool(s) for TB diagnosis			
Correct	4(50.0)	8(100.0)	6(75.0)
0 incorrect	5 (62.5)	4(50.0)	3(37.5)
1 incorrect	2(25.0)	4(50.0)	4(50.0)
2 incorrect			1(12.5)
3 incorrect	1(12.5)		
25. No. referrals to a TB clinic in past month			
None	4(50.0)		6(75.0)
1-4	2(25.0)		2(25.0)
6-10			
>10			
Never referred anyone	2(25.0)		

Table 5.4.2: Knowledge Scores for Study sample N=8

N=8	TOTAL			MAX SCORE	PRE%	POST1%	POST2%	DIFF POST1-PRE	DIFF POST2-1	DIFF POST2-PRE
	PRE	POST1	POST2							
1	12	19	19	37	32.4	51.4	51.4	18.9	0.0	18.9
2	7	16	12	37	18.9	43.2	32.4	24.3	-10.8	13.5
3	22	29	20	37	59.5	78.4	54.1	18.9	-24.3	-5.4
4	15	25	17	37	40.5	67.6	45.9	27.0	-21.6	5.4
5	7	32	20	37	18.9	86.5	54.1	67.6	-32.4	35.1
6	21	28	26	37	56.8	75.7	70.3	18.9	-5.4	13.5
7	17	20	25	37	45.9	54.1	67.6	8.1	13.5	21.6
8	6	7	15	37	16.2	18.9	40.5	2.7	21.6	24.3
				MEAN SUM	289.10	475.80	416.30	343.2	-59.5	75.7
				MEAN %	36.1	59.5	52.0	28.6	-7.4	9.5

Part 2 of the study shows a similar result to Part 1. The trend in the scores indicated an increase in knowledge from pre-test to post1-test and a decrease in the mean knowledge from post1 to post2. Statistical analysis indicated however, that the differences between these 3 factors was not significant $p>0.05$ (APPENDIX X). The possible reason for this is that the study sample was too small N=8 (Table 5.4.2). However, with the larger sample size for part 1 of the study, it was found that the training was successful and did result significant differences between pre-test, post1-test and post2-test.

5.5 Statistical data analysis of scores for Part 1 and Part 2 (APPENDIX X)

For Part 1 of the study, a paired T-test was conducted to compare pre-test with post1-test. The results for Paired Samples Statistics indicated that for N=28, the mean score for pre-test was 14.1 with a standard deviation of 5.6 and the mean score for the post1-test was 23.1 with a standard deviation of 5.2. This indicated an increase in the mean score average for the sample. A Paired Samples Test showing a 2-tailed analysis was then conducted. This revealed that the differences between the pre-test and post test was significant $(p<0.05)$. ANOVA looked at the difference in scores between groups and within the groups. This was also indicated that there were significant differences in scores $(p<0.05)$. For sample N=15 Scheffe was used to give multiple comparisons between pre-test, post1-test and post2-test. The mean difference between post1-test and pre-test was 10.1. This indicated that there was an overall increase in mean knowledge from the pre-test to post1-test. This difference was significant with a p-value = 0.000. The difference between post1-test and post2-test was 4.4. This indicated a mean decrease in knowledge from the post1-test to post2-test. This difference was significant with a p-value = 0.024. The difference between the post2-test and post 1 test was -4.4. This indicates a decrease in the mean difference with a p-value = 0.024. The above mean differences between pre-test, post1-test and post2-test knowledge indicating an increase from the pre-test to post1-test and the decrease in knowledge from the post1-test to post2-test were all thus significant $(p<0.05)$.

5.6   Testing Hypothesis

TB training showed to have an effect on knowledge of pharmacists' assistants before and after training. This result was significant. The Null hypothesis is thus rejected and the Alternative Hypothesis is accepted. TB training will thus have an effect on the knowledge of pharmacists' assistants after training.

The increase in knowledge from TB training did not increase the referral rates of patients to TB clinics from community pharmacies. The alternative hypothesis is thus rejected and the Null hypothesis is accepted. Thus the knowledge from TB training did not increase referral rates of patients to TB clinics.

5.7   Referrals

The study found that only 1 pharmacists' assistant referred patients to the TB clinic using the referral method learnt. Only two patients were referred. The patients did not attend the clinics to which they were referred. This will be discussed further.

5.6   Summary of Main findings

The findings of note in this study are summarised as follows:

- PAs were poorly knowledgeable about TB (mean score 38.1%) prior to the intervention. This was enhanced significantly after the training, which revealed a mean score increase to 62.5% (score difference 24.4%).

- Only 15 PAs from the original 28 participated in the Post-post questionnaire despite various efforts to communicate. This group had to be evaluated separately to indicate scores across the sample. The mean score prior to the intervention was 38.9% and 66.1% after (mean difference of 27.23%). The post2-test questionnaire revealed a decrease in knowledge (mean sum 54.2%) from the post questionnaire (mean difference 11.9%); however, it still remained higher than the pre-test questionnaire (mean difference 15.3%). This indicated that the PAs had not sustained all their knowledge gained from the workshop, but had not lost all that had been learned.

- Similarly, in Part 2 of the study, there was an increase in the mean score from 32.4% to 61.0% (mean score difference 28.6%).
- Part1 of the study showed significant differences between the pre-test, post1-test and post2-test.
- Part2 of the study indicated an insignificant difference between the pre-test, post1-test and post2-test. This is attributed to the small sample size.

CHAPTER 6

DISCUSSION

This chapter contextualises the findings of the study and discusses the most salient points which arose. In order to understand the nature of the sample groups, certain issues have been surfaced in this chapter. It orientates future researchers about the issues which arose, so that future prospects of similar studies will be conducted with a better understanding of the context in which such a study can be conducted. Due to the nature of the study, many issues arose after the implementation of the referral system, in particular the juxtaposition between knowledge and behavioural practices. The main findings will be discussed in this section while making reference to the findings of other similar studies.

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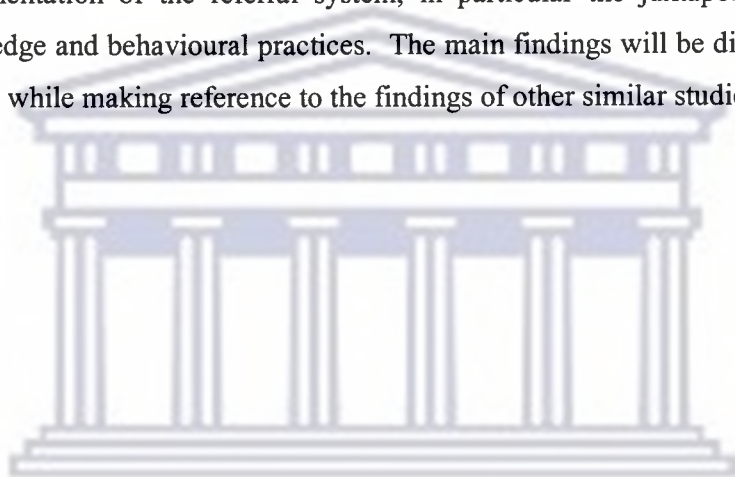
6.1 Knowledge and behavioural practices of the sample

The results from the study are comparable with those of previous studies. With regard to the study by Lönnroth *et al.,* (2003), their finding was that a low percentage of participants (37.4%) mentioned smear only as the best diagnostic test for pulmonary TB, which is comparable with the results of this study. Only 12.2% recommended a private physician as a referral site and 43.5% knew about the District TB Unit in the district where the pharmacy was situated.

Similarly, in this study, the pre-knowledge around referrals indicated that most PAs referred clients to a combination of a doctor and pharmacist (39.3%), 10.7% referred to a doctor only and 10.7% would refer to the pharmacist. Post1-questionnaire indicated that 100% of the PAs thought that the correct practice of referring TB suspects would have to be to a TB-clinic (refer to Table 5.1.1). This was similarly indicated in Table 1.2.1. The behaviour had changed and had declined to 80% who after the training used TB clinics as referral sites. The pre-test knowledge showed only 86.7% knew that a sputum test was the most accurate tool to obtain a TB diagnosis. This had increased to 100% for both post1-test and post2-test. The post2-test data indicated that there had been an increase in the knowledge in this regard because the number of participants who indicated sputum test as the only option had increased from post1 (53.3%) to post2 (80.0%). The results thus show that knowledge has not equated to behavioural practices in this regard.

An article by Siddiqi (Siddiqi *et al.,* 2005) addressed the success of interventions in mental care in the public sector acknowledged that appropriate training needs to be combined with continued supervision and support to achieve an effective outcome. According to Siddiqi *et al.* (2005), the effectiveness of interventions to change health professionals' behavior and practices should be a priority area for researchers and international agencies supporting health system development in developing countries.

6.1.1 Reading capacity/acumen

It was found that the majority of the participants were front shop assistants. This implies that majority of the staffs' level of education did not exceed matriculation

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or their training in pharmacy had not been formalized. This may be an indication of the level of confidence in behaviour of staff with regard to their referral practices. Two of the participants were purely Afrikaans speaking with a slight understanding of English; however, they were aided in the translation of the questionnaire and training to facilitate their understanding. Many of the participants answered question 5 by only circling the answer which they thought was correct. They were in fact required to elaborate and state that TB is spread through the inhalation of infected TB droplets which was taught in the training. During the pilot study, none of the respondents had misinterpreted this question, or had difficulties of any sort with it. This again links to the lack of confidence of the participants to take the initiative by elaborating on their answers. It should be noted that none of the questionnaires were filled out in the options that were written "other".

6.2 Documentation/ lack thereof in pharmacies

The study found that of all the participants in both Part 1 and Part 2 only 1 participant had utilized the referral method which had been learned in the training and had recorded in and returned the TB suspect register. This failure to document and track within community retail pharmacy setting requires further investigation in order to develop an accurate and functional referral system. The participants in Part 2 of the study, were then asked to give reasons why they had not utilised the referral methods that had been learned. The responses were as follows:

- "Clients did not present with a cough for more than 2 weeks in the 4 month period"
- "It takes too long to fill out the TB suspect register"
- "Patients don't want to stay in the pharmacy for too long and just want to get in and out of the pharmacy as quickly as possible"
- "When patients presented to the pharmacy, it was quicker to refer them verbally"
- "Busy days mean more sales, and so we couldn't afford to lose the sale by taking the time to fill out the TB suspect register, especially when considering the financial difficulties we are currently facing".

Bearing in mind the abovementioned, a few articles which addressed the issue of documentation in pharmacies were consulted. Research regarding documentation around referrals in pharmacies is limited. From the findings of the study, it may be assumed that the PAs resumed their previous roles in the pharmacy and did not utilize the referral procedures learnt. An attributing factor to this may be a force of habit. The reasons for which may include the levels of confidence and knowledge. Since they went back and referred clients verbally, it thus resulted in lack of documentation. This issue of documentation is an aspect that further research will need to investigate.

6.2.1 Training

In this study, the training with regard to knowledge imparted was successful. It is unfortunate, however that this could not be applied in practice. It is also recommended that the aspect of equating knowledge to behavioural practices in pharmacies is investigated and applied.

In order for an intervention to be successful there needs to be involvement of the pharmacist. Although pharmacy assistants can play a pivotal role, if there is no support with regard to the pharmacists knowledge and confidence with regard to their own involvement in national programmes such as TB, the chance of success of an intervention of this nature are diminished.

The most important point is that in order to perform the roles required for the success of a collaborative effort in national TB programmes, pharmacists themselves will require training to ensure that they are proficient enough in recognising symptoms of TB as well as side effects of TB medications, diagnosis and treatment of TB and are in fact familiar with the wider Government programmes and relevant guidelines. The FIP have recommended that the various pharmacy associations in different countries - especially those with a high burden of TB - should take a lead in collaborating with Government TB authorities and organise training programmes to motivate pharmacists for this socio-professional activity. Positive experiences in Mumbai and London indicated that there is great

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potential for pharmacist roles and, if integrated into TB control programmes, could make a significant contribution to achieving the millennium development goals for TB control.

6.2.2   Recruitment

Regardless of the various approaches utilized to recruit participants, the final study sample was still relatively small. If this was perhaps a compulsory study ordered by the South African Pharmacy Council, it may have influenced the participation rate and thus have increased it. This would be a recommendation for future studies in this field. Similarly, the study by Lönnroth *et al.* (2003) showed a decline of 40% in their targeted participating pharmacies.

6.3   Movement of participants

The movement of particularly the front shop staff was very high. This can be seen from both Part 1 and Part 2 of the study with a decline in the sample size from N=28 to N=15, and N=12 to N=8 respectively. The ability of pharmacists to retain their front shop staff is another aspect which future studies may have to investigate. It was found that many front shop staff had left the pharmacies in which they had worked, to seek opportunities at other pharmacies or other places of employment. Given the current economic situation, it is not unusual for people to seek higher paying jobs or better opportunities.

6.4   Decline in Sample size

It was expected that some pharmacists would not send their staff to the workshop due to limited front shop staff, busy pharmacies or a simple change of mind. In an attempt to minimize this issue over sampling was applied. This did not resolve the issue, and the numbers of PAs attending the workshop diminished in size as originally projected. The numbers of those who attended was only 25% of the expected amount. This is explained as one of the limitations of the study. Due to this experience it was a conscious choice to conduct telephonic follow-ups to prevent any further decline in sample size in an attempt to increase the response rate.

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6.5 Health seeking behaviour of patients with Pulmonary TB

6.5.1 Delay in TB diagnosis

The time from which a patient starts presenting with symptoms up until the time at which they are diagnosed with TB, is termed a delay in TB diagnosis. This is a serious issue in terms of the severity, pathogenicity and contractibility of the infection, with regards to the susceptibility of the patients' immediate contacts. Lonroth *et al.* (1999) described how patients also contributed significantly to the delay in TB diagnosis.

A qualitative study by Jaramillo (1998), looked at the paths followed and research barriers experienced by patients at health care services, while seeking help for pulmonary tuberculosis symptoms. The results showed that patients' behaviours, in addition to the health care services such as pharmacies, can contribute to the delays in diagnosis. This is often attributed to lack of awareness of TB symptoms. It concluded that most TB patients actively seeking help are diagnosed later rather than sooner by the health care system. In South Africa, it has been shown that there is a considerable delay between symptom onset and treatment initiation among pulmonary tuberculosis patients (Pronyk *et al.*, 2001). This may explain why in this study, the patients referred had not yet attended the clinics to which they were referred. The other possibility is that patients may have attended a totally different clinic. It has also been pointed out that the propensity to seek care depends on knowledge about and perceived risk of TB within reference groups (families, neighbourhood) and communities at large. It has further been proposed that patients with low knowledge about symptoms are more likely to postpone care-seeking and testing. Patients with higher perception about severity of the disease are less likely to delay care-seeking and diagnosis and those with low awareness about risk of TB symptoms are associated with delay in care-seeking (Auer *et al.,* 2000). A study in Gambia found that patients with haemoptysis have shorter delays than patients with less severe symptoms. Studies have also shown than stigma has also postponed seeking care due to fears of finding out their HIV status (Leinhardt *et al.*, 2003; Metcalf, C.A., 1990).

to actively seek the participation of private pharmacies through training and imparting a sense of ownership in the National TB Programme as also proposed in a study in India (Rajeswari *et al.*, 2002). The motivation for private pharmacies may need to include their involvement in the treatment of their referred and diagnosed patients, which would potentially increase their clientele base.

6.8   Strengths and Limitations of the study

The strength of the study was in the design of the referral tools. Through further investigation with the participants, none had indicated that they had a problem with the layout of the design of any of the tools. The main findings showed that due to the nature of how the business of a pharmacy is conducted, there was insufficient time for documentation using the suspect registers, especially during busy hours. This was affected by the management of the pharmacy who required efficiency in staff, particularly in making sales. This study was conducted during a period when retail pharmacies were in a position of financial uncertainty, due to proposed changes in pricing regulations as well as the general global economic downturn.

One of the main limitations of this study was a low participation rate. It should be noted that in this study in order to obtain the original sample of participants (N=28), more than 100 pharmacies were contacted. The number of pharmacies who had originally shown interest and agreed to send their staff to the workshops totalled above 50. Finally on the workshop days this was finally reduced to 28 participants from a total of 20 pharmacies. The reasons for this decline included a number of factors:

- Pharmacists claimed that their pharmacies were understaffed and could not handle the loss of an individual, who forms part of their workforce, for a day.
- Some pharmacists were simply uninterested in taking part in the study (no reason given)

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- Some pharmacists were uninterested in taking part in the study because of the "crisis" which retail community pharmacies were in at the time. This refers to the uncertainty of pricing regulations.

A study (Ward, 2007) investigated the resistance to change by pharmacists to participate in an STI training course. A decline in participants was also experienced from those who had initially indicated a willingness to be trained and subsequently declined at the time when the opportunity presented itself. This indicates that further research is required to ascertain what the expected decline in participants for studies conducted in retail community pharmacy may be.

Finally taking into consideration the fact that the post2-test questionnaire was conducted telephonically, this could have impacted on the results achieved being lower than anticipated as the may have had less time to process and think about questions depending on the interviewees style of questioning.

Having looked at the context in which this study was conducted, various factors have influenced the results by creating a juxtaposed picture between the knowledge gained and the behavioural practices of pharmacists' assistants. It is thus in this regard that it is recommended that these factors are researched before being applied to a referral system of this nature in a retail community pharmacy setting.

CHAPTER 7

CONCLUSION AND RECOMMENDATIONS

This final chapter is the culmination of the research study's final findings. It further provides a list of recommendations for future studies within this field.

7.1 Conclusion

South Africa has still not yet met the cure rate target and TB incidence rates are still rising. The literature has pointed out the need for strengthening the referral chain in the early stages of the disease.

The primary objectives of this thesis were:

1. To assess the knowledge of pharmacists' assistants with regard to recognizing TB symptoms

2. To train pharmacists' assistants in early symptom recognition and referral to an appropriate referral site

3. To assess the effectiveness of training by means of a pre-test, post1-test and post2-test questionnaire and to measure appropriate referral rates

4. To design a referral card and to track and assess its effectiveness (i.e. did referred people actually present to clinic)

5. To determine the accuracy of recognition by determining the number of referred patients who are diagnosed with TB.

The knowledge of participants regarding TB symptom recognition was assessed and resulted in a remarkable increase with regard to the pre-test and post1-test questionnaires. Pharmacists' assistants were trained with regard to TB symptom recognition and referral procedures. The effectiveness of the training was assessed and resulted in a significant increase in knowledge from pre-test to post1-test but a decrease 4 months later with the post2-test questionnaire. This however did not decrease below the initial pre-test knowledge. This comparison was significant and indicated that some knowledge was sustained. This shows a potential for continuous periodical training to sustain the knowledge learnt. Referral cards were designed to track and assess the effectiveness of referrals. Only 1 participant

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referred clients to the TB-clinic. It was found that the patients who were referred did not attend the clinics to which they were referred. Training may need to be conducted with a follow up assessment of behaviour, followed by further training and re-assessment of behaviour. A re-enforcement by pharmacists at the pharmacies may further advance the success of the referral system to continuously develop the knowledge of staff and thus influence behavioural patterns with regard to referral practices. In this study the accuracy of TB symptom recognition could not be determined due to the low referral rates.

The aim of the study was to improve the knowledge of pharmacists' assistants in TB symptom recognition and to test whether this would increase the number of appropriate referrals to the nearest and/or most convenient TB clinics. This study thus concludes that improved knowledge of pharmacists' assistants in TB symptom recognition did not improve appropriate referrals to TB clinics. It was established that the referral system learnt was not a difficult method for detection to implement, but the environment of the retail pharmacy setting can have an effect on trying to implement a system of this nature.

The health care community needs to further explore possibilities of collaboration and strengthening referral chains to see a significant decline in the TB incidence rates. The retail pharmacy as a healthcare structure leaves scope to explore the possibilities of collaboration in combating infections such as TB in South Africa that would promote a mutually beneficial approach to health care. The findings of this study indicate that there is scope for involving private pharmacies in TB programmes and for promoting awareness about TB. The government should actively seek participation of private pharmacies through advocacy, training and imparting a sense of ownership in the National TB Programme.

7.2   Recommendations

From the results obtained in this study, it is thus recommended that further studies be conducted and the following be investigated:

- Referral procedures from pharmacies to primary health care facilities in Cape Town
- The movement of staff from retail pharmacies
- Documentation methods in retail pharmacies in Cape Town
- The extent of willingness of pharmacists and pharmacy staff to participate   in research opportunities
- The strain which economic factors and pricing regulations have placed on the conduct of retail community pharmacy
- Knowledge may need to be re-enforced intermittently to maintain high knowledge levels; it is thus also recommended that this be investigated further.
- Further studies may need to focus on training the entire staff component, including the pharmacists are   trained. This would also need to include intermittent training and follow-up
- The period of future studies may need to be conducted over a much longer time frame e.g. 1 year, to see whether a significant increase in referral rates would be achieved or not.
- The role of pharmacies in screening and treatment needs

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UNIVERSITY *of the*
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FACULTY OF NATURAL SCIENCE
School of Pharmacy

Dear Pharmacist   25-06-07

TB is one of the major contributors to the burden of disease in Cape Town, with a 66% increase in the number of reported TB cases over the last six years. The Western Cape Provincial Department of Health and the City of Cape Town are committed to the effective control of TB, which is one of their key priorities.

I am a Masters Pharmacy student (M.Pharm) at the University of the Western Cape. I am conducting a study, under the supervision of Prof. Nadine Butler, which aims at improving early recognition of TB symptoms in the community pharmacy setting and the referral of suspected cases to the nearest TB clinic. The success of this study would involve your valuable participation. The study aims at the Pharmacists' assistants or any front-shop assistants employed on a permanent basis in the pharmacy.

As far as the assistants are concerned, I would like to add value to your pharmacy by training them in the recognition of symptoms that are related to TB. The basic training course would be conducted in one morning session- from 09h30 to 14h00. The training material that is going to be used for the course would be made available to the pharmacy. Furthermore, we would appreciate it if you, the pharmacist, could take responsibility for ensuring the confidentiality of information contained in a register which will be kept in the pharmacy and recorded by the participating assistants. The details of referred patients will be used by me to cross-reference actual clinic visits and will be destroyed once this has been completed.

You can be assured that confidentiality and privacy would be maintained throughout the duration of this project. As such, no information such as the name of the pharmacy or the participants would be divulged or reported in any of the results. The results of this study will be made available to you once it has been completed. We will also provide the pharmacy with any relevant aids such as maps of the closest TB clinics in your area or posters that will enhance the awareness of TB.

Your support and input in this study would be sincerely appreciated.

Thanking you

Lyzelle Dalais (B.Pharm)
(084 5482958)
Email: 2357691@uwc.ac.za

CONSENT

I, _____ the pharmacist for

_____ (Name of pharmacy)

hereby agree to participate in the study as proposed on 25 July 2007 at University
of

the Western Cape, School of Pharmacy

Pharmacists' signature: _____ Date: _____

NB. If you wish to send more than one assistant or if you would like to attend

yourself, please indicate who will be attending by listing their names below.

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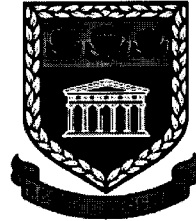
FACULTY OF NATURAL SCIENCE
School of Pharmacy

UNIVERSITY *of the*
WESTERN CAPE

Dear Pharmacists' Assistant   25-06-07

TB is one of the major contributors to the burden of disease in Cape Town, with a 66% increase in the number of reported TB cases over the last six years. The Western Cape Provincial Department of Health and the City of Cape Town are committed to the effective control of TB, which is one of their key priorities.

I am a Masters Pharmacy student (M.Pharm) attending the University of the Western Cape. I am conducting a study, under the supervision of Prof. Nadine Butler, which aims at improving early recognition of TB symptoms in the community pharmacy setting and the referral of suspected cases to the nearest TB clinic. The responsible pharmacist's support for this study has already been established, however, the success of this study would also involve your valuable participation. The study targets Pharmacists' assistants or front-shop assistants employed on a permanent basis in the pharmacy.

As far as you are concerned, I would like to add value to your pharmacy by training you in the recognition of symptoms that are related to TB. This basic training course would be conducted in one morning session - from 09h30 to 14h00 at the University of the Western Cape School of Pharmacy. The training material that is going to be used for the course would be made available to the pharmacy.

You can be assured that confidentiality and privacy would be maintained throughout the duration of this project. As such, no information such as the name of the pharmacy or you, the participant, would be divulged or reported in any of the results. The results of this study will be made available to you once it has been completed. I will also provide the pharmacy with any relevant aids such as maps of the closest TB clinics in your area or posters that will enhance the awareness of TB.

Your support and input in this study would be sincerely appreciated.

Thanking you

Lyzelle Dalais (B.Pharm)
(084 5482958)
Email: 2357691@uwc.ac.za

CONSENT

I, _____ the pharmacists'

assistant for _____ (name of

pharmacy) hereby agree to participate in the study as proposed.

Pharmacists' assistant signature: _____ Date: _____

Contact number:

UNIVERSITY *of the*
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FACULTY OF NATURAL SCIENCE
School of Pharmacy

Dr Ivan Toms   Date:
Director: Cape Town City Health

Dear Dr Ivan Toms

RE: Permission for conducting TB research in collaboration with TB clinics

I am currently a Pharmacy student at the University of the Western Cape conducting my Masters' theses around the area of TB. As it is known, there is still much room for improvement regarding referrals to TB clinics and early diagnosis. Private pharmacies are usually the first point of contact by clients when experiencing minor ailments such as coughs. Even though this may be the primary symptom patients come into the pharmacy for, it may be as a result of TB. This can however only be determined if these private health care providers take the appropriate history of these clients and can recognize the TB symptoms.

It is known that private pharmacies are a neglected link in the referral chain. The inability of pharmacy staff to recognise TB symptoms often results in a delay in diagnosis. This results in many untreated potential TB patients who may spread the infection further. The TB incidence rate is still above 70% in the Western Cape and has not declined, indicating many undiagnosed patients thus unknowingly contributing to the spread of TB.

My study entails training pharmacists' assistants in community pharmacies in the Western Cape Metropole region on the recognition of TB symptoms of clients consulting the selected pharmacies and referring them to the appropriate TB clinic. This however can only work in collaboration with the Department of Health and staff at the TB clinics. A referral card has been designed to communicate to both the client and staff at the TB clinics. As suggested by Judy Caldwell, they should be filed in a TB folder if the patient is TB sputum positive and in a Primary Health Care folder if they are found to be TB sputum negative.

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I am therefore requesting your assistance in informing the TB clinics of this study. I foresee this study to be beneficial to both pharmacy and the Department of Health. If you require any further information, please find the accompanying proposal, which explains the study in more detail.

Thanks for your time and consideration

Yours Sincerely

_____
Lyzelle Dalais (B.Pharm)
084 548 2958
2357691@uwc.ac.za

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APPENDIX IV

UNIVERSITY *of the*
WESTERN CAPE

FACULTY OF NATURAL SCIENCE
School of Pharmacy

Mr Gary Black

Executive Director

Pharmaceutical Society of South Africa: CWP branch

Dear Mr Gary Black

Re: Assistance with recruiting community pharmacists' assistants and front-shop assistants to participate in TB training workshop

I am an Academic Intern at the University of the Western Cape conducting my Masters' theses around the area of TB. As it is known, there is still much room for improvement regarding referrals to TB clinics and early diagnosis. Private pharmacies are usually the first point of contact by clients when experiencing minor ailments such as coughs. Even though this may be the primary symptom patients come into the pharmacy for, it may be as a result of TB. This can however only be determined if these private health care providers take the appropriate history of these clients and can recognize the TB symptoms.

My study thus entails training pharmacists' assistants, including front-shop assistants, in community pharmacies in the Western Cape Metropole region on the recognition of TB symptoms of clients consulting the selected pharmacies and referring them to the appropriate TB clinic. A referral card has been designed to communicate to both the client and staff at the TB clinics, which the participants will be trained to use. However, since I require 80 pharmacies to participate, the recruiting of participants can only work in collaboration with PSSA CWP branch.

I am therefore requesting your assistance in informing the Pharmacists via the Tincture Press publication of this study. Any pharmacists who are interested can contact me, Lyzelle Dalais, on the number provided or via email.

I see this study as a step forward to pharmacy and as something that pharmacists may in future have to part take in for their continued professional development. If you require any further information, please find the accompanying proposal, which explains the study in more detail.

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Thanks for your consideration

Yours sincerely

_____
Lyzelle Dalais (B.Pharm)
084 548 2958
2357691@uwc.ac.za

UNIVERSITY *of the*
WESTERN CAPE

FACULTY OF NATURAL SCIENCE
School of Pharmacy

BASIC TRAINING IN TB SYMPTOM RECOGNITION

AGENDA

1. REGISTRATION

2. WELCOME & ICE BREAKER

3. PRE-EVALUATION

4. SESSION 1-TB TRAINING (THEORY)

5. TEA- BREAK

6. SESSION 2 (PRACTICAL)

7. CASE STUDY

8. ROLE PLAY- HOW TO IMPLEMENT

9. LUNCH

10. CONSOLIDATION & POST EVALUATION QUESTIONNAIRE

11. END

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Session 1: 3hrs (with a tea break in between)

- A brief introduction to TB (The mycobacterium and its structure)
- The history of TB
- The global situation
- The current situation in South Africa and the Western Cape in particular, with reference to TB incidence rates, prevalence rates
- The relationship between TB and HIV
- Types of coughs
- Treatment of coughs
- Diagnostic methods for TB
- Symptoms of Early and Late phase TB
- TB treatment
- MDR & XDR
- Daily Observed Treatment Short Course (DOTS)
- Appropriate referrals to TB clinics

Lunch

Session 2: (1hour)

- Explanation on how to use referral cards, Z-cards and TB suspect register
- Case study and role play on a typical situation in the pharmacy of a patient seeking
- Appropriate referrals to TB clinics

School of PHARMACY
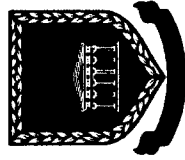
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UNIVERSITY *of the*
WESTERN CAPE

FACULTY OF NATURAL SCIENCE
School of Pharmacy

AN INVESTIGATION INTO THE IMPACT OF TRAINING
PHARMACISTS' ASSISTANTS IN EARLY RECOGNITION AND
REFERRAL PROCEDURES ON TUBERCULOSIS REFERRAL RATES
IN THE WESTERN CAPE METROPOLE REGION.

INSTRUCTIONS

Answer ALL questions

Do not leave any blank spaces

Where appropriate answer in block letters

Time: 20mins

Name & Surname:..

Name of Pharmacy which you are representing:....................

Contact number of Pharmacy:...

Questionnaire

Circle the most appropriate answers.

1. What is your gender?

   a) Male
   b) Female

2. What is your age?

   a) Less than 20yrs
   b) 20 to 29yrs
   c) 30 to 39yrs
   d) 40 to 49 yrs
   e) 50yrs and more

3. How long have you been working as a pharmacist assistant?

   a) less than 1yr
   b) 1-5yrs
   c) More than 5yrs

4. What kind of Pharmacists' assistant are you?

   a) Post basic Pharmacists' assistant
   b) Post basic Pharmacists' assistant (learner)
   c) Basic Pharmacists' assistant
   d) Basic Pharmacists' assistant (learner)
   e) Not a registered Pharmacists' assistant
   f) Other(specify)..................................

5. When someone asks you for a cough medicine, do you ask the consumer about their cough?

   a) Always
   b) Sometimes
   c) Never

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10. Which of the following describe the signs and symptoms of TB?
(Circle all the answers that apply)

a) Coughing for more than 2 weeks
b) Coughing up phlegm
c) Fever
d) Pains in the chest
e) A runny nose
f) Loss of appetite
g) Loss of weight
h) Night sweats
i) Extreme fatigue(tiredness)
j) Blood in sputum
k) Other(specify)...............................

11. Which of the following are risk factors to contracting TB

a) Smoking
b) Exercise
c) Alcohol
d) Asthma
e) Colds & flu
f) HIV
g) None of the Above

12. How is TB spread?

a) Coughing and sneezing
b) Touching someone who has TB
c) By sexual contact
d) Living in the same house as someone who has TB
e) Touching blood that has been infected with TB
f) Touching the clothes of someone with TB
g) Other (specify)...............................

6. Which of the following describes a dry cough?

a) Cough that produces no phlegm
b) Cough that produces phlegm
c) Coughing up blood
d) Nausea and vomiting
e) Other(specify)...............................

7. Which of the following describes a wet cough?

a) Cough that produces no phlegm
b) Cough that produces phlegm
c) Coughing up blood
d) Nausea and vomiting
e) Other(specify)...............................

8. All coughs should be treated with medication.

a) Always
b) Sometimes
c) Never

9. What is Tuberculosis (TB)?
(Circle all the answers that apply)

a) Skin Rash
b) Disease caused by colds and flu
c) Infectious disease caused by bacteria in the lungs
d) Sexually Transmitted Disease
e) Sores, pimples or lesions
f) Other(specify)...............................

13. Which of the following symptoms manifest in the early phase or late phase of TB by placing an "E" for early and "L" for late phase next to the symptom.

a) Coughing for more than 2 weeks
b) Coughing up phlegm
c) Fever
d) Pains in the chest
e) A runny nose
f) Loss of appetite
g) Loss of weight
h) Night sweats
i) Fatigue
j) Blood in sputum
k) Other(specify).................

14. Do you think that there is a connection between TB and HIV/AIDS?

a) Yes
b) No
c) I don't know

If yes then how? (Circle all that apply)

a) HIV protects from TB
b) HIV positive people are more at risk of contracting TB
c) TB protects against HIV
d) TB positive people are more likely to get HIV

15. Have you personally come into contact with someone who had or has TB?

a) Yes
b) No
c) I don't know

16. Do you think TB can be cured?

a) Yes

b) No
c) I don't know

17. Which of the following are true about TB treatment? (Circle all the answers that apply)

a) It is treatment that you take once a week
b) It is treatment that you have to take everyday for the rest of your life (chronic treatment)
c) It is treatment that you take only once and you are cured
d) It is treatment that you take regularly for at least 6 months
e) It is treatment that you take for 18 months
f) Other(specify).................
....
....

18. What is Multiple Drug Resistant Tuberculosis (MDR-TB)? (Circle all that apply)

a) A TB infection that will not respond to the drugs normally used to treat TB
b) A type of drug used to treat TB
c) TB that is resistant to many drugs e.g. paracetamol, cough mixtures
d) Resistance to the two most effective first line drugs: Rifampicin and Isoniazid.
e) Other(specify).................
....
f) I don't know

19. What causes MDR-TB? (Choose the MOST correct answer)

a) Excessive coughing
b) Over exposure to TB individuals
c) Inappropriate or ineffective treatment, which allows naturally-occurring resistant TB bacteria to survive and multiply and can be transmitted directly to susceptible individuals

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d) Other(specify)..
....

e) I don't know

20. What is Extensive Drug Resistant Tuberculosis (XDR-TB)?

a) A Type of drug which induces a severe TB
b) A condition whereby in addition to MDR is also resistant three or more of the six classes of second-line drugs
c) A type of TB condition which is resistant to ALL drugs
d) Other(specify)..
....

e) I don't know

21. Where is the nearest TB clinic to the pharmacy in which you work?

a) ....

b) I don't know

22. Why do you need to refer a person with TB symptoms to a clinic?
(Tick all the answers that apply)

a) To prevent the spread of TB
b) To prevent death
c) To treat the disease
d) To stop the bacteria from growing in the body
e) So that the doctor or the nurses can see them
f) Because we don't have the treatment in the pharmacy
g) To get a diagnosis/confirmation of TB
h) Other (specify)..

d) Other (specify)..

23. What do you currently do when you suspect someone has TB?

a) Refer them to the pharmacist
b) Refer them to a doctor
c) Refer them to a TB clinic
d) Treat them yourself
e) Give more cough medicine
f) Other (specify)..

24. Which tool(s) are the MOST accurate for TB diagnosis?

a) Blood pressure test
b) Sputum test
c) X-Ray
d) Symptom recognition by taking a patients history
e) Urine test
f) Peak flow test

25. How many people have you referred to a TB clinic in the last month for suspected TB symptoms?

a) None
b) 1-5
c) 6-10
d) More than 10
e) Since I have worked, I have never referred anyone to a TB clinic.

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APPENDIX VII

REFERRAL CARD

REFERRAL TO TB CLINIC

The symptoms you have may be due to tuberculosis. It would be beneficial for you to go to your nearest TB clinic for a free TB sputum test. TB is both preventable and curable and the treatment is highly effective. TB testing and treatment is free of charge at all clinics.

Present this card at ………………………………….. (name of clinic) where you will receive further help.

All clinics are open from Monday – Friday

Open Hours: 07:30 – 16:30

PHARMACY
University of the Western Cape

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REFERRAL TO TB CLINIC

Dear Sister

The following patient………………………………………….. (name of patient) presented

at………………………………….. (name of pharmacy) On………………………..….(date) with the

following symptoms suggestive of TB:

☐ Cough > 2 weeks   ☐ Chest pain
☐ Fever   ☐ Weight loss
☐ Night Sweats   ☐ Loss of appetite
☐ Extreme fatigue   ☐ Blood in sputum

Would you please investigate this client further?

Yours sincerely

Name: …………………………

Address: ………………………..

Telephone Number: …………………………………

Date: ……………………..

△ **SANDOZ**
A healthy decision

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APPENDIX VIII

TB SUSPECT REGISTER

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TB Suspect Register   (PRINT IN BLOCK LETTERS)

PHARMACY NAME:

SYMPTOMS (tick where appropriate)

Date	Name & Surname	Sex	Age	cough >2wks	Fever Night Sweats	Chest pain	Loss of appetite	Weight Loss	Extreme fatigue	blood in sputum	Referred to (name of TB Clinic)
1											
2											
3											
4											
5											
6											
7											
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9											
10											
11											
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APPENDIX IX

Z-CARD

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KNOW THE FACTS

WHAT IS TB?

TB is caused by a germ called Mycobacterium tuberculosis. TB is a disease that mainly affects the lungs, but can be found in any other place in the body. The disease is preventable and curable.

HOW IS TB SPREAD?

The disease is spread from person to person when a person who has TB coughs, sneezes or spits. TB germs are spread in the air and breathed in by other people, especially when living in poorly ventilated, overcrowded rooms. Fortunately, not all those who breathe in TB germs become ill with TB. In most cases the germs are sealed off in the body and they do not multiply. However, if the body's immune system (soldiers) can no longer control the germs, they become active and the person becomes ill with TB.

Chances of developing TB are increased when the body's immune system is lowered because of things like:

- HIV/AIDS
- Lack of proper food
- Drinking too much alcohol or taking drugs
- Stress

HOW DOES TB AFFECT THE BODY?

The germs are present in the sputum coughed up by those who have TB of the lungs. As the body tries to fight the germs holes may develop in the lungs.

If you have been coughing for more than two weeks please visit your nearest clinic as soon as possible to have a free TB sputum test.

TB testing and treatment is free of charge.

Then the person feels tired and has difficulty breathing and may cough up blood. If not treated, TB may spread to ten new people every year and be fatal.

WHAT ARE THE SIGNS AND SYMPTOMS OF TB?

- A cough for longer than two weeks
- Producing phlegm when you cough
- Night sweats (sheets wet with sweat in the morning)
- Coughing up blood
- Loss of appetite
- Weight loss
- Tiredness and weakness of the body
- Chest pains

TB in parts of the body other than the lungs may result in pain wherever the TB is located and weight loss. If you have been coughing for more than 2 weeks and have any of these symptoms, please visit your nearest clinic as soon as possible to have a free TB sputum test.

HOW IS TB DIAGNOSED?

- Any of the above symptoms may be an indication of the disease.
- TB is diagnosed by testing the spit (sputum) at a laboratory. If the germs are found in the sputum then the person has TB.
- In children who cannot produce spit (sputum) a skin test may be done by a nurse or doctor to show if the child has have TB.
- X-rays may show changes in the lungs.

Young children (< 5 years) are more at risk of picking up TB from adults, therefore all children < 5 years who have been in close contact with an adult who has TB must go to the clinic. Staff will examine the child to see if the child needs to receive any treatment. If the child does not have TB, tablets will be given to the child to prevent TB from developing.

WHAT WILL HAPPEN IF I HAVE TB?

If you are diagnosed with TB, don't worry, TB is curable. Examples of people who have had TB and were cured are our previous President Mandela and Archbishop Tutu.

TB treatment should:

- Start as soon as possible.
- Be taken once a day, Monday to Friday for 6 months.
- We want to support you while taking your TB treatment and will ask that

you either come to the clinic to take your tablets or we will arrange for you to take your tablets at a community TB DOT supporter.

- If you are working we will ask you to tell us who can support you and see to it that you take your tablets at work.
- If you have been treated for TB before, treatment is 8 months.
- For some forms of TB the treatment is 18 months.
- You will be asked to have an HIV test.

WHY IS IT IMPORTANT TO COMPLETE THE FULL COURSE OF TREATMENT?

- If medicines are stopped too soon you may just get sick again and it will be more difficult to treat you the second time.
- The TB germs can become stronger and you may develop drug resistant TB which is hard to treat.
- Drug resistant TB is more likely to cause death.

HOW CAN YOU HELP PREVENT THE SPREAD OF TB?

- Cover your mouth and nose when you cough or sneeze.
- Open all windows and doors of your home so as to allow the fresh air to flow through.
- Let your family and friends know that you have TB and that you are being treated.
- Complete your full course of treatment
- Try and eat healthy food and drink less alcohol.

WHAT ABOUT HIV AND TB?

- HIV damages the immune system (the soldiers in the body). HIV positive people have a one in ten (10%) chance of getting TB every year. HIV negative people have a 10% chance of getting TB in their whole lifetime.
- TB treatment is the same for HIV-positive and HIV-negative people.
- If you have TB and are HIV positive:
  - Cotrimoxazole (Bactrim) tablets will be added to lower your chances of picking up other infections.
  - A vitamin supplement (Pyridoxine) will also be given.
  - We will check your immune system by doing a blood test (CD4 count).
  - If your CD4 count is below 200 you will be put on anti retroviral treatment.

stop TB
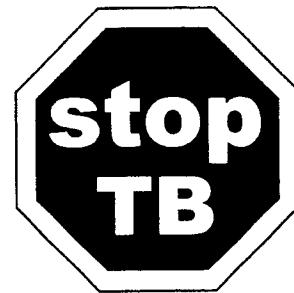
HOW CAN THE SPREAD OF TB BE PREVENTED?

- Come to your clinic for a free TB test if you have been coughing for more than 2 weeks.
- Ask your friends or family members who have been coughing to come for a free TB test.
- Stop smoking as it is damaging to your lungs.
- Try and eat better (meat, fish, eggs, beans, milk, amasi, brown bread, maize meal, vegetables, and fruits)
- Drink less alcohol and stop taking drugs.
- Get more exercise.
- Try and reduce stress in your life.

KHAYELITSHA

Clinic	Phone	Address
Kuyasa Clinic	021 363 0271/2/3	
Luvuyo Clinic	021 367 1104/5	Hlela Road,
Matthew Goniwe Clinic	021 362 6100/1	Kwahlaza Road,
Mayenzeke Clinic	021 367 1112/3	Fundana Road,
Michael Mapongwana CHC	021 361 3353	Steve Biko Road, Harare,
Nolungile Youth Centre	021 387 1107	Solomon Tsuku Road, Site C, Khayelitsha
Site B Youth Centre	021 361 0121	Lwandle Road, Site B, Khayelitsha
Nolungile Clinic	021 387 1107	Site C, Khayelitsha
Site B Clinic	021 364 8133	Cnr Lwandle & Bongo Road Site B, Khayelitsha
Town Two Clinic	021 361 8596/3167	Cnr Zibonele & Manyano Street, Town 2, Khayelitsha
Zakhele Clinic	021 361 1113	Zakhele Road, Khayelitsha

KLIPFONTEIN SUBDISTRICT

Clinic	Phone	Address
Guguletu Clinic	021 637 9075	Cnr NY1 & NY3, Guguletu
Hanover Park Clinic	021 692 4250	Hanover Park Avenue, Hanover Park
Heideveld Clinic	021 637 8093	Heideveld Road, Heideveld
Lansdowne Clinic	021 797 4217	Cnr Lansdowne Road & Church Street, Lansdowne
Manenberg Clinic	021 637 5830	Manenberg Road, M/Berg
Masincedane Clinic	021 386 1717	Mjondo Avenue, KTC, Nyanga
Nyanga Clinic	021 380 8000	Sithandatho Avenue, Nyanga
Silvertown Clinic	021 637 1293	Petunia Street, Athlone
Vuyani Clinic	021 637 9016	Cnr of NY133 & NY 134, Guguletu

NORTHERN SUBDISTRICT

Clinic	Phone	Address
Bloekombos Clinic	021 980 6298/9	Sam Ntakana Avenue, Kraaifontein
Bothasig Clinic	021 558 5010	21 Van Breughel Street, Bothasig
Brackenfell Clinic	021 980 1289	Paradys Street, Brackenfell
Brighton Clinic	021 980 6125/6122/6124	Brighton Street, Kraaifontein
Durbanville Clinic	021 970 3052	De Villiers Street, Durbanville
Harmonie Clinic	021 980 6202	Frans Conradie Avenue, Kraaifontein
Northpine Clinic	021 981 4319	Northpine Drive, Brackenfell
Scottsdene Clinic	021 980 6244	Eon Street, Scottsdene
Wallacedene Clinic	980 6094	Cnr La Boheme & Pietersen Streets, Wallacedene

SOUTHERN SUBDISTRICT

Clinic	Phone	Address
Alphen Clinic	021 794 5906/8	Main Road, Constantia
Claremont Clinic	021 671 1148/78	
Diep River Clinic	021 712 9598/712 8579	Schaap Road, Diep River
Fish Hoek Clinic	021 782 3847/782 6490	61 Central Circle, Fish Hoek
Grassy Park Civic Clinic	021 705 0131/706 2064	Civic Centre, Market Road, Grassy Park
Hout Bay Harbour CHC	021 790 1050	CMC Building, Karbonkel Road, Hout Bay
Hout Bay Main Road Clinic	021 790 1720/2393	Imizamo Yetho, Main Road, Hout Bay
Klip Road Clinic	021 705 1947/705 1983	Klip Road, Grassy Park
Lavender Hill Clinic	021 701 9005/6	74 Grindle Crescent, Lavender Hill
Lotus River Clinic	021 703 6990/703 9330	Klip Road, Lotus River
Masiphumelele Clinic	021 785 3938/795 3556	Pokela Road, Masiphumelele
Muizenberg Clinic	021 788 8940	Atlantic Road, Muizenberg
Ocean View Clinic	021 783 1688	Pollux Way, Ocean View
Parkwood Clinic	021 705 0103/4	Walmer Road, Parkwood Estate
Phillipi Clinic	021 692 1161/3	Lansdowne Road, Philippi
Retreat Clinic	021 712 0310/1/2	11th Avenue, Retreat
Seawinds Clinic	021 701 1348/9	Military Road, Steenberg
Strandfontein Clinic	021 393 6226/6236	Welgelegen Road, Strandfontein
Westlake Clinic	021 701 1964	Westlake Drive, Westlake
Wynberg Clinic	021 797 5190/1	Lower Maynard Road, Wynberg

TYGERBERG SUBDISTRICT

Clinic	Phone	Address
Adriaanse Clinic	021 936 8841/2/3	Avenue, Clarke's Estate
Bishop Lavis Clinic	021 934 1018	Drive, Bishop Lavis
Delft CHC	021 954 2237/28	& Voorbrug Road, Delft
Delft South Clinic	021 955 1010	Street & Delft Main Road
Dirkie Uys Clinic	021 590 1606	Road, Goodwood
Elsies River Clinic	021 936 8885/6	Avenue, Elsies River
Kasselsvlei CHC	021 951 2326/7	Road, Bellville South
Netreg Clinic	021 694 1733/4	& Jakkalsvlei Streets, Netreg
Parow Clinic	021 938 8037/8258	Road, Parow
Ravensmead Clinic	021 936 8758/8760	
St Vincent Clinic	021 953 8028/9	
Uitsig Clinic	021 936 8847/9	
Valhalla Park Clinic	021 934 0101/2	
Vanguard CHC	021 694 5540/1	

(WESTERN SUBDISTRICT)

Clinic	Phone	Address
Albow		Road, Milnerton
Chapel Street Clinic		Street, Woodstock
Du Noon Clinic	021 556	Du Noon
Factreton Clinic	021 593 3060/5	Factreton Avenue, Factreton
Langa Clinic	021 694 1740/1	Street, Langa
Maitland Clinic	021 511 2523	Road, Maitland
Melkbos Clinic	021 553 2499	Road, Melkbos Strand
Protea Park Clinic	021 572 4696	Avenue, Atlantis
Saxon Sea Clinic	021 572 5380	Cnr Grosvenor & Hermes Avenues, Atlantis
Spencer Road Clinic	021 447 9031	Spencer Road, Salt River
Table View Clinic (Mon & Fri only)	021 557 1065/6	South Road, Table View

EASTERN SUBDISTRICT

Clinic	Phone	Address
Bluedowns Clinic	021 909 0668	Bentley Road, Blue Downs
Gordons Bay Clinic	021 856 8038	Cnr Sir Lowry's Pass Road & Mountainside Boulevard, Gordon's Bay
Gustrouw CHC	021 845 8383	Hassan Khan Road, Gustrouw
Hillcrest Clinic	021 909 2500/2996	Blue Downs Avenue, Blue Downs
Ikwezi CHC	021 845 7556/7	Simon Street, Lwandle
CHC	021 845 8383	Meteran Avenue, Dennemere
Kuils River Clinic	021 900 1620/4	Carinus Street, Kuils River
Macassar Clinic	021 857 2330	Cnr Musica & Hospital Streets, Macassar
Mfuleni Clinic	021 909 2755/58	School Street, Mfuleni
Russels Rest Clinic	021 900 409 4/5/6	Andrew Street, Russels Rest, Eerste River
Sarepta Clinic	021 900 1652	Rietvlei Road, Sarepta, Kuils River
Sir Lowrys Pass Clinic	021 858 1493/4	Cnr Nolan & Brinkhuis Street, Sir Lowry's Pass
Somerset West Clinic	021 850 4534	28 Church Street, Somerset West
Wesbank Clinic	021 955 4140/1/2	Silversands Road, Wesbank

MITCHELLS PLAIN SUBDISTRICT

Clinic	Phone	Address
Crossroads 1 Clinic	021 374 1144	Old Klipfontein Road, Crossroads
Crossroads 2 Clinic	021 386 1113	Lansdowne Road, Crossroads
Eastridge Clinic	021 392 7125/6/7	1st Avenue, Mitchells Plain
Lentegeur Clinic	021 371 2126	Merrydale Street, Mitchells Plain
Mzamomhle Clinic	021 374 1173/4	Sagwityi Road, Brown's Farm
Phumlani Clinic	021 371 7170/81	3719 Stock Road, Philippi
Rocklands Clinic	021 392 5121/2	Park Avenue, M/Plain
Tafelsig Clinic	021 397 8195/8906	Kilimanjaro Road, Mitchells Plain
Weltevreden Valley Clinic	021 372 4430/7353	Oliver Tambo Drive
Westridge Clinic	021 392 4124	Westpoort Road, Mitchell's Plain

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DATA ANALYSIS SHEETS

```
T-TEST PAIRS=pre WITH post (PAIRED)
  /CRITERIA=CI(.9500)
  /MISSING=ANALYSIS.
```

T-Test

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	pre	14.1071	28	5.62626	1.06326
	post	23.1429	28	5.28250	.99830

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	pre & post1	28	.358	.061

Paired Samples Test

	Paired Differences					T	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 pre – post1	-9.03571	6.18530	1.16891	-11.43412	-6.63731	-7.730	27	.000

119

```
SAVE OUTFILE='C:\Documents and
Settings\user\Desktop\knowledge2.sav'
   /COMPRESSED.
SAVE OUTFILE='C:\Documents and
Settings\user\Desktop\knowledge2.sav' /COMPRESSED.
ONEWAY scores BY factor
   /MISSING ANALYSIS
   /POSTHOC=SCHEFFE ALPHA(0.05).
```

Oneway

ANOVA

scores

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	764.044	2	382.022	21.386	.000
Within Groups	750.267	42	17.863		
Total	1514.311	44			

Post Hoc Tests

Multiple Comparisons

Scores
Scheffe

(I) factor	(J) factor	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Pre	post1	-10.06667*	1.54331	.000	-13.9831	-6.1502
	post2	-5.66667*	1.54331	.003	-9.5831	-1.7502
post1	Pre	10.06667*	1.54331	.000	6.1502	13.9831
	post2	4.40000*	1.54331	.024	.4836	8.3164
post2	Pre	5.66667*	1.54331	.003	1.7502	9.5831
	post1	-4.40000*	1.54331	.024	-8.3164	-.4836

*. The mean difference is significant at the 0.05 level.

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Homogeneous Subsets

Scores

Scheffe

factor	N	Subset for alpha = 0.05		
		1	2	3
pre	15	14.4000		
post2	15		20.0667	
post1	15			24.4667
Sig.		1.000	1.000	1.000

Means for groups in homogeneous subsets
are displayed.

```
ONEWAY scores BY factor
  /STATISTICS DESCRIPTIVES
  /MISSING ANALYSIS
  /POSTHOC=SCHEFFE ALPHA(0.05).
```

Oneway

Descriptives

scores

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Pre	15	14.4000	5.17963	1.33737	11.5316	17.2684	3.00	22.00
Post1	15	24.4667	3.71996	.96049	22.4066	26.5267	16.00	31.00
Post2	15	20.0667	3.59497	.92822	18.0758	22.0575	14.00	27.00
Total	45	19.6444	5.86653	.87453	17.8819	21.4069	3.00	31.00

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Explore

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
pre	8	100.0%	0	.0%	8	100.0%

Descriptives

		Statistic	Std. Error
pre	Mean	13.3750	2.25940
	95% Confidence Interval for Mean Lower Bound	8.0324	
	Upper Bound	18.7176	
	5% Trimmed Mean	13.3056	
	Median	13.5000	
	Variance	40.839	
	Std. Deviation	6.39056	
	Minimum	6.00	
	Maximum	22.00	
	Range	16.00	
	Interquartile Range	13.00	
	Skewness	.157	.752
	Kurtosis	-1.743	1.481

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Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
pre	.216	8	.200[*]	.899	8	.282

a. Lilliefors Significance Correction

*. This is a lower bound of the true significance.

pre
pre Stem-and-Leaf Plot

```
 Frequency      Stem &   Leaf

     3.00          0 .   677
     3.00          1 .   257
     2.00          2 .   12

 Stem width:       10.00
 Each leaf:         1 case(s)
```
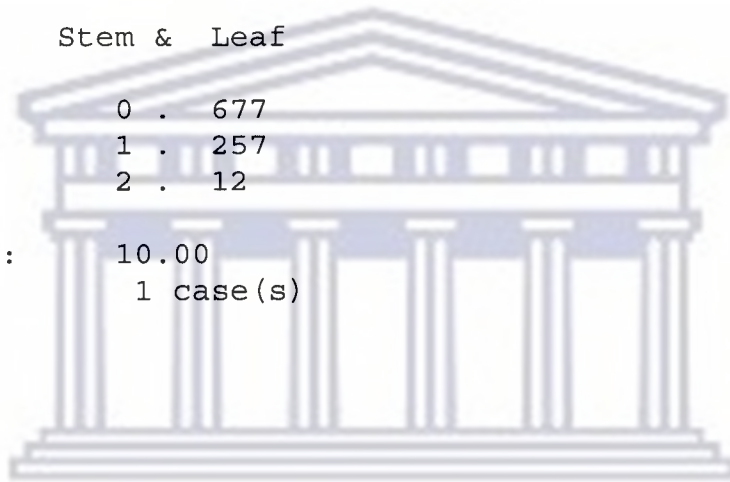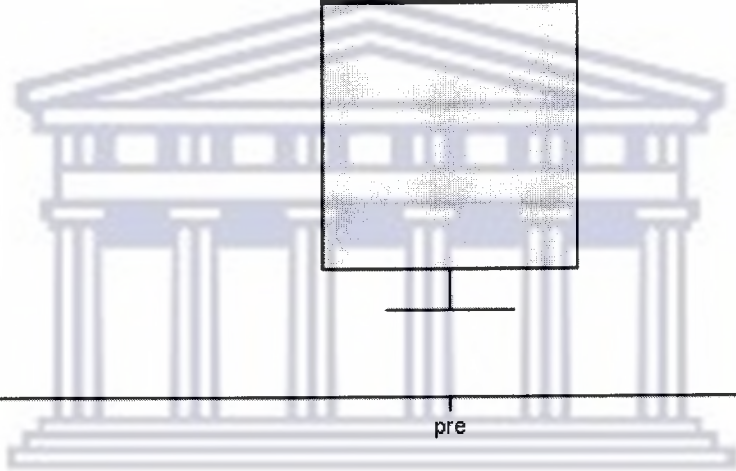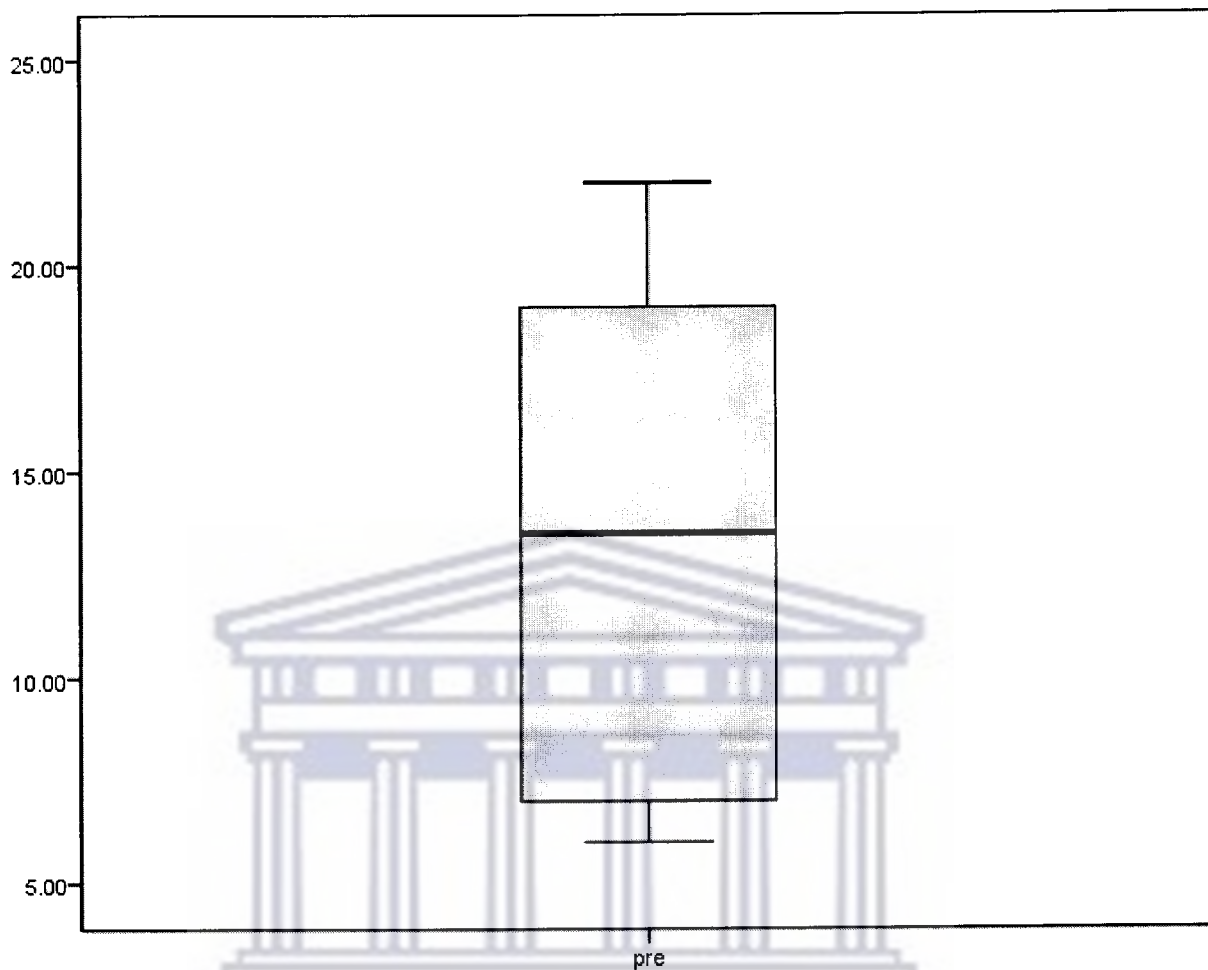
```
ONEWAY scores BY factor
  /MISSING ANALYSIS
  /POSTHOC=SCHEFFE ALPHA(0.05).
```

124

Oneway

ANOVA

scores

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	310.583	2	155.292	3.586	.046
Within Groups	909.375	21	43.304		
Total	1219.958	23			

Post Hoc Tests

Multiple Comparisons

Scores
Scheffe

(I) factor	(J) factor	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
pre	post1	-8.62500	3.29027	.051	-17.2889	.0389
	post2	-5.87500	3.29027	.227	-14.5389	2.7889
post1	pre	8.62500	3.29027	.051	-.0389	17.2889
	post2	2.75000	3.29027	.709	-5.9139	11.4139
post2	pre	5.87500	3.29027	.227	-2.7889	14.5389
	post1	-2.75000	3.29027	.709	-11.4139	5.9139

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Homogeneous Subsets
Scores

Scheffe

factor	N	Subset for alpha = 0.05
		1
pre	8	13.3750
post2	8	19.2500
post1	8	22.0000
Sig.		.051

Means for groups in homogeneous subsets are displayed.

Kruskal-Wallis Test

```
ONEWAY scores BY factor
  /STATISTICS DESCRIPTIVES
  /MISSING ANALYSIS
  /POSTHOC=SCHEFFE ALPHA(0.05).
```

126

```
NPAR TESTS
  /M-W= scores BY factor(1 2)
  /MISSING ANALYSIS.
```

NPar Tests
Mann-Whitney Test

Normal Q-Q Plot of pre
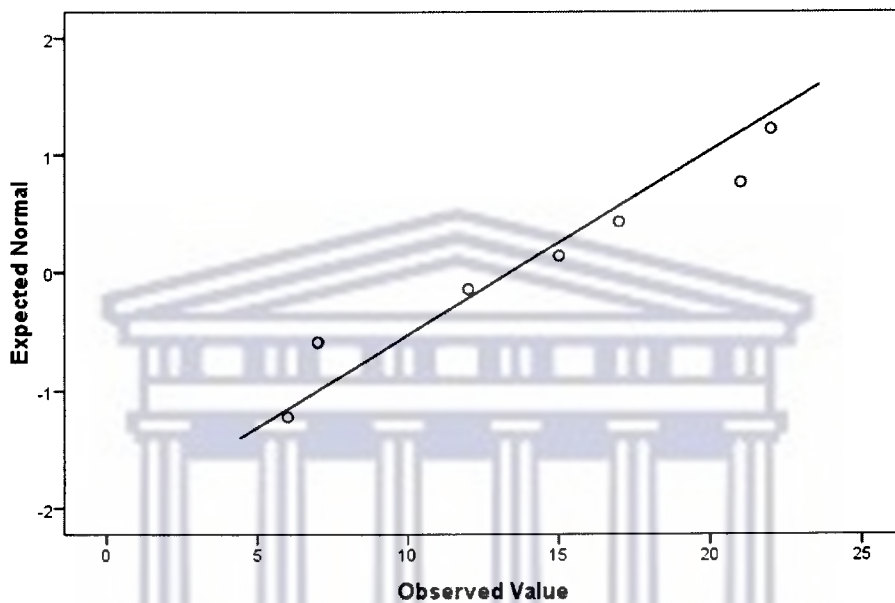
Detrended Normal Q-Q Plot of pre

127
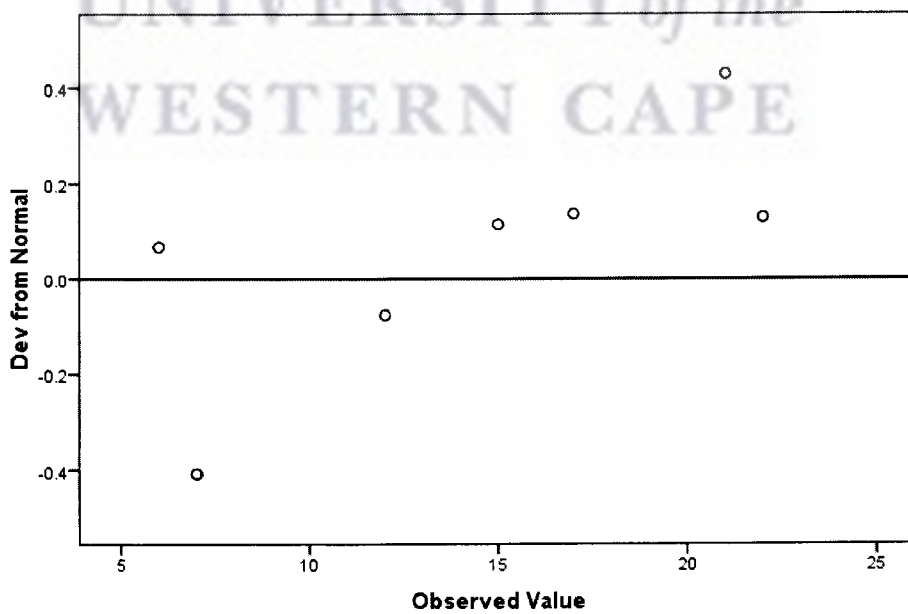
APPENDIX XI

DATA SHEETS

Questionaiirre Data

DEMOGRAPHICS OF GROUP

Question	PA	1			2			3			4		
		pre	post 1	post 2	pre	post 1	post 2	pre	post 1	post 2	pre	post 1	post 2
	Eg												
1	1	2	2	2	3	3	3	3	3	3	2	2	1
2	2	2	2	2	1	1		2	2	2	4	4	
3	3	2	2	2	3	3	3	2	2	2	1	1	1
4	4	2	2	2	4	4	4	3	3	3	5	5	3
5	5	2	2	2	3	3	3	3	3	3	5	5	3
6	6	2	2	2	5	5	5	3	3	3	5	5	5
7	7	2	2	2	4	4	4	3	3	3	6	6	6
8	8	2	2	2	5	5	5	3	3	3	6	6	
9	9	1	1	1	2	2	2	2	2	2	6	6	
10	10	2	2	2	3	3	3	3	3	3	1	1	1
11	1B	1	1	1	2	2	2	2	2	2	5	5	3
12	2B	1	1	1	5	5	5	3	3	3	5	5	5
13	3B	2	2	2	2	2	2	2	2	2	2	2	2
14	4B	1	1	1	3	3	3	3	3	3	5	5	5
15	5B	1	1	1	4	4	4	3	3	3	5	5	5
16	6B	2	2	2	2	2	2	3	3	3	5	5	5
17	7B	2	2	2	3	3	3	3	3	3	6	6	6
18	8B	2	2	2	4	4	4	2	2	2	1	1	1
19	9B	1	1	1	3	3	3	2	2	2	3	3	1
20	10B	2	2	2	3	3	3	1	1	1	6	6	6
21	11B	1	1	1	2	2	2	2	2	2	5	5	3
22	12B	1	1	1	2	2	2	3	3	3	5	5	1
23	1C	2	2	2	3	3	3	1	1	1	1	1	1
24	2C	1	1	1	2	2	2	2	2	2	5	5	5
25	3C	2	2	2	3	3	3	2	2	2	4	4	
26	4C	2	2	2	1	1	1	1	1	1	3	3	
27	5C	2	2	2	2	2	2	3	3	3	4	4	
28	6C	2	2	2	3	3	3	3	3	3	5	5	5

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Data table (rotated 90°). Columns grouped under headings **9**, **10**, and **11**, each divided into **pre**, **post 1**, and **post 2**, with **correct**/**incorrect** sub-columns.

9				10						11					
pre	post 1		post 2	pre correct	pre incorrect	post 1 correct	post 1 incorrect	post 2 correct	post 2 incorrect	pre correct	pre incorrect	post 1 correct	post 1 incorrect	post 2 correct	post 2 incorrect
1	1	1		9	0	9	0	8	0	2	2		1	1	0
1	1	1		5	0	9	0			1	2	2	1	1	
1	1			8	0	9	0	9	0	2	3	2	2	1	0
2	2	2		7	0	8	0	9	1	2	0	2	0		0
1	1	1		6	0	8	0	8	0	1	0	2	0	2	2
1	1	2		9	0	6	0			2	1	2	1		
1	1	1		9	0	9	0	8	1	2	0	2	0	2	0
1	1			8	0	8	0			2	0	2	1		
1	3			1	0	1	0			0	0	1	0		3
2	1	1		9	0	9	0	7	0	2	2	2	0	2	2
1	1	1		7	0	8	0	8	0	2	1	2	0	2	1
2	2			7	0	8	0			1	2	2	0		
1	1			1	1	8	0	4	0	1	0	1	0	1	0
1	1	1		6	0	9	0			1	1	2	0		3
1	1			6	0	8	0	9	0	2	0	2	2	2	2
2	1			9	0	9	0	8	0	2	1	1	1	2	1
1	1	1		6	0	8	0	9	0	2	1	2	1		0
1	1			8	0	8	0			1	1	2	0		3
2	1	2		6	0	9	0	7	0	2	2	2	2	1	0
1	1	1		7	1	8	0	9	0	2	0	2	1	1	2
1	1	1		9	0	8	0	8	0	1	0	2	1	1	1
1	1			9	0	9	0	8	0	1	0	2	0	1	0
1	1	1		6	0	8	0			2	0	2	2	2	0
1	1			3	1	9	0			1	0	2	0		
1	1			8	0	9	0	9	0	1	1	2	0	1	0
1	1			7	0	8	0	9	0	2	3	2	0	2	0
1	1			8	0	9	0	8	0	1	0	1	3		2
1	1			6	0	8	0	8	0	0	1	2	1	1	1

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	14b			15			16			17					
	pre	post 1	post 2	pre	post 1	post 2	pre	post 1	post 2	pre correct	pre incorrect	post 1 correct	post 1 incorrect	post 2 correct	post 2 incorrect
(1=correct, 2= incorrect)															
0	0	1	2	3	3	3			1	1	0	1	0	1	1
0	0	1		1	1				1	1	0	1	1		
1	1	2	2	2	2	1		1	1	1	0	1	0	1	1
1	1	2	2	3	3	2		1	1	1	1	1	2	1	1
2	2	1	1	2	2	1	1	1	1	1	0	1	0	1	0
1	1	2	1	2	1	2	1	1	1	1	0	1	0	1	
1	1	2		1	1		1	1	1	0	0	1	0	1	
0	0	0		1	1		1	1	1	1	1	0	1	1	0
2	2	2	1	2	2		1	1	1	0	1	1	1	1	0
0	0	1	2	3			3			0	0	1	0	1	
0	0	1	0	1			1	1		1	0	1	0	1	
0	0	1		3	1		3	1		0	0	1	0	1	0
1	1	1	1	3	2	1	1	1	1	1	1	1	1	1	0
2	2	1	1	2	3	2	1	1	1	1	0	1	0	1	0
1	1	1		2	1		1	1		1	0	1	0	1	0
1	1	1	1	1	1		1	1	1	1	0	1	0	1	
1	1	1	1	1	1	1	1	1	1	0	0	1	0	1	1
1	1	1		3			3			0	0	1	0	1	0
0	0	1	2	1	1		1	1		1	0	1	0	0	0
2	2	1	1	2	2	1	1	1	1	0	0	1	0	1	0
1	1	1		1	1	1	1	1	1	1	0	1	1	1	1
1	1	1		1	1		1	1		0	0	1	0	1	0
1	1	1		1	1		1	1		1	1	1	1	0	0
1	1	1		1	1		1	1		1	0	1	0	1	1

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	18						19			20			21		
	pre correct	pre incorrect	post 1 correct	post 1 incorrect	post 2 correct	post 2 incorrect	pre 1=correct 2=incorrect	post 1 1=correct 2=incorrect	post 2	pre 1=correct 2=incorrect	post 1 2=incorrect	post 2	pre	post 1	post 2
	2	1	1	2	2	0	1	1	1	2	1		2		1
	0	1	1	1			1	1	1	2	1	1	2	1	
	1	0	0	2	2	0	1	1	1	2	1	1	1	1	
	1	0	0	1	2	0	1	1	1	2	1	1	2	1	
	1	0	0	0	2		1	2	2	2	2	2	1		
	1	0	0	2	1	0	2	1	1	1	1		1	1	1
	1	0	0	0		0	1	1	1	2	2	1	1	1	
	1	0	0	2			2	2	2	2	2		2	2	
	0	0	0	0	2	0	1	1	1	2	1		2	1	
	2	0	0	2	2	0	2	1	1	2	1	1	1	1	
	0	0	0	2		0	2	1	1	1	1	1	1		
	0	0	1	0	1	0	2	1	1	2	2	2	1	1	
	0	1	0	0		0	2	2	2	1	1	1	1	2	1
	0	0	0	2	1	0	1	1	1	1	2		1	1	
	1	0	0	2			2	2	2	2	1	1	2	1	1
	0	0	0	2	2	0	1	1	1	1	1	1	2	1	1
	1	0	1	2	2		1	1	1	2	2	2	1	1	1
	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	0	0	0	2	2	0	2	2	2	2	1	2	2	1	
	2	0	0	2	2	0	2	1	1	2	1	1	1	1	1
	2	0	0	2	1		2	1	1	2	1	1	1	1	1
	1	1	1	2			2	2	2	2	1	1	1	1	1

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Table (rotated). Column groups for questions 22, 23, 24 and 25, each with pre/post measurements.

	22						23					24						25			
	pre correct	pre incorrect	post 1 correct	post 1 incorrect	post 2 correct	post 2 incorrect	pre a,b,c=1,2,3	post 1	post 1	post 2	post 2	pre correct	pre incorrect	post 1 correct	post 1 incorrect	post 2 correct	post 2 incorrect	pre a,b,c=123	post 1	post 1	post 2
	1	4	1	4	1	6		6	3	3		1	0	1	0	1	0		5	5	1
	0	3	1	4	1			6	3			1	0	1	2	1			2	2	
	1	3	1	5	1	4		6	3	3		1	0	1	1	1	0		1	1	1
	1	4	1	5	1	3		6	6	6		1	0	1	0	1	0		5	5	1
	1	4	1	5	1	6		1	3	3		1	0	1	0	1	3		1	1	2
	1	6	1	6	1			1	3			1	0	1	0				1	1	
	1	5	1	4	1	5		6	3	6		1	2	1	2	1	2		2	2	2
	1	4	1	4				6	3			1	2	1	2	1			2	2	
	0	1	0	1				3	3			1	0	1	0	1			1	1	
	1	6	0	4				6	3			1	2	1	0	1			1	1	
	0	3	1	3	1	4		6	3	3		1	0	1	0	1	0		1	2	3
	0	0	0	4	1	4		6	3	3		0	1	1	0	1	1		2	2	1
	0	2	0	2	1	5		3	3	3		1	0	1	0	1			2	2	2
	1	3	1	2	1	5		3	3	3		1	0	1	0	1	0		2	2	2
	1	4	1	3	1	6		2	3	3		1	0	1	0	1			2	2	
	1	5	1	3				3	3			1	1	1	1	1	0		3	3	2
	1	6	1	6	1	6		6	3			1	2	1	2				1	1	
	1	3	1	3	1	6		6	3	3		1	0	1	0	1	0		2	2	2
	1	3	1	2	1	5		3	3	3		1	1	1	0	1			2	2	2
	1	5	1	3	1	6		3	3	3		1	1	1	1	1	0		4	4	1
	1	5	1	5	1	5		2	3			0	0	1	0				1	1	1
	1	6	1	6	1	5		3	3			1	1	1	0	1			2	2	2
	1	5	1	5	1	6		3	3			1	1	1	1	1			2	2	2
	1	4	1	3				1	3	3		0	0	1	0	1			1	1	2
	1	4	1	4	1	5		2	3	3		1	1	1	1	1	0		1	1	1
	1	4	1	5	1	6		6	6	6		1	2	1	0	1	0		5	5	1
	1	4	1	5	1	6		3	3	3		1	0	1	0	1	0		1	1	1
	1	2	1	4				1	3			1	0	1	0	1			1	1	1

Post 2 questionaires not returned

Question	1			2			3			4		
PA	pre	post 1	post 2	pre	post 1	post 2	pre	post 1	post 2	pre	post 1	post 2
Eg						DEMOGRAPHICS OF GROUP						
1	2	2	2	2	2	2	2	2	2	6	6	6
2	2	2	2	2	2	2	2	2	2	6	6	6
3	2	2	2	2	2	2	1	1	1	5	5	5
4	2	2	2	2	2		1	1	1	5	5	5
5	1	1	1	2	2		1	1	1	6	6	6
6	1	1		3	3		2	2	2	4	4	4
7	1			2	2		2	2		5	5	
8	2	2	2	2	2	2	3	3	3	5	5	5
9	2	2		2	2		2	2	2	5	5	
10	2	2	2	4	4	4	3	3	3	3	3	4
11	1	1		4	4		2	2	2	1	1	1
12	2	2		1	1		1	1	1	5	5	5

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	5			6			7			8		
	pre	post 1	post 2	pre	post 1	post 2	pre	post 1	post 2	pre	post 1	post 2

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	9			10						11					
pre	post 1	post 2	pre correct	pre incorrect	post 1 correct	post 1 incorrect	post 2 correct	post 2 incorrect	pre correct	pre incorrect	post 1 correct	post 1 incorrect	post 2 correct	post 2 incorrect
1	1	1	4	0	7	0	9	0	1	0	1	1	2	2
1	1	1	3	0	8	0			1	0	0	1		
1	1	1	6	0	9	0	5	0	0	1	1	1	1	0
1	1	1	2	0	9	0	8	0	1	0	1	0	0	0
1	1	1	8	0	9	0	7	0	1	1	2	1	2	1
1	1	1	7	0	8	0	7	0	2	1	2	0	1	0
1	1	1	4	0	9	0			1	1	2	0		
1	1	1	4	0	9	0	7	0	0	1	2	0	0	0
1	1	1	8	0	8	0			0	0	1	1	2	0
1	1	1	6	0	7	0	7	0	2	0	2	0		
1	1	1	5	0	7	0	7	0	2	0	2	1	2	0
1	1	1	4	0	5	0	6	0	1	0	0	0	1	0

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12						13						14a		
pre correct	pre incorrect	post 1 correct	post 1 incorrect	post 2 correct	post 2 incorrect	pre correct	pre incorrect	post 1 correct	post 1 incorrect	post 2 correct	post 2 incorrect	pre 1,2,3	post 1	post 2
1	0	1	1	1	1	6	4	9	0	6	2	2	1	2
0	1	0	1			3	1	5	4			1	1	
0	0	1	0		0	0	0	9	0			2	1	
1	1	1	1	1	0	2	2	3	6	4	6	2	2	2
1	1	1	0		0	7	3	9	1	4	4	1	1	1
0	2	1	0		1	6	3	8	1	7	3	1	1	1
1	1	1	0	1	0	7	3	8	0	7	3	1	1	1
0	1	0	0	1		1	2	7	2			2	1	
1	0	1	0		0	5	3	8	0	7	1	2	1	1
0	1	1	2	1	1	3	2	6	0	5	0	3	1	1
1	1	1	0	1	0	2	2	1	3	1	2	1	3	1

	14b			15			16			17					
	pre	post 1	post 2	pre	post 1	post 2	pre	post 1	post 2	pre correct	pre incorrect	post 1 correct	post 1 incorrect	post 2 correct	post 2 incorrect
(1=correct, 2= incorrect)															
	0	1	1	1	1	1	1	1	1	1	0	1	0	1	0
	2	2	2	2	2		1	1	1	1	0	1	0		
	0	1	1	1	1	1	1	1	1	1	0	1	0		0
	0	0	0	2	2	1	1	1	1	1	2	1	0	1	0
	1	1	1	1	1	1	3	1	1	1	0	1	1	1	0
	1	1	1	3	1		1	1	1	1	1	1	1		
	1	1	1	1	1	1	1	1	1	1	2	1	0		
	0	0	1	3	3	1	1	1	1	1	0	1	0	1	0
	0	1	1	1	1		1	1	1	1	0	1	0		
	0	1	1	2	2	1	1	1	1	1	0	1	1	1	0
	1	1	1	3	1		3	1	1	1	0	1	0	1	0
	2	0	1	1	1								1		0

18						19			20			21		
pre		post 1		post 2		pre	post 1	post 2	pre	post 1	post 2	pre	post 1	post 2
correct	incorrect	correct	incorrect	correct	incorrect	1=correct 2= incorrect	2= incorrect		1=correct 2=incorrect					
0	0	0	1	1	0	2	1	1	2	2	0	2	1	0
0	0	2	0	2		0	1	1	2	2	1	1	1	
1	0	2	0	2		2	1	1	1	1		2	1	
2	0	2	0	2	0	2	2	1	1	1	1	2	1	1
2	0	2	0	2	0	1	1		1	1	2	2	1	1
2	0	2	0	2	0	1	1	1	2	1	1	2	1	1
1	1	2	0	2		1	0	0	2	1	0	2	2	1
0	1	0	0		0	1	2	1	2	1	1	1	1	1
2	0	2	0	2	0	1	1	0	1	1	1	1	1	1
0	1	1	0			2	2	0	2	2	2	1	1	1
0	0	0	0											

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	22						23			24						25		
	pre correct	pre incorrect	post 1 correct	post 1 incorrect	post 2 correct	post 2 incorrect	pre a,b,c=1,2,3	post 1	post 2	pre correct	pre incorrect	post 1 correct	post 1 incorrect	post 2 correct	post 2 incorrect	pre a,b,c=123	post 1	post 2
	0	1	1	0	5	0	3	3	3	0	1	1	1	0	0	1	1	1
	0	3	0	1	1		3	3		0	1	1	0			1	1	1
	1	4	1	5	5		6	3		0	0	1	0			1	1	1
	1	2	1	2	2	1	3	3	3	0	1	1	0	0	2	2	2	1
	1	2	1	4	3	1	6	3	3	1	0	1	0	1	1	1	2	1
	1	6	1	5	6	1	3	3	1	0	3	1	1	1	1	5	5	1
	1	5	1	2	5	1	6	3	6	1	0	1	0	1	1	5	1	1
	1	2	1	1	2	1	3	3	3	1	3	1	0	0	0	1	1	2
	1	3	0	2	2	1	3	3	3	0	0	1	1	1	0	2	2	2
	1	4	0	6	6	1	3	3	3	1	0	1	1	1	1	2	2	2
	0	2	0	3	3	1	3	3	3	0	0	1	1	1	0	1	3	1
		3	0	4	3		3	3				1	1	1	1	1	1	1

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